033/2018

Question Booklet Alpha Code	A	Question Booklet Serial Number	

Total Number of Questions : 100 **Time : 75 Minutes**

Maximum Marks : 100

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.

033/2018

1. The approximate ratio of the peaks at m/z values 98, 100 and 102 in the mass spectrum of 1, 2 - dichloroethane will be :

(A) 3 : 1 : 1 (B) 9 : 6 : 1 (C) 1 : 2 : 1 (D) 1 : 1 : 2

2. The Bonding in metal carbonyls can be identified using :

(A) UV spectroscopy (B) IR spectroscopy

(C) C^{13} NMR (D) None of these

3. Magnetic moment of $[Co(H_2O)_6]^{2+}$ is approximately :

(A) 2.5 BM (B) 5.3 BM (C) 3.9 BM (D) None of these

4. Quarter life for a first order reaction will be equal to :

(A) $\frac{\ln 2}{k}$ (B) $\frac{\ln 0.4}{k}$ (C) $\frac{\ln 5}{k}$ (D) $\frac{\ln 4}{k}$

5. Angle between (110) and (100) planes in a simple cubic crystal lattice is equal to :

(A) 15 (B) 60 (C) 45 (D) None of these

6. Number of protons in the shielded zone of 18 - annulene is :

(A) 6 (B) 3 (C) 5 (D) 2

7. Silicates with continuous 3D framework :

(A) Neso silicates (B) Phyllo silicates

(C) Tecto silicates (D) None of these

8. Packing fraction of a hcp lattice is close to :

(A) 0.74 (B) 0.98 (C) 0.52 (D) None of these

9. Effective number of Zn and S^{2-} ions in ZnS crystal are :

(A) 8, 4 (B) 4, 4 (C) 4, 8 (D) None of these

10. Absorbance of a solution whose transmittance is 50% is :

(A) 0.699 (B) 0.301 (C) 1.301 (D) 1.699

11. Indicator used in the Mohrs method is :

(A) Fluorescien (B) Eosin (C) Ferroin (D) Chromate

12. Number of bridging carbonyls in $Ir_4(CO)_{12}$ at low temp. is :

(A) 3 (B) 9 (C) 6 (D) 0

13. Term symbol for B is :

(A) $^3P_{3/2}$ (B) $^2P_{3/2}$ (C) $^1P_{3/2}$ (D) $^2P_{5/2}$

14. $\left[x, \frac{d}{dx}\right] =$

(A) -1 (B) 1 (C) 0 (D) 2

15. Complexes formed by the lanthanides with hindered β-diketonates can be separated by :

(A) Gel permeation chromatography (B) Gas chromatography

(C) Gel filtration chromatography (D) Ion exchange chromatography

16. Structure of $[C_2B_9H_{12}]^-$ is :

(A) Closo (B) Arachno (C) Nido (D) Hypho

17. Ground state term symbol of Co in $[CoF_6]^{3-}$ is :

(A) ^4F (B) ^4D (C) ^3F (D) ^5D

18. Rate of an enzyme catalysed reaction is 0.02 mol/dm^3 and the rate is halved when the concentration of substrate is 20 mg/dm^3. The ratio K_1/K_{-1} will be ..... assuming $K_2 >> K_{-1}$.

(A) 0.5 dm^3/mg (B) 2 dm^3/mg (C) 0.2 dm^3/mg (D) 0.05 dm^3/mg

19. J_{max} for a rigid diatomic molecule with rotational constant 1.566 cm^{-1} at 300 K is :

(A) 8 (B) 6 (C) 5 (D) 4

20. Temperature effect of schottky defect is given by :

(A) $e^{E/2KT}$ (B) $e^{-E/KT}$ (C) $e^{E/KT}$ (D) $e^{-E/2KT}$

21. The degeneracy of the energy level of a particle in cubic box with quantum numbers $n_x = 3$, $n_y = 2$, $n_z = 1$:

(A) 6 (B) 3 (C) 1 (D) 2

22. Rotational entropy is maximum for :
(A) H_2 (B) N_2 (C) Cl_2 (D) O_2

23. No. of ways in which four indistinguishable particles may be assigned to three states having Energy 1, 2 and 3 such that total energy remains 10 units is :
(A) 5 (B) 10 (C) 6 (D) 4

24. Value of ΔG for adsorption _____ with increase in temperature.
(A) Becomes more positive starting from a negative value
(B) Becomes more negative starting from a negative value
(C) Becomes more negative starting from a positive value
(D) None of the above

25. Catalyst used in Wackers process :
(A) $SnCl_4$ (B) $[PtCl_4]^{2-}$ (C) $[CoCl_4]^{2-}$ (D) $[PdCl_4]^{2-}$

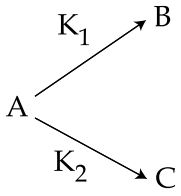
26. Co-catalyst used in Wackers process :
(A) Co (B) Cu (C) Mo (D) Ag

27. Which of the following thermal sigmatropic rearrangement is impossible ?
(A) [1, 5]H (B) [1, 7]H (C) [1, 3]H (D) None of these

28. Example for a nidoborane is :
(A) B_4H_{10} (B) B_5H_9 (C) $[B_6H_6]^{2-}$ (D) B_5H_{11}

29. C-H stretching vibration of acetylene occurs at around :
(A) 3000 cm^{-1} (B) 2900 cm^{-1} (C) 2300 cm^{-1} (D) 3400 cm^{-1}

30. The activation energy for disappearance of A for the following reaction is :



(A) $\frac{K_1E_1 + K_2E_2}{K_1 + K_2}$ (B) $\frac{K_1E_2 + K_2E_1}{K_1 + K_2}$

(C) $\frac{K_1(E_1 + E_2)}{K_2}$ (D) None of these

31. Hot bands in IR spectrum is a consequence of which of the following transitions ?

(A) $v = 0 \rightarrow v = 2$ (B) $v = 1 \rightarrow v = 2$ (C) $v = 0 \rightarrow v = 1$ (D) $v = 0 \rightarrow v = 3$

32. The mass spectrum of an alkyl halide showed M and M + 2 peaks in the intensity ratio 1 : 1. The compound is :

(A) alkyl chloride (B) alkyl bromide

(C) alkyl iodide (D) cannot be predicted

33. The number of peaks expected in the proton decoupled CMR spectrum of toluene is :

(A) 7 (B) 6 (C) 5 (D) 2

34. The density of an FCC crystal (0.2 kg of the element contains 24×10^{23} atoms) with unit cell parameter 2 A° is :

(A) 4.17×10^{7} kg/ms (B) 4.17×10^{4} kg/ms

(C) 4.17×10^{23} kg/ms (D) 41.7×10^{4} kg/ms

35. Rotational partition function for H_2 at 0°C is approximately :

(A) 10 (B) 15 (C) 1.5 (D) 3.5

36. Which of the following is not a feasible term symbol for $[Ne]2p^1, 3p^1$ configuration ?

(A) $^3D_2$ (B) $^3D_3$ (C) $^3D_1$ (D) $^2D_3$

37. Determination of CFSE of transition metal complexes can be done using _____ spectroscopy.

(A) Electronic (B) Rotational (C) ESR (D) NMR

38. The vapour phase irradiation of trans 1, 2 - dimethyl cyclohexanone will give :

(A) cis-1, 2-dimethyl cyclopentane

(B) trans-1, 2-dimethyl cyclopentane

(C) cis and trans 1, 2-dimethyl cyclohexane

(D) Mixture of (A) and (B)

39. Photochemical isomerisation of trans stilbene to cis isomer can be effected in presence of :

(A) $(C_6H_5)_2C=O$ (B) $(CH_3)_2C=O$ (C) $(C_6H_5)_2CH_2$ (D) None of these

40. When aqueous solvents are to be used in IR spectroscopy, sample and reference cells are made of :

(A) $CaCl_2$ (B) CaF_2 (C) NaCl (D) KCl

41. Natural rubber can be distinguished from butyl rubber by an IR spectral peak around :

(A) 1200 cm^{-1} (B) 1600 cm^{-1} (C) 2600 cm^{-1} (D) None of these

42. Enantioselective epoxidation of allylic alcohols can be achieved by :

(A) Al-isopropoxide (B) Sn-isopropoxide

(C) Ti-isopropoxide diethyl tartarate (D) None of these

43. The shape of ClF_2^+ is :

(A) Angular (B) Linear (C) Triagonal (D) None of these

44. The residual entropy associated with a crystal with 6 possible orientations will be nearly :

(A) 10 (B) 1.5 (C) 15 (D) 3.5

45. The point group of 1, 1-difluoroethylene is :

(A) C_{3v} (B) $C_{\infty v}$ (C) C_{2v} (D) C_{3h}

46. For the reaction $A \rightarrow B \rightarrow C$, where $k_1 = 5 \times 10^6\ s^{-1}$ and $k_2 = 3 \times 10^6\ s^{-1}$, time at which [B] is maximum is :

(A) 2.6×10^{-7} s (B) 1.1×10^{-7} s (C) 2.55×10^{-6} s (D) 2.55 s

47. The number of radial nodes for 4s orbital of hydrogen atom is :

(A) 0 (B) 4 (C) 3 (D) 2

48. The number of metal-metal bonds in $Ir_4(CO)_{12}$ and $Fe_3(CO)_{12}$ are respectively :

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

49. The magnetic moment of a six co-ordinate transition metal complex is approximately 6 BM. Identify the complex if it is both ESR and Mossbauer active.

(A) $[Mn(H_2O)_6]^{2+}$ (B) $[Fe(H_2O)_6]^{3+}$ (C) $[Fe(H_2O)_6]^{2+}$ (D) $[Fe(CN)_6]^{3-}$

50. Lability of the ions, Cr^{2+}, V^{2+}, Mn^{2+} follow the order :

(A) $Cr^{2+} < V^{2+} < Mn^{2+}$ (B) $Mn^{2+} > Cr^{2+} > V^{2+}$

(C) $Cr^{2+} > V^{2+} > Mn^{2+}$ (D) $V^{2+} > Cr^{2+} > Mn^{2+}$

51. The normalization constant of the equation, $\Phi_m(\varphi) = B_m e^{im\varphi}$ is :

(A) $1/2\pi$ (B) $1/\pi$ (C) $1/\sqrt{2\pi}$ (D) $1/\sqrt{\pi}$

52. The CFSE of $[Ti(H_2O)_6]^{3+}$ having a λ_{max} 492 nm is :

(A) 8130 (B) 20325 (C) 10162 (D) None of these

53. The structures in which n and $(n-1)$ corners of n-cornered polyhedrons are occupied are respectively :

(A) closo and nido (B) nido and closo

(C) closo and arachno (D) nido and arachno

54. The conversion of vinyl cyclopropane to cyclopentene upon heating is an example of _____ sigmatropic rearrangement.

(A) [1, 5] (B) [3, 3] (C) [1, 3] (D) [1, 2]

55. Minimum intensity of absorption in the UV-visible region will be shown by :

(A) $[Cr(H_2O)_6]^{2+}$ (B) $[V(H_2O)_6]^{2+}$ (C) $[Mn(H_2O)_6]^{2+}$ (D) $[Co(H_2O)_6]^{2+}$

56. Expected number of lines in the ESR spectrum of benzene radical anion is :

(A) 6 (B) 4 (C) 7 (D) 0

57. Depolarisation by hydrogen ions can be prevented by use of :

(A) Nitrate ions (B) Hydrazine (C) Hydroxylamine (D) All of the above

58. Current observed in the absence of an electroactive species is termed :

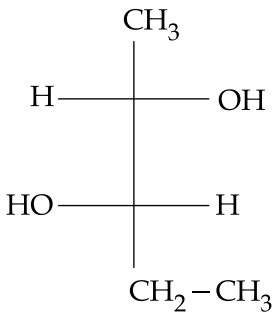
(A) Residual current (B) Faradaic current

(C) Diffusion current (D) None of these

59. The decadic absorbance of a solution at a wavelength 200 nm is recorded as 1.08. Given the values of molar extinction co-efficient and path length to be 629 m^2/mol and 0.00121 m, the concentration of the solution is :

(A) 0.142 M (B) 1.42 M (C) 0.00142 M (D) 0.0142 M

60. The configuration of the compound is :



(A) 2S, 3R (B) 3R, 2S (C) 2S, 3S (D) 2R, 3R

61. Average position of a particle in a one dimensional box of length L is :

(A) $\frac{L}{3}$ (B) L (C) 2L (D) $\frac{L}{2}$

62. Ground state energy for an electron confined to a potential well of width 0.4 nm is :

(A) 226.7 kJ/mol (B) 22.6 kJ/mol (C) 3.76 kJ/mol (D) None of these

63. The lowest energy band in the absorption spectrum of $[Ni(\text{ethylene diamine})_3]^{2+}$:

(A) $^3T_{2g} \leftarrow {}^3A_{2g}$ (B) $^3T_{1g} \leftarrow {}^3A_{2g}$ (C) $^4A_{2g} \leftarrow {}^4T_{2g}$ (D) None of these

64. The symmetry elements of chair form of cyclohexane are :

(A) E, C_2, C_3, σ_v (B) E, C_2, C_3, σ_d (C) E, C_3, σ_v, σ_d (D) E, C_2, C_6, σ_d

65. Which among the following are allowed transitions ?

(A) $1s \rightarrow 2p$ (B) $2p \rightarrow 3s$ (C) $3d \rightarrow 4f$ (D) all of these

66. Which among the following is Mossbauer inactive ?

(A) ^{57}Fe (B) ^{67}Zn (C) ^{119}Sn (D) ^{121}Sb

67. The nuclear partition function of ortho deuterium molecule is :

(A) 3 (B) 2 (C) 6 (D) None of these

68. The shape of $[TeF_5]^-$ ion based on VSEPR theory is :

(A) Octahedral (B) Square pyramidal

(C) Pentagonal (D) Triagonal bipyramidal

69. According to the transition state theory, the rate constant of a reaction _____ with pressure when ΔV^* is negative.

(A) Decreases (B) Increases

(C) Remains unaltered (D) First decreases and then increases

70. The hybridization in Zeise's salt is :

(A) dsp^2 (B) sp^3d (C) sp^2d (D) None of these

71. "It is always better to begin with the children see, feel and experiment, than arguing and generating". To which maxim of teaching this statement is related ?

(A) Empirical to Rational (B) Macro to Micro

(C) Particular to General (D) Simple to Complex

72. Which of the following assessment technique is most appropriate for assessing creative thinking in students ?

(A) Reasoning questions (B) Open ended questions

(C) Logical questions (D) Hypothesising

73. Jigsaw method is a form of :

(A) Collaborative Learning (B) Co-operative Learning

(C) Graphic Organiser Strategy (D) Problem Based Learning

74. Which is an example for reflective teaching practise ?

(A) Changing presentation style after a feedback session

(B) Giving follow-up activities regularly

(C) Ensuring activities suggested in text book

(D) Conducting an achievement test

75. According to Benjamin S. Bloom, the category which develops the creative ability of students is :

(A) Analysis (B) Application (C) Evaluation (D) Synthesis

76. Ex Post Facto research means :

(A) The research is carried out after the incident.

(B) The research is carried out alongwith the happening of an incident.

(C) The research is carried out prior the incident.

(D) The research is carried out keeping in mind the possibilities of an incident.

77. Research ethics do not include :

(A) Honesty (B) Subjectivity (C) Integrity (D) Objectivity

78. Which is the main purpose of research in education ?

(A) To help in the personal growth of an individual.

(B) To increase social status of an individual.

(C) To help the individual to become an eminent educationalist.

(D) To increase job prospects of an individual.

79. When 2 or more successive footnotes refer to the same work, which one of the following expressions is used ?

(A) ibid (B) et.al (C) op.cit (D) loc.cit

80. Conferences are meant for :

(A) Multiple target groups (B) Group discussions

(C) Show casing new research (D) All of the above

81. Under Art : 321 of the Constitution of India, the power to extend functions of the Union Public Service Commission has been vested in the :

(A) Chairman of the Commission (B) President of India

(C) Parliament (D) Ministry of Home Affairs

82. Consider the following statements :

(a) The President can commute death sentence to the life imprisonment.

(b) The Governor cannot commute death sentence to the life imprisonment.

(c) The President's power to pardon extends to punishment or sentence by Court Martial.

Which one of the statements given above is/are **correct** ?

(A) (b) only (B) (a) and (c) only

(C) (b) and (c) only (D) (a), (b) and (c)

83. Salient feature of Indian Constitution have been borrowed from various sources. Which of the following is **wrongly** matched ?

(A) Emergency provisions - Germany

(B) Fundamental rights - USA

(C) Structural parts - Government of India Act, 1935

(D) Bicameralism and relation between executive and legislature - Canadian Constitution

84. Which of the following are **correctly** matched ?

(a) Tenth Schedule - Added by 52nd Amendment Act

(b) Nineth Schedule - Added by 1st Amendment Act

(c) Art : 15(5) - Added by 93rd Amendment Act

(d) Twelfth Schedule - Added by 74th Amendment Act

Codes :

(A) (a) and (b) (B) (a), (b) and (c)

(C) (a), (c) and (d) (D) (a), (b), (c) and (d)

85. Under Indian Constitution which is not a ground on which the state can place restriction on freedom of religion ?

(A) Public Order (B) Morality

(C) Health (D) Economic justice

86. What is the time span mentioned in the RTI Act, 2005 for making orders, for removing difficulties in giving effect to the provisions of the RTI Act, 2005 ?

(A) 1 year from the commencement of the Act

(B) 2 years from the commencement of the Act

(C) 3 years from the commencement of the Act

(D) 4 years from the commencement of the Act

87. Under protection of Women from Domestic Violence Act, 2005, who will present application to magistrate ?

(A) Aggrieved person

(B) Protection officer

(C) Other person on behalf of the aggrieved person

(D) Either (A) or (B) or (C)

88. Protection of Children from Sexual Offences Act, 2012 came into effect from :

(A) November 14th 2012 (B) October 2nd 2012

(C) November 1st 2012 (D) October 10th 2012

89. Who can apply to court for injunction under Sec : 22 A of Air [Prevention and Control of Pollution] Act, 1981 ?

(A) Pollution Control Board (B) Any Person

(C) State Government (D) Central Government

90. Which of the following statement is false ?

(A) Under Transplantation of Human Organs Act, 1994, a foreigner cannot get a local donor in India.

(B) Human blood is 'drug' under Drugs and Cosmetic Act.

(C) Cadaveric organ donation means pledging of organs for Transplantation after confirmation of brain death.

(D) A person between the age of 18 - 65 years can donate blood.

91. The Nampoothiri woman who is nominated to the Cochin Legislative assembly to render advice on the Nampoothiri bill :

(A) Lalitha Prabhu (B) Lalithambika Antharjanam

(C) Arya Pallem (D) K. Devayani

92. Who among the following poets is known as RASHTRAKAVI ?

(A) Pallath Raman (B) K.P. Karuppan

(C) M. Govinda Pai (D) N.V. Krishna Warrier

93. Purogamana Sahitya Samiti (Progressive Writers Association) was founded in the year :

(A) 1937 (B) 1928 (C) 1932 (D) 1941

94. Which of the following townships has a college named after Velu Thampi Dalawa ?

(A) Neyyattinkara (B) Dhanuvechapuram

(C) Attingal (D) Parassala

95. Patriotic poem "Varika Varika Sahachare" is written by :

(A) Amsi Narayana Pillai (B) Bodheswaran

(C) Abhaya Dev (D) Vayalar Ramavarma

96. The Newspaper "Samadarsi" started in 1923 was founded by :

(A) C.V. Kunjuraman (B) K. Ramakrishna Pillai

(C) K. Krishnan (D) Kesari A. Balakrishna Pillai

97. Sarvodaya leader M.P. Manmadhan is associated with :

(A) Khadi Movement (B) Prohibition Movement

(C) Hindi Movement (D) Abstention Movement

98. Kerala Provincial Congress Committee came into existence in :

(A) 1919 (B) 1928 (C) 1924 (D) 1921

99. "Hunger March" of 1936 from Kannur to Chennai was led by :

(A) K. Kelappan (B) P. Krishna Pillai

(C) N.C. Shekhar (D) A.K. Gopalan

100. The book "Gandhi and Anarchy" is written by :

(A) C. Achutha Menon (B) C. Shankaran Nair

(C) K.M. Panicker (D) V.K. Krishna Menon

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SPACE FOR ROUGH WORK

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