Code No.	V – 2341

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2025

CSS

CHEMISTRY/CHEMISTRY WITH SPECIALIZATION IN RENEWABLE ENERGY/CHEMISTRY WITH SPECIALIZATION IN FUNCTIONAL MATERIALS

For office use only

General Instructions

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be (✓) 'tick marked' **only** in the "**Response Sheet**" provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

Time : 2 Hours **Max. Marks : 100**

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

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Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. When one litre of water is cooled from 4°C to 0°C, its volume ————————.
   A. increases
   B. decreases
   C. remains the same
   D. first decrease and then increases

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2. Vermillion is ————————.

   A. mercury acetate
   B. mercury sulfide
   C. mercury nitrate
   D. mercury chloride

3. ———————— joins the two halves of an electrochemical cell.

   A. Calomel electrode
   B. Reference electrode
   C. Salt bridge
   D. Hydrogen electrode

4. In an electrochemical cell, the electrode at which the reduction takes place is called ————————.

   A. over voltage
   B. anode
   C. electrolyte
   D. cathode

5. An increase in the conductivity equivalent of a solid electrolyte with dilution is primarily due to ————————.

A. 100 percent electrolyte ionisation with natural dilution

B. an increase in both ion numbers and ionic mobility

C. increased ionic mobility of ions

D. a rise in ion counts

6. When three of the phases of a two component system are simultaneously in equilibrium, the number of degrees of freedom is ————————.

A. zero B. one

C. two D. three

7. The temperature of an object increases slowly, then the energy of that object ————————.

A. increases slowly B. decreases quickly

C. increases quickly D. decreases slowly

8. The ———————— law of thermodynamics states that no process is possible whose sole result is the transfer of heat from a colder to a hotter object.

A. Zeroth B. First

C. Second D. Third

9. Frenkel defect is shown by ————————.

A. sodium chloride B. silver nitrate

C. silver bromide D. diamond

10. What does the "θ" represents in Bragg's Law?

A. The angle of incidence of X-rays

B. The angle of reflection of X-rays

C. The angle of diffraction of X-rays

D. The angle of refraction of X-rays

11. A reaction's rate constant is determined by ————————.

A. extent of the reaction

B. temperature of the reaction

C. initial concentration of the reactants

D. the time of completion of reaction

12. For a given rate, the unit of rate and the rate constant are the same for ———————— reaction.

A. zero order

B. first order

C. second order

D. third order

13. ———————— act as a is a poison catalyst (inhibitor) for a reaction.

A. Potassium nitrate

B. Aluminum nitrate

C. Aluminum oxide

D. Chlorine

14. ———————— Law specifically governs the relative lowering of vapour pressure in solutions.

A. Vant Hoff's

B. Raoult's

C. Boyle's

D. Charles's

15. Bronze is an alloy consisting of ————————.

A. Copper and Tin

B. Copper and Zinc

C. Copper and Nickel

D. Copper and Aluminum

16. Because of adsorption surface energy ————————.

A. decreases

B. increases

C. becomes zero

D. increases first and then decreases

17. What is the substance that is adsorbed called?

A. Absorsent

B. Adsorbate

C. Adsorbent

D. Absorbite

18. What is the unit of Specific Heat Capacity?

A. Joule / (grams. K)
B. Joule / kg
C. Joule / (mole. K)
D. Joule / K

19. Vision is initiated by a photochemical reaction of ————————.

A. Enzymes
B. Hydrogen chloride
C. Mercapton
D. Rhodopsin

20. Boric acid is an acid because its molecule ————————.

A. contains replaceable H^+ ion
B. gives up a proton
C. accepts OH^- from water releasing proton
D. combines with proton from water molecule

21. A base, as defined by Bronsted theory, is a substance which can ————————.

A. gain a pair of electrons
B. lose a pair of electrons
C. donate protons
D. accept protons

22. Liquid hydrocarbon is converted into gaseous hydrocarbon by ————————.

A. Distillation
B. Hydrolysis
C. Oxidation
D. Cracking

23. An organic compound A reacts with sodium metal and forms B. On heating with conc.H_2SO_4, A gives diethyl ether. What are A and B?

A. C_3H_7OH and CH_3ONa
B. C_4H_9OH and C_4H_9ONa
C. CH_3OH and CH_3ONa
D. C_2H_5OH and C_2H_5ONa

24. ———————— is used to depress the Central nervous system.

A. Iodoform
B. Freon
C. Chloroform
D. Nitrobenzene

25. The displacement of electrons in a multiple bond in the presence of attacking reagent is called ————————.

A. Inductive effect
B. Electromeric effect
C. Hyper conjugation
D. Resonance

26. Which one of the following conformations of cyclohexane is chiral?

A. Chair
B. Boat
C. Twist boat
D. Rigid

27. In the Dumas method, the nitrogen present in organic compound gets converted to ————————.

A. Sodium Cyanide
B. Dinitrogen Gas
C. Gaseous Ammonia
D. Ammonium Sulphate

28. Paper chromatography is an example of ———————— chromatography.

A. partition chromatography
B. thin layer
C. column
D. adsorption

29. The oxidation of toluene to benzaldehyde by chromyl chloride is called ————————.

A. Swern oxidation
B. Etard reaction
C. Oppenauer oxidation
D. Baeyer-Villiger Oxidation

30. The catalyst used in Rosenmund's reduction is ————————.

A. anhydrous $AlCl_3$
B. $HgSO_4$
C. anhydrous $ZnCl_2$
D. $Pd/BaSO_4$

31. When acetaldehyde is heated with Fehling's solution it gives a precipitate of ————————.

A. Cu
B. CuO
C. Cu_2O
D. $Cu(OH)_2$

32. Amine that cannot be prepared by Gabricl-phthalimide synthesis is ————.

A. methyl amine
B. benzyl amine
C. iso-butylamine
D. aniline

33. Reaction of aniline with benzaldehyde is ———————— reaction.

A. an elimination
B. an addition
C. a substitution
D. a condensation

34. Among the followings, ———————— does not undergo Cannizzarro's reaction.

A. 2, 2-dimethylpropanal
B. 2-methylpropanal
C. benzaldehyde
D. 4-methoxybenzaldehyde

35. The reagent used for the separation of acetaldehyde from acetophenone is ————————.

A. $C_6H_5NHNH_2$
B. NH_2OH
C. $NaHSO_3$
D. NaOH and I_2

36. ———————— reaction converts an aryl diazonium salt in to an aryl halide using Copper (II) halide.

A. Sandmeyers
B. Gattermann
C. Gattermann-Koch
D. Finkelatein

37. Esters can easily be identified using ———————— spectroscopy.

A. IR
B. UV-Visible
C. Proton NMR
D. Mass

38. Hydrogenation of oils and fats is carried out using ———————— catalyst.

A. Sn
B. Ni
C. Pb
D. Pt

39. Lucas reagent is a mixture of ————————.

A. concentrated nitric acid + hydrated $ZnCl_2$

B. concentrated hydrochloric acid + hydrated $ZnCl_2$

C. concentrated hydrochloric acid + anhydrous $ZnCl_2$

D. concentrated nitric acid + anhydrous $ZnCl_2$

40. A sweetener used in sugarless gums and candies is ————————.

A. Xylitol B. Ribitol

C. Mannitol D. Inositol

41. Nitration of pyrrole is best carried out using ————————.

A. ammonium nitrate

B. nitric acid

C. con. nitric and sulfuric acids

D. acetyl nitrate

42. Biuret test is used to find the presence of ————————.

A. fats B. oils

C. carbohydrates D. proteins

43. The saponification of a fat or oil is done using ———————— solution for hot process.

A. NaOH B. KOH

C. NaCl D. HCl

44. Lead nitrate on heating leaves a yellow residue. It is ————————.

A. PbO_2 B. PbO

C. $HPbO_3$ D. $Pb(OH)_2$

45. Polyacrylonitrile is also known as ————————.

A. Teflon B. Nylon

C. Orlon D. Buna-N

46. The catalyst used in the preparation of PTFE is ——————.

A. Persulphate
B. Peroxide
C. Ziegler – Natta
D. Alkyl mercaptan

47. Which of the following is used both acid-base and redox titrations?

A. Potassium hydroxide
B. Potassium dichromate
C. Oxalic acid
D. Acetic acid

48. Which of the following is a suitable redox indicator?

A. Methyl orange
B. Diphenylamine
C. Starch
D. Potassium ferricyanide

49. For the neutralization of 20 mL of 0.1 N solution of nitric acid, ————— mL of 0.2 N potassium hydroxide solution is required.

A. 10
B. 20
C. 40
D. 2

50. ————————— is a true buffer solution.

A. CH_3COONa and HCl
B. CH_3COONa and HCOOH
C. CH_3COONa and CH_3COOH
D. CH_3COONa and Na_2SO_4

51. AgCl precipitate is washed with a solution of ————————— to prevent peptization.

A. dilute sulfuric acid
B. dilute hydrochloric acid
C. silver nitrate solution
D. dilute nitric acid

52. A salt containing Ni^{2+} appears in ————————— colour.

A. yellow or white
B. green or blue
C. red or orange
D. pink or violet

53. ———————— ions give brick red colour to the flame.

A. Calcium
B. Strontium
C. Lithium
D. Potassium

54. ————————— ions forms a yellow precipitate with potassium chromate solution.

A. Lead
B. Ferric
C. Copper
D. Silver

55. In the test for nitrogen, the sodium fusion extract is acidified with ————————.

A. dilute sulfuric acid
B. concentrated sulfuric acid
C. dilute hydrochloric acid
D. concentrated hydrochloric acid

56. In the analysis of III group basic radicals of salts, the purpose of adding solid ammonium chloride to ammonium hydroxide solution is ————————.

A. to increase the concentration of OH^- ions
B. to suppress the dissociation of ammonium hydroxide
C. to introduce Cl^- ions
D. to increase the concentration of NH_4^+ ions

57. Complexometric titration is used for the determination of ————————.

A. halides
B. acids and bases
C. metal ions
D. oxides

58. Liquid ammonia is an example of a ————————.

A. amphoteric solvent
B. amphiprotic solvent
C. protogenic solvent
D. protophillic solvent

59. Raman frequencies are in the ———————— region.

A. ultra violet
B. infra red
C. microwave
D. visible

60. The titration in which voltage or potential of the titration mixture is measured with the help of redox electrode is ———————— titration.

A. potentiometric
B. conductometric
C. precipitation
D. complexometric

61. The equivalent weight of an acid can be calculated by ————————.

A. Molecular weight × basicity
B. Molecular weight / basicity
C. Molecular weight × acidity
D. Molecular weight / acidity

62. An aromatic compound containing chlorine, when heated with alcoholic silver nitrate, gives a white precipitate. The compound is ————————.

A. chlorobenzene
B. 1, 2-dichlorobenzene
C. benzyl chloride
D. 1, 3-dichlorobenzene

63. 2, 4-dinitrophenyl hydrazine is known as ————————.

A. Schiff's reagent
B. Tollen's reagent
C. Barfoed's reagent
D. Borsche's reagent

64. Mulliken and Barker's test is given by ————————.

A. o-aminotoluene
B. p-nitro toluene
C. p-bromo acetanilide
D. benzamide

65. Atomic Theory was first proposed by ————————.

A. J.J. Thomson
B. Neils Bohr
C. Rutherford
D. John Dalton

66. The line spectrum observed when electrons fall from higher quantum levels into L level is referred to as ———————— series.

A. Brackett
B. Lyman
C. Paschen
D. Balmer

67. The ———————— states that the velocity and position of an object cannot be measured precisely or simultaneously.

A. Heisenberg uncertainty principle

B. Hund's rule

C. Pauli's exclusion principle

D. Aufbau Principle

68. The particle nature of light is evident from the phenomenon of ————————.

A. Compton Effect

B. Reflection

C. Diffraction

D. Polarization

69. According to the Fajans' rule, polarization is high with ————————.

A. small cation and small anion

B. large cation and large anion

C. small cation and large anion

D. large cation and small anion

70. Atoms obtain octet configuration when linked with other atoms. This is said by ————————.

A. Lewis

B. Kossel

C. Langmuir

D. Sidgwick

71. How many periods and groups are present in the modern periodic table?

A. 8 periods and 17 groups

B. 7 periods and 17 groups

C. 7 periods and 18 groups

D. 8 periods and 18 groups

72. What happens to an element's electropositive nature as it moves from the left to the right in a periodic table?

A. Increases

B. Decreases

C. Increases first, then decreases

D. Decreases first, then increases

73. What is the most efficient method to get water with zero degrees hardness?

A. By Electrolysis
B. Use of synthetic resins
C. By Calgon process
D. By Permutit process

74. What catalyst is usually used in the laboratory to speed up oxygen production?

A. Vanadium (V) oxide
B. Copper (II) oxide
C. Manganese (IV) oxide
D. Titanium (IV) oxide

75. Oxygen is not evolved when ozone reacts with ————————.

A. sulfur dioxide
B. potassium iodide
C. hydrogen peroxide
D. mercury

76. The borax bead test can be used to detect the presence of ————————.

A. Potassium
B. Iron
C. Aluminum
D. Sodium

77. When glass is treated with hydrofluoric acid ———————— is produced.

A. $HSiF_5$
B. NaF
C. SiF_4
D. H_2SiF_6

78. When concentrated hydrochloric acid is mixed with concentrated nitric acid, the species produced are ————————, ————————, ————————.

A. NOCl, Cl_2 and H_2O
B. NO, Cl_2 and H_2O
C. NO_2, Cl_2 and H_2O
D. HNO, HOCl and H_2O

79. The rare gas having the least ionization potential is ————————.

A. He
B. Rn
C. Ne
D. Ar

80. Lithium carbonate on heating gives ————————.

A. LiO and CO
B. Li, O_2 and CO
C. Li_2O and CO_2
D. Li and CO_2

81. The processes of concentrating Au and Ag ores is based on their solubility in ————————.

A. concentrated nitric acid
B. counteracted hydrochloric acid
C. potassium cyanide
D. sodium hydroxide

82. Zn dissolves in an excess of NaOH because of the formation of ————————.

A. Na_2ZnO_2
B. ZnO
C. $Zn(OH)_2$
D. $NaZn(OH)_3$

83. A common ore of titanium is ————————.

A. carnolite
B. Ilmenite
C. pyrolusite
D. monozite

84. Lanthanide contraction is caused by the ———————— of the $4f$ electrons.

A. poor shielding effect
B. change in ionization energy
C. size difference
D. radioactive property

85. Ethylenediaminetetraacetic acid is a ———————— ligand.

A. bidentate
B. tridentate
C. tetradentate
D. hexadentate

86. Metal-co-ordination theory was proposed by ————————.

A. Schrodinger
B. August Hoffmann
C. Alfred Werner
D. Albert Werner

87. The geometrical shape of $K_4[Ni(CN)_4)$ is ————————.

A. Octahedral
B. Square planar
C. Trigonal pyramidal
D. Tetrahedral

88. The undesirable substances present in the ore are called ————————.

A. mineral
B. waste
C. gangue
D. slag

89. Zone refining is used to produce very pure ————————.

A. silicon
B. zinc
C. sodium
D. copper

90. Two monosaccharides are joined together in disaccharide by ———————— linkage.

A. peptide
B. glycosidic
C. phosphodiester
D. disulphide

91. Half-life of a radioactive element X is 3 hrs. It transforms to form a stable element Y. After the birth of X; at time t, the ratio of the nuclei of X and Y is 1 : 15, what is the value of t?

A. 6 hrs
B. 12 hrs
C. 24 hrs
D. 48 hrs

92. The maximum energy of electrons, obtained by β-decay, is known as ————————.

A. zero-point energy
B. fermi energy
C. radiation energy
D. end-point energy

93. In atom bomb, the energy is obtained due to ————————.

A. thermonuclear reaction
B. chemical reaction
C. controlled fission
D. uncontrolled fission

94. The amino acid sequence of a protein is known as ————————.

A. primary structure
B. secondary structure
C. tertiary structure
D. quaternary structure

95. The water solubility of a dye can be increased by introducing ————————.

A. C_2H_5 group
B. COOH group
C. phenyl group
D. amino group

96. Pyridine undergoes nucleophilic substitution with $NaNH_2$ at 100°C to form ————————.

A. 2-aminopyridine
B. 3-aminopyridine
C. 4-aminopyridine
D. 2, 4-diaminopyridine

97. A deficiency of thiamin is known to cause ————————.

A. Scurvy
B. Pellagra
C. Beribery
D. Anemia

98. Riboflavin is also known as ————————.

A. Vitamin B_1
B. Vitamin B_2
C. Vitamin B_{12}
D. Vitamin C

99. A conductance cell is platinized to ————————.

A. avoid temperature effects
B. prolong its service
C. avoid capacitance of the cell
D. avoid polarization effects

100. ———————— is widely recognized as the "Father of Chemistry".

A. Antoine Lavoisier
B. Robert Boyle
C. Dmitri Ivanovich Mendeleev
D. John Dalton

————————

RESPONSE SHEET

1	A	B	C	D	E	26	A	B	C	D	E	51	A	B	C	D	E	76	A	B	C	D	E
2	A	B	C	D	E	27	A	B	C	D	E	52	A	B	C	D	E	77	A	B	C	D	E
3	A	B	C	D	E	28	A	B	C	D	E	53	A	B	C	D	E	78	A	B	C	D	E
4	A	B	C	D	E	29	A	B	C	D	E	54	A	B	C	D	E	79	A	B	C	D	E
5	A	B	C	D	E	30	A	B	C	D	E	55	A	B	C	D	E	80	A	B	C	D	E
6	A	B	C	D	E	31	A	B	C	D	E	56	A	B	C	D	E	81	A	B	C	D	E
7	A	B	C	D	E	32	A	B	C	D	E	57	A	B	C	D	E	82	A	B	C	D	E
8	A	B	C	D	E	33	A	B	C	D	E	58	A	B	C	D	E	83	A	B	C	D	E
9	A	B	C	D	E	34	A	B	C	D	E	59	A	B	C	D	E	84	A	B	C	D	E
10	A	B	C	D	E	35	A	B	C	D	E	60	A	B	C	D	E	85	A	B	C	D	E
11	A	B	C	D	E	36	A	B	C	D	E	61	A	B	C	D	E	86	A	B	C	D	E
12	A	B	C	D	E	37	A	B	C	D	E	62	A	B	C	D	E	87	A	B	C	D	E
13	A	B	C	D	E	38	A	B	C	D	E	63	A	B	C	D	E	88	A	B	C	D	E
14	A	B	C	D	E	39	A	B	C	D	E	64	A	B	C	D	E	89	A	B	C	D	E
15	A	B	C	D	E	40	A	B	C	D	E	65	A	B	C	D	E	90	A	B	C	D	E
16	A	B	C	D	E	41	A	B	C	D	E	66	A	B	C	D	E	91	A	B	C	D	E
17	A	B	C	D	E	42	A	B	C	D	E	67	A	B	C	D	E	92	A	B	C	D	E
18	A	B	C	D	E	43	A	B	C	D	E	68	A	B	C	D	E	93	A	B	C	D	E
19	A	B	C	D	E	44	A	B	C	D	E	69	A	B	C	D	E	94	A	B	C	D	E
20	A	B	C	D	E	45	A	B	C	D	E	70	A	B	C	D	E	95	A	B	C	D	E
21	A	B	C	D	E	46	A	B	C	D	E	71	A	B	C	D	E	96	A	B	C	D	E
22	A	B	C	D	E	47	A	B	C	D	E	72	A	B	C	D	E	97	A	B	C	D	E
23	A	B	C	D	E	48	A	B	C	D	E	73	A	B	C	D	E	98	A	B	C	D	E
24	A	B	C	D	E	49	A	B	C	D	E	74	A	B	C	D	E	99	A	B	C	D	E
25	A	B	C	D	E	50	A	B	C	D	E	75	A	B	C	D	E	100	A	B	C	D	E

ROUGH WORK

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