Roll No.----------

Paper Code		
6	4	3

(To be filled in the OMR Sheet)

प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No. | | | | | | | | |

प्रश्नपुस्तिका सीरीज
Question Booklet Series
A

B.Sc. (Biotechnology) First Semester, Examination, February/March-2022
BBT-1001
Chemistry-I

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

643

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

1. For conversion $C_{(graphite)} \rightarrow\rightarrow C_{(diamond)}$ the $\Delta S$is :

(A) Zero

(B) Positive

(C) Negative

(D) Unknown

2. Consider the following diagram for a reaction :

$$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)} + 393.5\ kJ$$

The nature of the reaction is :

(A) Exothermic

(B) Endothermic

(C) Reaction at equilibrium

(D) None of the above

3. A necessary condition for adiabatic change is :

(A) $\Delta T = 0$

(B) $\Delta P = 0$

(C) $q = 0$

(D) $w = 0$

4. Which one of the following statements is false ?

(A) Temperature is a state function

(B) Work is a state function

(C) Change in the state is completely defined when the initial and final states are specified

(D) Work appears at the boundary of the system

5. Which among the following is not a state function ?

(A) Internal energy

(B) Free energy

(C) Work

(D) Enthalpy

6. In an adiabatic process, no transfer of heat takes place between system and surroundings. The correct option for free expansion of an ideal gas under adiabatic condition from the following is :

(A) $q = 0, \Delta T \neq 0, W = 0$ $q = 0, \Delta T \neq 0, W = 0$

(B) $q \neq 0, \Delta T = 0, W = 0$ $q \neq 0, \Delta T = 0, W = 0$

(C) $q = 0, \Delta T = 0, W = 0$ $q = 0, \Delta T = 0, W = 0$

(D) $q = 0, \Delta T = 0, W \neq 0$ $q = 0, \Delta T = 0, W \neq 0$

7. The enthalpies of formation of all elements in their standard states is :

(A) Unity

(B) Zero

(C) Less than zero

(D) Different for each element

8. Thermodynamics is not concerned about :

(A) Energy changes involved in a chemical reaction

(B) The extent to which a chemical reaction proceeds

(C) The rate at which a reaction proceeds

(D) The feasibility of chemical reaction

9. The variations in enthalpy that cannot be detected per calorimeter can be detected with the aid of :

(A) Newton's law

(B) Hess's law

(C) Krebs law

(D) Ohm's law

10. The energy required to brake a given covalent bond is :

(A) Bond energy

(B) Bond enthalpy

(C) Bond dissociation energy

(D) All of above

11. Changes in enthalpy in an exothermic reaction is :

(A) Positive

(B) Negative

(C) Constant

(D) Neutral

12. The first law of thermodynamics states that energy cannot be :

(A) Created only

(B) Destroyed only

(C) Converted

(D) Created and destroyed

13. Hess's law states that a chemical reaction is independent of the route by which chemical reactions take place while keeping the same :

(A) Initial conditions only

(B) Final conditions only

(C) Mid-conditions

(D) Initial and final condition

14. The standard enthalpy change of neutralization involves the reaction of an acid with an alkali to form 1 mol of :

(A) Water

(B) Oxygen

(C) Nitrogen

(D) Anhydrous salt

15. The change in the energy between a chemical reaction and the surroundings at constant temperature is called :

(A) Enthalpy change

(B) Enthalpy

(C) Enthalpy profile

(D) Dynamic enthalpy

16. To initiate a reaction the minimum energy which is required to break bonds is called :

(A) Bond energy

(B) Activation energy

(C) Breaking energy

(D) Ionization energy

17. The standard condition for enthalpy changes are :

(A) The pressure of 100 kPa

(B) Temperature 298K

(C) Normal physical state

(D) All of above

18. The application of law of thermodynamics to the enthalpy change was done by :

(A) Newton

(B) Hess's

(C) Lewis

(D) Sophocles

19. In what manner will increase of pressure affect the following equation:

$$C(s) + H_2O \rightarrow CO(g) + H_2(g)$$

(A) Shift in the reverse direction

(B) Shift in the forward direction

(C) Increase in the yield of hydrogen

(D) No effect

20. The equilibrium between water and its vapor in an open vessel :

(A) Can be achieved

(B) Depends upon pressure

(C) Cannot be achieved

(D) Depends upon temperature

21. When a catalyst is added to a reversible reaction in equilibrium state the value of the equilibrium constant :

(A) Increases

(B) Decreases

(C) Does not change

(D) Becomes zero

22. A vessel at equilibrium contains SO_3, SO_2 and O_2 now some helium gas is added so that total pressure increases while temperature and volume remain constant. According to Le Chatelier Principle the dissociation of$SO_3{}^{2-}$:

(A) Decreases

(B) Remain constant

(C) Increases

(D) Change unpredictably

23. The chemical equilibrium of a reversible reaction is not influenced by :

(A) Temperature

(B) Pressure

(C) Catalyst

(D) Concentration

24. Le Chatelier Principle is applicable to :

(A) Heterogeneous reaction

(B) Homogeneous reaction

(C) Irreversible reaction

(D) System in equilibrium

25. The equilibrium constant of a reaction is 300. If the volume of reaction flask is tripled the equilibrium constant is :

(A) 300

(B) 600

(C) 900

(D) 100

26. For a reversible reaction the concentration of the reactants is doubled, then the equilibrium constant :

(A) Becomes one-fourth

(B) Is doubled

(C) Is halved

(D) Remains the same

27. The role of a catalyst in a reversible reaction is to :

(A) Alter the equilibrium constant of the reaction

(B) Increase the rate of the forward reaction

(C) Allow the equilibrium to be achieved quickly

(D) Decrease the rate of backward reaction

28. In which of the following cases does the reaction go farthest to completion ?

(A) $K = 1$

(B) $K = 10$

(C) $K = 10^{-2}$

(D) $K = 10^{2}$

29. The solubility product expression for tin(II) hydroxide, $Sn(OH)_2$, is :

(A) $[Sn^{2+}][OH^{-}]$

(B) $[Sn^{2+}]^{2}[OH^{-}]$

(C) $[Sn^{2+}][OH^{-}]^{2}$

(D) $[Sn^{2+}]^{3}[OH^{-}]$

30. The solubility product expression for silver(I), sulfide, using x to represent the molar concentration of silver(I) and y to represent the molar concentration of sulfide, is formulated as :

(A) xy

(B) $x^{2}y$

(C) xy^{2}

(D) $x^{2}y^{2}$

31. Consider the following solubility data for various chromates at 25°C-

Salt	K_{sp}
Ag_2CrO_4	9.0×10^{-12}
$BaCrO_4$	2.0×10^{-10}
$PbCrO_4$	1.8×10^{-14}

The chromate that is the most soluble in water at 25°C on a molar basis is :

(A) Ag_2CrO_4

(B) $BaCrO_4$

(C) $PbCrO_4$

(D) None of these

32. The molar solubility of $PbBr_2$ is 2.17×10^{-3} M at a certain temperature. Calculate K_{sp} for $PbBr_2$:

(A) 6.2×10^{-6}

(B) 6.4×10^{-7}

(C) 4.1×10^{-8}

(D) 3.4×10^{-6}

33. The solubility of silver sulfate in water at 100°C is approximately 1.4 g per 100 ml. What is the solubility product of this salt at 100°C ?

(A) 5.7×10^{-8}

(B) 3.5×10^{-7}

(C) 8.3×10^{-6}

(D) 3.6×10^{-4}

34. Concept of entropy change is applicable for thermodynamic law :

(A) I-law

(B) II-law

(C) Both

(D) None

35. What is the molar solubility, s of $Ba_3(PO_4)_2$ in terms of K_{sp} ?

(A) $s = {K_{sp}}^{1/2}$

(B) $s = {K_{sp}}^{1/5}$

(C) $s = [K_{sp}/27]^{1/5}$

(D) $s = [K_{sp}/108]^{1/5}$

36. For $Cu(OH)_2, K_{sp} = 1.6 \times 10^{-19}$.What is the molar solubility of $Cu(OH)_2$?

(A) 3.4×10^{-7} M

(B) 6.4×10^{-7} M

(C) 2.7×10^{-11} M

(D) 5.1×10^{-10} M

37. Many lead salts are often used as pigments. If $PbSO_4$were used in an Unglazed ceramic bowl, how many milligrams of lead (II) could dissolve per liter of later ?

(A) 43

(B) 35

(C) 11

(D) 28

38. Ag_3PO_4 would be least soluble at 25℃ in :

(A) 0.1 M $AgNO_3$

(B) 0.1 M HNO_3

(C) Pure water

(D) 0.1 M Na_3PO_4

39. The molar solubility of $PbCl_2$in 0.20 M $Pb(NO_3)_2$ solution is :

(A) 1.7×10^{-4} M

(B) 9.2×10^{-3} M

(C) 1.7×10^{-5} M

(D) 4.6×10^{-3} M

40. When we mix together, from separate sources, the ions of a slightly soluble ionic salt, the salt will precipitate if Q_{sp}_____K_{sp}, and will continue to precipitate until Q_{sp}_____K_{sp}.

(A) Is greater than; equals

(B) Is less than; is greater than

(C) Is less than; equals

(D) Equals; is less than

41. SN_1 reaction is a _____ reaction.

(A) Unimolecular

(B) Bimolecular

(C) Trimolecular

(D) Zero

42. Which of the following pairs of compounds gives a precipitate when aqueous solutions of them are mixed ? Assume that the concentrations of all compounds are 1.0 M immediately after mixing :

(A) $CuBr_2 and K_2CO_3$

(B) HNO_3 and NH_4I

(C) $BaCl_2$ and $KClO_4$

(D) Na_2CO_3 and H_2SO_4

43. A swimming pool was sufficiently alkaline so that CO_2 absorded from the Air produced in the pool a solution which was 2×10^{-4} M in CO_3^{2-} M. if the pool water was originally 4×10^{-3} M in $Mg^{2+}, 6 \times 10^{-4}$ M inCa^{2+}and8×10^{-7} M in Fe^{2+}, then a precipitate should form of :

(A) Only $MgCO_3$

(B) Only $CaCO_3$

(C) Only $FeCO_3$

(D) Only $CaCO_3$ and $FeCO_3$

44. When equal volumes of the solutions indicated are mixed, precipitation should occur only for :

(A) 2×10^{-3} M $Mg^{2+} + 2 \times 10^{-3}$M OH^-

(B) 2×10^{-1} M $Ba^{2+} + 2 \times 10^{-3}$M F^-

(C) 2×10^{-3} M $Ca^{2+} + 2 \times 10^{-2}$M OH^-

(D) 2×10^{-3} M $Ca^{2+} + 2 \times 10^{-3}$M OH^-

45. At what pH will $Cu(OH)_2$ start to precipitate from a solution with $[Cu^{2+}] = 0.0015$ M?
(A) 9.0
(B) 8.0
(C) 6.0
(D) 9.4

46. What is the pH of a saturated solution of $Mg(OH)_2$?
(A) 3.5
(B) 10.1
(C) 10.9
(D) 10.5

47. Which solid will precipitate first if an aqueous solution of Na_2CrO_4 at 25°C is slowly added to an aqueous solution containing 0.001 M $Pb(NO_3)_2$ and 0.100 M $Ba(NO_3)_2$ at 25°C ?
(A) $BaCrO_4(s)$
(B) $NaNO_3(s)$
(C) $PbCrO_4(s)$
(D) $Pb(NO_3)_2(s)$

48. A solution is 0.0010 M in both Ag^+ and Au^+. Some solid NaCl is added slowly until the solid AgCl just begins to precipitate. What is the concentration of Au^+ ions at this point ? K_{sp} for $AgCl = 1.8 \times 10^{-10}$ and for $AuCl = 2.0 \times 10^{-13}$.
(A) 2.0×10^{-10} M
(B) 4.5×10^{-7} M
(C) 1.8×10^{-7} M
(D) 1.1×10^{-6} M

49. Which one of the following salts does not contain water of crystallization ?
(A) Blue vitriol
(B) Baking soda
(C) Washing soda
(D) Gypsum

50. What is formed when zinc reacts with sodium hydroxide ?
(A) Zinc hydroxide sodium
(B) Sodium zincate and hydrogen gas
(C) Sodium zinc-oxide and hydrogen gas
(D) Sodium zincate and water

51. SN_2 reaction is a _____reaction.

(A) Unimolecular

(B) Bimolecular

(C) Trimolecular

(D) Zero

52. The rate of hydrolysis reaction is faster for SN_1 reaction :

(A) Tertbutyl chloride

(B) Methyl chloride

(C) Ethyl chloride

(D) Isopropyl chloride

53. For the synthesis of tertbutyl methyl ether, alkyl halides & alkoxide are :

(A) $CH_3 - Cl \,\&(CH_3)_3C - ONa$

(B) $(CH_3)_3C - Cl \,\& \, CH_3 - ONa$

(C) $CH_3 - Cl \,\&(CH_3)_3C - Cl$

(D) $CH_3 - CH_2 - Cl \,\&(CH_3)_3C - ONa$

54. _____has the highest nucleophilic character.

(A) I^-

(B) F^-

(C) Cl^-

(D) Br^-

55. The wavelength range correspond to UV-Visible region :

(A) 100-200 nm

(B) 200-400 nm

(C) 400-800 nm

(D) 200-800 nm

56. Which functional group has the lowest CO stretching frequency :

(A) $-COOR$

(B) $-CONH_2$

(C) $-COCl$

(D) $-CHO$

57. The highest energy transition is :

(A) pi-pi*

(B) sigma-sigma*

(C) nonbonding-pi*

(D) nonbonding-sigma*

58. Which functional group has the highest CO stretching frequency :

(A) $-\mathrm{COOH}$

(B) $-\mathrm{CONH_2}$

(C) $-\mathrm{COCl}$

(D) $-\mathrm{CHO}$

59. The lowest energy transition is :

(A) pi-pi*

(B) sigma-sigma*

(C) nonbonding-pi*

(D) nonbonding-sigma*

60. Addition of bromine to an alkene is _____addition.

(A) $\mathrm{SN_2}\&\, TRANS$

(B) $\mathrm{SN_1}\&\, TRANS$

(C) $\mathrm{SN_2}\&\, CIS$

(D) $\mathrm{SN_1}\&\, CIS$

61. Emission without a change in spin multiplicity is called :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) Singlet state

62. The reagent used for nitration reaction is :

(A) $\mathrm{HNO_3}$

(B) $\mathrm{HCl} + \mathrm{HNO_3}$

(C) $\mathrm{H_2SO_4} + \mathrm{HNO_3}$

(D) $\mathrm{HNO_2}$

63. Sul phonation of benzene is a _____reaction.

(A) Elimination

(B) Electrophilic substitution

(C) Nucleophilic substitution

(D) Addition

64. The Lewis acid is used for Friedel craft reaction is :

(A) LiCl

(B) $FeCl_2$

(C) $AlCl_3$

(D) $MgCl_2$

65. The catalyst used for halogenations reaction is :

(A) Li

(B) Fe

(C) Al

(D) Mg

66. Which electrophile is generated in nitration reaction :

(A) NO+

(B) NO_2

(C) NO_2+

(D) HNO_3

67. The r/d step of SN1reaction is :

(A) Carbocation formation

(B) Back side attack

(C) Nucleophile attack

(D) Product formation

68. Stereochemistry of SN2 reaction is :

(A) Racemization

(B) Inversion

(C) Retention

(D) Mixture

69. Which carbocation is least stable :

(A) $(CH_3)_3C^+$

(B) $(CH_3)_2CH^+$

(C) $CH_3CH_2C^+$

(D) $CH_3{}^+$

70. For E_1 elimination reaction 1 stands for :

(A) One step

(B) First order

(C) One nucleophile

(D) One leaving group

71. Hydrogen bond _____ IR stretching frequency.

(A) Increases

(B) Decreases

(C) Remains same

(D) None of them

72. The transition involve in Fluorescence is :

(A) $S_0 - S_1$

(B) $S_1 - S_0$

(C) $S_1 - T_1$

(D) $T_1 - S_0$

73. The transition involve in ISC is :

(A) $V_0 - S_1$

(B) $V_1 - S_1$

(C) $S_1 - T_1$

(D) $T_1 - S_0$

74. Which of the following has highestλ_{max} for $n -> \sigma^*$ transition ?

(A) $R - OH$

(B) $R - SH$

(C) $R - NH_2$

(D) All

75. Beer Lambert's law gives the relation between which of the following ?

(A) Reflected radiation and concentration

(B) Scattered radiation and concentration

(C) Energy absorption and concentration

(D) Energy absorption and reflected radiation

76. Jablonski diagram is related with :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) All

77. If a reaction obeys Einstein law, quantum yield is _____.

(A) 0

(B) 1

(C) <1

(D) >1

78. Which of the following can make difference in optical isomers ?

(A) Heat

(B) Temperature

(C) Polarized light

(D) Pressure

79. According to perspective formula, the solid wedge indicates the group which is :

(A) Towards reader

(B) Away from reader

(C) In plane of paper

(D) None

80. The energy required to rotate n-butane molecule about the carbon-carbon bond I is called _____.

(A) Rotational energy

(B) Torsional energy

(C) Enantiomeric

(D) Potential energy

81. The potential energy of n-butane is minimum for _____.

(A) Skew conformations

(B) Staggered conformations

(C) Eclipsed conformations

(D) Gauche

82. In gauche conformations, the methyl groups are _____.

(A) 60° apart

(B) 90° apart

(C) 180° apart

(D) 360° apart

83. In R/S nomenclature R & S stands for :

(A) Rectus & Sigmastar

(B) Right & Sigmastar

(C) Rectus & Sinistar

(D) Right &Sinistar

84. The potential energy of cyclohexane is maximum for_____.

(A) Chair conformations

(B) Half chair conformations

(C) Boat conformations

(D) Twist-Boat conformations

85. To express the relationship between the number of molecules reacting with the number of photons absorbed, the concept is known as _____.

(A) Photon analysis

(B) Quantum efficiency

(C) Quantum mechanics

(D) Photo degradation

86. A photochemical reaction takes place by the absorption of :

(A) Infrared radiation

(B) UV-VIS radiation

(C) Heat energy

(D) None

87. On radiative process from the following is :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) All

88. Spin inversion of electron takes place in the following process :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) All

89. Spin multiplicity value for triplet state is :

(A) 0

(B) 1

(C) 2

(D) 3

90. The most stable conformation of ethylene glycol :

(A) Anti

(B) Gauche

(C) Fully eclipsed

(D) Partially eclipsed

91. Range of pH scale is :

(A) 7 to 10

(B) 0 to 10

(C) 0 to 14

(D) 7 to 14

92. Level of pH found in antacid solution :

(A) ≤ 6.5

(B) ≥ 7.0

(C) > 10

(D) > 14

93. Three unknown solutions are given with pH value of 6, 8 & 9.5 respectively. Which solution will contain the maximum OH-ion ?

(A) Solution sample-1

(B) Solution sample-2

(C) Solution sample-3

(D) Data are insufficient

94. pH of neutral salt is :

(A) 7

(B) < 7

(C) > 7

(D) 0

95. Ammonium sulphate salt is :

(A) Basic salt

(B) Acidic salt

(C) Neutral salt

(D) Complex salt

96. When sulphuric acid reacts with eggshell it produces :

(A) Hydrogen gas

(B) Nitrogen gas

(C) Carbon monoxide

(D) Carbon dioxide gas

97. In the Chlor-alkali process, the byproduct gases are :

(A) Hydrogen only

(B) Hydrogen and oxygen gas

(C) Hydrogen and chlorine gas

(D) Chlorine and nitrogen gas

98. The following salt is not hygroscopic in nature :

(A) $NaCl$

(B) $MgCl$

(C) $CaCl_2$

(D) KCl

99. When more and more water is diluted with acids its H^+ion concentration will :

(A) Increase

(B) Decrease

(C) Remains the same

(D) Depends on the type of acids

100. When acids react with metal oxide it produces :

(A) Water and salt

(B) Salts and hydrogen gas

(C) Salts only

(D) No reaction takes place

******

Rough Work / रफ कार्य

Rough Work / रफ कार्य

DO NOT OPEN THE QUESTION BOOKLET UNTIL ASKED TO DO SO

1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
3. Every question has same marks. Every question you attempt correctly, marks will be given according to that.
4. Every answer should be marked only on Answer Booklet **(O.M.R ANSWER SHEET).**Answer marked anywhere else other than the determined place will not be considered valid.
5. Please read all the instructions carefully before attempting anything on Answer Booklet**(O.M.R ANSWER SHEET).**
6. After completion of examination please hand over the Answer Booklet **(O.M.R ANSWER SHEET)** to the Examiner before leaving the examination room.
7. There is no negative marking.

Note: On opening the question booklet, first check that all the pages of the question booklet are printed properly in case there is an issue please ask the examiner to change the booklet of same series and get another one.