Scientific Asstt. (chemical) - 2019

SAC/19

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE ASKED TO DO SO.

2020

TEST BOOKLET

TEST BOOKLET SERIES

A

Time allowed : $1\frac{1}{2}$ hours

Full marks : 100

Answer ***all*** the questions.

Questions are of equal value.

Serial No. 0001 ..... ***Roll No.*** | |

Signature of the Candidate: | |

INSTRUCTIONS

Candidates should read the following instructions carefully before answering the questions:

1. This booklet consists of 14 pages including this front page, containing 100 questions. **Verify the Page Nos. and Test Booklet series on each page and bring at once to the Invigilator's notice any discrepancy.**
2. Answers will have to be given in the Special Answer-Sheet supplied for the purpose.
3. Before you proceed to mark in the Answer-Sheet in response to various items in the Test Booklet, you have to fill in some particulars in the Answer-Sheet as per instructions sent to you in the Admit Card. ***Do not fold the Answer-Sheet as this will result in error in your marks.***
4. All questions are of multiple-choice answer-type. You will find ***four*** probable answers **(A)**, **(B)**, **(C)** and **(D)** against each question. Find out which of the four answers appears to you to be correct or the best. Now darken the circle corresponding to the letter of the selected answer in the Answer-Sheet with **Black Ball Point Pen** as per instructions printed on the reverse of the Admit Card and in the Answer-Sheet.
5. One and only one circle is to be fully blackened for answer. Any spot in any other circle (multiple circle) or in wrong circle will be considered as wrong answer. If more than one circle is encoded for a particular answer, it will be treated as a wrong answer.
6. ***There will be negative marking of $\frac{1}{3}$ mark for each wrong answer.***
7. ***There are blank pages at the end of this Booklet for Rough Work.***
8. ***The Special Answer-Sheet should be handed over to the Invigilator before leaving the Examination Hall. You are permitted to take away the used Test Booklet after completion of the examination.***

Fill up the blanks as directed in the bracket:

1. Of _____ did he speak? (Accusative)
(A) who
(B) whose
(C) whom
(D) where

2. The man _____ a snake. (Transitive verb)
(A) kill
(B) killed
(C) killing
(D) was killed

3. Look _____ a reference. (Preposition)
(A) at
(B) into
(C) in
(D) up

4. I felt a jar _____ my nerves. (Preposition)
(A) in
(B) on
(C) over
(D) at

5. If a man is not _____ he can hardly expect successful. (correct option of being *diligent*)
(A) industrious
(B) industrial
(C) liberal
(D) humane

6. Form verbs from objectives:
Dear >
(A) endear
(B) dearness
(C) dearing
(D) enduring

Form Adjectives from Nouns:

7. Advice >
(A) advisable
(B) advicable
(C) advitize
(D) advicate

8. Calamity >
(A) calamitible
(B) calamite
(C) calamitous
(D) calandrous

9. Vice >
(A) vicable
(B) vicious
(C) vicarious
(D) vicible

Fill in the blanks with proper phrases:

10. The crops failed _____ seasonal rain.
(A) due to
(B) for want of
(C) in want of
(D) in lose of

11. I have kept a reserve fund _____ accidents.
(A) in case of
(B) if in need
(C) because of
(D) if due in

12. He said all he could _____ his client.
(A) defending in
(B) in defendant of
(C) in defence of
(D) in confidence of

13. The house stood _____ the bridge.
(A) in back of
(B) in front of
(C) in case of
(D) in side of

14. Tell me all you know _____ that matter.
(A) in matter of
(B) in case of
(C) in connection with
(D) in search of

15. Write the affirmative of:
I am not so intelligent as you.
(A) You are so intelligent than I.
(B) You are more intelligent than I.
(C) I am more intelligent as you.
(D) You are so very intelligent.

16. Windows 7 is an example of
(A) OS
(B) Compiler
(C) Interpreter
(D) Profiler

17. The symbol ◇ in a flow chart is used to indicate
(A) Input/output operation
(B) Decision
(C) Process
(D) Start/stop

18. 'C' is an example of
(A) Low level language
(B) Machine language
(C) High level language
(D) Object oriented language

19. The AND gate returns TRUE only if
(A) Both inputs are FALSE.
(B) The first input is TRUE.
(C) The second input is TRUE.
(D) All the inputs are TRUE.

20. The range of a Local Area Network (LAN) is
(A) less than 10 kms.
(B) greater than 10 kms but less than 50 kms.
(C) greater than 50 kms but less than 100 kms.
(D) greater than 100 kms.

21. What will be the output of the following code fragment?

for i ← 1 to 10 do
S = S + i;
Write (S);

(A) 55
(B) 45
(C) 0
(D) Cannot say

22. What is the i's complement of 0011011100?

(A) 1100100011
(B) 1110011010
(C) 0011011100
(D) 1111111111

23. $(39)_{10} = (?)_2$

(A) 001100
(B) 100111
(C) 111000
(D) 000111

24. ORACLE is an example of _____ type of package.

(A) Word Processing
(B) Database
(C) Office Automation
(D) Data Analysis

25. Linux is an example of

(A) Multiuser OS
(B) Multitasking OS
(C) Multiprocessing OS
(D) All of these

26. An IP address consists of _____ bytes.

(A) 4
(B) 2
(C) 32
(D) 6

27. Structured programming forbids the use of

(A) loops
(B) go to statement
(C) if statement
(D) print statement

28. A technique in which processing does not begin until all inputs has been collected is called _____ processing.

(A) Concurrent
(B) Multi
(C) Offline
(D) Batch

29. A programming error in which rules governing the structure of a language are wrongly applied—

(A) Grammatical error
(B) Semantic error
(C) Syntax error
(D) Input error

30. A person responsible for looking into the overall functioning of a database is called

(A) Data Processing Manager
(B) System Analyst
(C) System Manager
(D) Database Administrator

31. If A : B = 2 : 3, B : C = 4 : 5 then 5A : 3C is

(A) 8 : 9
(B) 5 : 8
(C) 7 : 9
(D) 6 : 7

32. Out of his total income, Mr. X spends 20% on house rent and 70% of the rest on household expenses. If he saves Rs. 1800 his total income in rupees is

(A) 7000
(B) 8000
(C) 7500
(D) 7800

33. A man purchases two articles T and C for Rs. 500. He sells the article T at a loss of 10% and the article C at a gain of 10%. He still gains Rs. 10 on the whole. The cost price of the article C in rupees is

(A) 200
(B) 250
(C) 300
(D) 350

34. If a and b be positive integers such that $a^2 - b^2 = 23$, then the value of b is

(A) 10
(B) 11
(C) 12
(D) None of the above

35. The ratio of the cost price to the selling price is 25 : 26. The percentage of the profit is

(A) 26%
(B) 1%
(C) 25%
(D) 4%

36. The value of $\frac{256 \times 256 - 144 \times 144}{112}$ is

(A) 360
(B) 380
(C) 400
(D) 420

37. 36 men can build a wall of 140 m long in 21 days. The number of men required to build the same wall in 14 days is

(A) 54
(B) 48
(C) 36
(D) 18

38. Which of the following is greatest?

(A) $\sqrt{0{\cdot}09}$
(B) $\sqrt[3]{0{\cdot}064}$
(C) 0·5
(D) $\frac{3}{5}$

39. The interest of a sum of money lent at $6\frac{1}{4}\%$ simple interest rate per annum was 50% of the sum. The money was lent for (in years)

(A) 5
(B) 6
(C) 7
(D) 8

40. A man starts from a place P and reaches the place Q in 7 hours. He travels one fourth of the distance at 10 km/h and the remaining distance at 12 km/h. Then the distance between P and Q in km is

(A) 70
(B) 80
(C) 72
(D) 90

41. The ages of son and father are in the ratio of 1 : 4. After 9 years, the ratio would be 2 : 5. The present age of son (in years) is

(A) 10
(B) 8
(C) 9
(D) 12

42. The marked price of an article A is Rs. 920. During the off season it is sold for Rs. 874. What per cent discount is being allowed?

(A) 4
(B) 5
(C) 3
(D) 6

43. The least perfect square number divisible by 8, 12, 16 is

(A) 144
(B) 64
(C) 576
(D) 288

44. Prime factors of 1936 are

(A) 2 and 11
(B) 2, 3 and 11
(C) 8, 2 and 11
(D) 2, 2, 2, 3, 11, 11

45. If $12n + 7 > 139$ and n is an integer, then the smallest possible value of n is

(A) 13
(B) 11
(C) 12
(D) 10

46. The least number that is when subtracted from 5629 makes the result a perfect square is

(A) 1
(B) 2
(C) 3
(D) 4

47. The value of $\sqrt{\sqrt[3]{0{\cdot}000729}}$ is

(A) 0·9
(B) 0·3
(C) 0·03
(D) 0·09

48. The average of first eight odd prime numbers is

(A) 12·5
(B) 12·25
(C) 9·625
(D) 9·5

49. 30% of the sum of two numbers is equal to 40% of their difference. The ratio of the greater one to the smaller one is

(A) 4 : 3
(B) 5 : 2
(C) 7 : 1
(D) 7 : 2

50. The sum of 6 consecutive odd positive integers is 144. The sum of the greatest and the least is

(A) 46
(B) 42
(C) 54
(D) 48

51. Diphenyl carbazide in acetone is used as a reagent for colourimetric estimation of

(A) Mn (VII)
(B) Cr (VI)
(C) Ni (II)
(D) Fe (II)

52. The formation of the oxide ion (O^{2-}) in the gas phase from the oxygen atom requires first an exothermic and then an endothermic step as shown below:

$$O_{(g)} + e^- \rightarrow O^-_{(g)}, \Delta H^0 = -141 KJmol^{-1}$$

$$O^-_{(g)} + e^- \rightarrow O^{2-}_{(g)}, \Delta H^0 = +780 KJmol^{-1}$$

Thus, process of formation of O^{2-} in the gas phase is unfavourable even though O^{2-} is isoelectronic with neon. It is due to the fact that,

(A) Oxygen is more electronegative.
(B) addition of electron in oxygen results in larger size of the ion.
(C) electron repulsion outweighs the stability gained by achieving noble gas configuration.
(D) O^- ion has comparatively smaller than oxygen atom.

53. 0·01 $MK_2Cr_2O_7$ solution is

(A) 0·01 (N)
(B) 0·05 (N)
(C) 0·06 (N)
(D) 0·006 (N)

54. A number of metals are available in earth's crust but most abundant elements are:

(A) Al and Fe
(B) Al and Cu
(C) Fe and Cu
(D) Cu and Ag

55. Which of the following is the correct expression for the equation of state of van der Waal's gas?

(A) $P + \frac{a}{n^2V^2}(V - nb) = nRT$

(B) $\left(P + \frac{na}{n^2V^2}\right)(V - b) = nRT$

(C) $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$

(D) $\left(P + \frac{n^2a^2}{V^2}\right)(V - nb) = nRT$

56. Duralumin mainly composed of

(A) Al and Cu
(B) Al and Zn
(C) Al and Ni
(D) Al and Mg

57. Which one of the following solution will function as buffer?

(A) NaCl + NaOH
(B) $Na_2B_4O_7$
(C) $H_3PO_4 + H_3PO_3$
(D) $Na_2SO_4 + Na_2S_2O_8$

58. Hollow Cathode Lamp (HCL) is an important part of

(A) Atomic Absorption Spectrophotometer
(B) UV-Vis Spectrophotometer
(C) Flame photometer
(D) Colourimeter

59. The term 'R_f (retention factor)' is associated with the following method of separation:

(A) Precipitation method
(B) Thin-layer and paper chromatographic method
(C) Ion-exchange method
(D) Column chromatographic method

60. pH of water is 7. When a substance Y is dissolved in water, the pH becomes 13. The substance Y is salt of

(A) strong acid and strong base
(B) weak acid and weak base
(C) strong acid and weak base
(D) weak acid and strong base

61. A buffer solution is prepared by mixing 10ml of 1·0M acetic acid and 20 ml of 0·5M sodium acetate and diluted to 100ml. If the pK_a of acetic acid is 4·76, then the pH of the buffer solution is

(A) 3·84
(B) 4·76
(C) 4·34
(D) 5·21

62. Which one of the following fluxes is used to remove acidic impurities in metallurgical processes?

(A) Silica
(B) Sodium chloride
(C) Limestone
(D) Tin stone

63. Which one is correct order of increasing acidic nature of ZnO, MgO, Na_2O, P_2O_5?

(A) $ZnO < MgO < Na_2O < P_2O_5$
(B) $MgO < Na_2O < ZnO < P_2O_5$
(C) $Na_2O < MgO < ZnO < P_2O_5$
(D) $Na_2O < ZnO < MgO < P_2O_5$

64. At 20°C, the Ag^+ ion concentration in a saturated solution of Ag_2CrO_4 is $1·5 \times 10^{-4}$ moles/L. The solubility product of Ag_2CrO_4 would be at 20°C

(A) $3·3750 \times 10^{-12}$
(B) $1·6875 \times 10^{-10}$
(C) $1·6875 \times 10^{-12}$
(D) $1·6875 \times 10^{-11}$

65. The indicator among the following can be used most appropriately in the titration of ammonium hydroxide with acetic acid solution.

(A) Methyl red
(B) Bromocresol green
(C) Thymophthalein
(D) None of the three

66. Which one of the following is the strongest acid?

(A) $SO_2(OH)_2$
(B) $SO(OH)_2$
(C) $ClO_3(OH)$
(D) $ClO_2(OH)$

67. General electronic configuration of inner-transition elements is

(A) $(n-2)f^{1-14}(n-1)d^{1-5}ns^2$
(B) $(n-2)f^{0-14}(n-1)d^{1-2}ns^2$
(C) $(n-2)f^{1-14}(n-1)d^{1-2}ns^{1-2}$
(D) $(n-2)f^{1-14}(n-1)d^{0-1}ns^2$

68. The electronic configuration of gadolinium (atomic number, Z = 64) is

(A) $[Xe]\ 4f^8\ 5d^0\ 6s^2$
(B) $[Xe]\ 4f^7\ 5d^1\ 6s^2$
(C) $[Xe]\ 4f^9\ 5d^1\ 6s^0$
(D) $[Xe]\ 4f^7\ 5d^2\ 6s^1$

69. Largest difference in radii is found in case of the pair

(A) Li, Na

(B) Na, K

(C) K, Rb

(D) Rb, Cs

70. Rates of diffusion of H_2, HD, D_2 and He gases will be in the order:

(A) $He > H_2 > HD > D_2$

(B) $HD > D_2 = He < H_2$

(C) $D_2 > He = HD > H_2$

(D) $H_2 > HD > D_2 = He$

71. The incorrect statement of following is

(A) an aqueous solution of sodium acetate is basic.

(B) dissociation of H_2S is suppressed in acid medium.

(C) a white precipitate is formed when silver nitrate solution is added to sodium chloride solution.

(D) the mixture of ammonium chloride and ammonium hydroxide solution is acidic.

72. The unit of molar extinction co-efficient is

(A) mole L^{-1} cm

(B) $mole^{-1}$ L cm

(C) $mole^{-1}$ L^{-1} cm

(D) L $mole^{-1}$ cm^{-1}

73. The solute specie which is estimated by colourimetric method must have concentration in solution is

(A) µg/L

(B) mg/L

(C) g/L

(D) None of the above

74. In the spectrophotometer, the light which is passed through the solution column is

(A) golden yellow light

(B) monochromatic light

(C) ultraviolet light

(D) infra-red light

75. Without looking at the periodic table, select the elements of group 13 (group III B) of the periodic table (atomic numbers are given):

(A) 3, 11, 19, 37

(B) 5, 13, 21, 39

(C) 7, 15, 31, 49

(D) 5, 13, 31, 49

76. The temperature at which real gases obey the ideal gas laws over a wide range of pressure is called

(A) Critical temperature

(B) Boyle temperature

(C) inversion temperature

(D) reduced temperature

77. Pure metals are more useful than alloys because

(A) Electrical conductivity of pure metals is lower than of their alloys.

(B) Electrical conductivity of pure metals is greater than of their alloys.

(C) Electrical conductivity of both metals and its alloys is equal roughly.

(D) Electrical conductivity is not a parameter of both metal and alloys.

78. Which of the following is not an actinoid?

(A) Curium (Z = 96)

(B) Californium (Z = 98)

(C) Uranium (Z = 92)

(D) Terbium (Z = 65)

79. Ziegler-Natta catalyst is used for

(A) hydroformylation

(B) alkene polymerisation

(C) hydrogenation of alkene

(D) acetone synthesis

80. The solubility of a sparingly soluble salt (A_xB_y) is *s* moles/L, the value of *s* in terms of solubility product (K_{sp}), is

(A) K_{SP}

(B) K_{SP}. xy

(C) $K_{SP}\,(xy)^{x+y}$

(D) $\left[K_{sp}/(x^x.y^y)\right]^{\frac{1}{x+y}}$

81. Rose red precipitate of bis-(dimethylglyoximato) nickel (II) will not be found if the solution is made basic with

(A) KOH

(B) NH_4OH

(C) NaOAC

(D) $Na_2B_4O_7 \cdot 10H_2O$

82. Which of the following statements is *not* correct?

(A) Ionisation energy increases on going down a group in the periodic table.

(B) Among the alkaline earth metals, reducing character increases down the group.

(C) Fluorine is the most electronegative element.

(D) Metallic character increases on growing down a group in the periodic table.

83. Equimolar solutions of the following substances were prepared. Which one of these solution will record the highest pH value?

(A) $BaCl_2$

(B) $AlCl_3$

(C) LiCl

(D) $BeCl_2$

84. The charge transfer band in the estimation of an analyte is most important part in

(A) atomic absorption spectrophotometry

(B) UV-Vis spectrophotometry

(C) fluorimetry

(D) Flame photometry

85. In the titration of ferrous salt solution with potassium permanganate in acid medium, the indicator used commonly is

(A) starch

(B) phenolphthalein

(C) $KMnO_4$ itself

(D) Ferroin

86. Which one of the following compound is used as primary standard substance?

(A) $NaBiO_3$

(B) $Na_2C_2O_4$

(C) $KMnO_4$

(D) $Na_2S_2O_3$

87. Argentometry is used in the estimation of chloride ion. The indicator that used is called

(A) adsorption indicator

(B) redox indicator

(C) metal-ion indicator

(D) acid-base indicator

88. The salt which will not hydrolyse in aqueous solution is

(A) copper sulphate

(B) sodium sulphate

(C) potassium cyanide

(D) sodium carbonate

89. The R. M. S. velocity of CO gas molecules at 27°C is approximately

(A) 2000 m/s

(B) 1414 m/s

(C) 1000 m/s

(D) 1500 m/s

90. Which one of the following is *not* the complex salt?

(A) $FeSO_4(NH_4)_2SO_4 \cdot 6H_2O$

(B) $FeSO_4 \cdot 6KCN$

(C) $[Pt(NH_3)_4][PtCl_4]$

(D) $Cd(CN)_2 \cdot 2KCN$

91. IUPAC name of $[Pt(NH_3)_2Cl(NO_2)]$ is

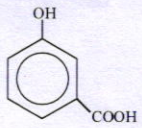
(A) platinum diamminechloronitro complex

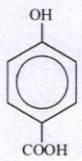
(B) chloronitritodiammineptatinum (II)

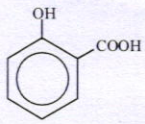
(C) diamminechloridonitrito-N-platinum (II)

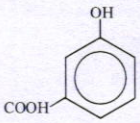
(D) diamminechloronitrito-N-platinate (II)

92. Salicylic acid used for colourimetric estimation of ferric ion is

(A) 

(B) 

(C) 

(D) 

93. As the temperature is raised from 20°C to 40°C, the average kinetic energy of neon atoms changes by a factor of which of the following?

(A) $\frac{1}{2}$

(B) $\left(\frac{313}{293}\right)^{1/2}$

(C) $\left(\frac{313}{293}\right)$

(D) 2

94. In the presence of 0·25 – 0·3N HCl, $H_2S_{(g)}$ fails to precipitate the metal ion as metal sulphide from its solution is

(A) Bi^{3+}

(B) As^{3+}

(C) Sb^{3+}

(D) Fe^{3+}

95. Which of the following statement is correct?

(A) The pH of $1{\cdot}0 \times 10^{-8}$ M solution is 8.

(B) The conjugate base of $H_2PO_4^-$ is HPO_4^{2-}.

(C) Auto protolysis constant of water is a constant value which does not depend on temperature.

(D) When a solution of a weak monoprotic acid is titrated against a strong base, at half neutralization point pH = ½(pK_a).

96. Addition of NH_4Cl and NH_4OH to a solution containing Al^{3+}, Fe^{3+}, Co^{2+} and Bi^{3+}, the metal ion which will not precipitate as metal hydroxide is

(A) Al^{3+}

(B) Fe^{3+}

(C) Co^{2+}

(D) Bi^{3+}

97. The ion that has same bond order with CO is

(A) O_2^-

(B) N_2^+

(C) O_2^+

(D) CN^-

98. Consider the following two statements:

(a) Line spectra contain information about atoms.

(b) Band spectra contain information about molecules.

(A) Both (a) and (b) are wrong.

(B) (a) is correct but (b) is wrong.

(C) (b) is correct but (a) is wrong.

(D) Both (a) and (b) are correct.

99. The wavelength of a spectral line for an electronic transition is inversely related to

(A) the number of electrons undergoing the transition.

(B) the nuclear charge of the atom.

(C) the difference in the energy of the energy levels involved in the transition.

(D) the speed of electron undergoing the transition.

100. A gas can be liquified at temperature T and at pressure P provided

(A) $T = T_c$ and $P < P_c$

(B) $T < T_c$ and $P > P_c$

(C) $T > T_c$ and $P > P_c$

(D) $T > T_c$ and $P < P_c$