

- entertained 30 minutes after starting of the examination.
7. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.
 6. For each correct answer, the candidate will get full credit. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer. There will be No Negative marking.
 5. Only black or blue ball point pen is to be used in the OMR Answer-Sheet.
 4. The candidate **must not** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers **Must Not** be ticked in the question booklet.
 3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
 2. All the candidates **must return** the question booklet as well as OMR Answer-Sheet to the invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
 1. Part-I (Question No. 1 to 40) is compulsory. Part-II (Question Nos. 41 to 100) is Optional. From Part-II, the candidate is to attempt 60 questions from any **One Option** out of the three **Optional parts** i.e. either from Option "A" or "B" or "C". All questions carry equal marks.

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

(Signature of the Candidate)

(Signature of the Invigilator)

Date of Examination

Option Attempt (Under Part-II)

Roll No. (in figures)

(in words)

Father's Name

Mother's Name

Candidate's Name

Date of Birth

Time : 1½ Hours

Max. Marks : 100

Total Questions : 100



Sr. No.
10068

SUBJECT : Chemistry

PHDURS-EE-2013

(NOT TO BE OPENED BEFORE TIME OR TILL ASKED TO DO SO)

Total No. of Printed Pages : 29

*For Invigilator
21/01/2013*

(COMPULSORY)

PART - I

1. At 25°C which of the following substance has the lowest molar entropy ?
 (1) N₂ (gas) (2) Mg(s) (3) C₆H₆(l) (4) CCl₄(g)

2. The unit of the rate and rate constant are the same for a reaction of order :

- (1) 0 (2) 1 (3) $\frac{1}{2}$ (4) 2

3. Walden role is given by :

- (1) product of equivalent conductance and viscosity
 (2) product of molarity and viscosity
 (3) sum of viscosity and ionic conductance
 (4) product of molarity and molecular mass

4. In Rice-Herzfeld mechanism of decomposition of acetaldehyde, the order of reaction is :

- (1) 1/2 (2) 1 (3) 3/2 (4) 2

5. Clausius-Clapeyron equation is given by :

- (1) $\log \frac{p_2}{p_1} = \frac{\Delta H_{vap}}{2.303 R} \left[\frac{T_2 - T_1}{T_1 \times T_2} \right]$
 (2) $\log \frac{p_2}{p_1} = \frac{\Delta H_{vap}}{2.303 R} \left[\frac{T_1 \times T_2}{T_1 - T_2} \right]$
 (3) $\log \frac{p_2}{p_1} = \frac{\Delta H_{vap}}{2.303} \left[\frac{T_1 + T_2}{T_1 - T_2} \right]$
 (4) $\log \frac{p_2}{p_1} = \frac{\Delta H_{vap}}{2.303} \left[\frac{T_1 + T_2}{T_1 - T_2} \right]$

6. Which quantum number does not arise from solution of Schrodinger equation ?

- (1) Principal quantum number
 (2) Spin quantum number
 (3) Magnetic quantum number
 (4) Azimuthal quantum number

7. If length of the one dimensional box is halved, the energy of the particle will become :

- (1) Half
 (2) Doubled
 (3) Four times
 (4) One fourth

8. The degeneracy of energy level with energy equal to $\frac{6h^2}{8m^2}$ is :

- (1) 2 (2) 3 (3) 6 (4) 9

9. Unit of equivalent conductivity is :

- (1) $\text{ohm cm}^2 \text{eq}^{-1}$ (2) $\text{ohm}^{-1} \text{cm}^2 \text{eq}^{-1}$
 (3) $\text{ohm cm}^{-2} \text{eq}^{-1}$ (4) $\text{ohm}^{-1} \text{cm}^{-2} \text{eq}^{-1}$

10. If K = equilibrium constant, Q = reaction quotient and G = Gibbs's free energy, which of the following is true for a spontaneous reaction ?

- (1) $\Delta G < \Delta G^\circ$ (2) $\Delta G > \Delta G^\circ$
 (3) $K > Q$ (4) $K < Q$

11. The wave length of de-Broglie's wave associated with a moving proton of mass 1.66×10^{-27} kg and kinetic energy of 5×10^{-27} J is :

- (1) 162.65×10^{-8} m (2) 16.265×10^{-8} m
 (3) 16.265 m (4) 1.6265 m

12. The pure rotational spectrum of gaseous HCl consists of a series of equally spaced lines separated by 20.80 cm^{-1} . The value of rotational constant is :

- (1) 20.80 cm^{-1} (2) 10.40 cm^{-1} (3) 5.20 cm^{-1} (4) 2 cm^{-1}

13. Which of the following molecules has lowest vibrational stretching frequency ?


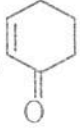
- (1) $^1\text{H}^35\text{Cl}$ (2) $^2\text{D}^35\text{Cl}$ (3) $^1\text{H}^36\text{Cl}$ (4) $^1\text{H}^37\text{Cl}$

14. The proton nmr spectrum of propane will consist of :

- (1) a triplet and a singlet (2) a triplet and a quartet
 (3) a doublet and a sextet (4) a triplet and a septet

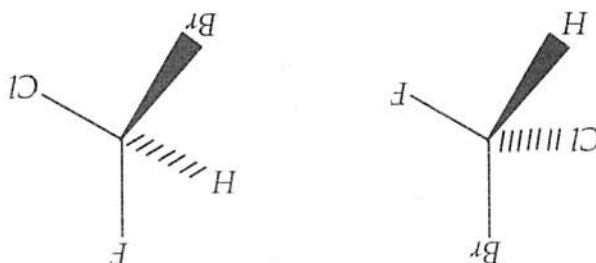
15. To check that a secondary alcohol has been completely oxidized to a ketone you can :

- (1) check out the IR spectrum has absorptions at 3500 cm^{-1} and 1650 cm^{-1}
 (2) check out the IR spectrum has no absorptions at 3500 cm^{-1} and 1650 cm^{-1}
 (3) check out the IR spectrum has no absorptions at 3500 cm^{-1}
 (4) check out the IR spectrum has no absorptions around 1650 cm^{-1}

16. The β -isomer of hydrated trisglycinate cobalt (III) is in colour consisting of two bands.
17. Which listed below gives only spin active nuclei ?
- (1) $^1\text{H}, ^{13}\text{C}, ^{19}\text{F}$ (2) $^2\text{H}, ^{12}\text{C}, ^{19}\text{F}$ (3) $^1\text{H}, ^2\text{H}, ^{12}\text{C}$ (4) $^1\text{H}, ^{12}\text{C}, ^{19}\text{F}$
18. The position of the characteristic carbonyl stretching absorption bands in the IR spectrum of  and  are observed at :
- (1) 1715 cm^{-1} and 1680 cm^{-1} (2) 1680 cm^{-1} and 1715 cm^{-1}
 (3) 1740 cm^{-1} and 1715 cm^{-1} (4) 1715 cm^{-1} and 1740 cm^{-1}
19. The lowest energy transition for tetrahedral complex of Mn^{2+} is :
- (1) ${}^3\text{A}_2 \rightarrow \text{T}_1$ (2) ${}^4\text{T}_1 \rightarrow {}^4\text{A}_2$ (3) ${}^3\text{A}_2 \rightarrow {}^3\text{T}_2$ (4) ${}^4\text{A}_2 \rightarrow {}^4\text{T}_2$
20. The cis isomers often have molar absorptivity values for $d \rightarrow d$ transitions than trans isomers.
- (1) Larger (2) Smaller (3) Equal (4) None of the above
21. The geometry of IF_8^- ion is :
- (1) Pyramidal (2) Tetrahedral (3) Trigonal bipyramidal (4) Square antiprismatic
22. Which of the following statement is false ?
- (1) $[\text{Cu(en)}_2]^{2+}$ is more stable than $[\text{Cu}(\text{NH}_3)_4]^{2+}$
 (2) $[\text{FeF}]^{2+}$ is stable than $[\text{FeCl}]^{2+}$
 (3) $[\text{Fe}(\text{CN})_6]^{4-}$ is less stable in comparison to $[\text{Fe}(\text{CN})_6]^{3-}$
 (4) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ is less stable than $[\text{Cd}(\text{NH}_3)_4]^{2+}$

23. The coordination numbers of Ti(N) and O_2^- in rutile are, respectively :
 (1) 6 and 3 (2) 3 and 6 (3) 2 and 4 (4) 4 and 2
24. Racemization of a chiral complex such as $[Cr(ox)_3]^{3-}$ is least likely to occur by :
 (1) a dissociative pathway
 (2) a pathway involving a 5-coordinate species in which one ox^{2-} ligand is monodentate
 (3) the Ray-Dutt twist mechanism
 (4) the Bailar twist mechanism
25. In the base-catalysed substitution of Cl^- by OH^- in $[Co(NH_3)_5Cl]^{2+}$ under strongly basic conditions, the first step in the mechanism is :
 (1) conversion of an ammine to amido ligand
 (2) substitution of Cl^- by $[OH]^-$
 (3) dissociation of Cl^- to give a 5-coordinate intermediate
 (4) association of $[OH]^-$ to give a 7-coordinate intermediate
26. In tetrahedral complexes, which orbital is involved in σ as well as π bond according to MO theory :
 (1) e (2) t_2 (3) a_1 (4) b
27. The term symbol for ground state of Ni is :
 (1) 7S_3 (2) 3F_4 (3) 3P_0 (4) 7F_2
28. In which of the following configuration, the orbital contribution is quenched in octahedral field ?
 (1) $t_2g^4 eg^2$ (2) $t_2g^6 eg^1$ (3) t_2g^4 (4) $t_2g^5 eg^2$
29. Which of the following does *not* possess bridged CO ?
 (1) $CO_2(CO)_8$ (2) $Fe_3(CO)_{12}$ (3) $Os_3(CO)_{12}$ (4) $Fe_2(CO)_9$
30. Which of the following will have highest CO stretching frequency ?
 (1) $Cr(CO)_6$ (2) $Mn(CO)_6^+$
 (3) $V(CO)_6^-$ (4) $Fe(CO)_4^{2-}$

31. The two compounds shown below are :



- (1) diastereomers
 (2) enantiomers
 (3) identical
 (4) conformational isomers

32. Which of the following is *not true* about enantiomers? They have the same :

- (1) Melting Point
 (2) Boiling Point
 (3) Specific rotation
 (4) Density

33. When benzyl chloride is treated with ethanolic KCN, benzyl ethyl ether is produced along with benzyl cyanide. The most likely mechanism for the reaction would be :

- (1) SN^2
 (2) SN^1
 (3) SN^i
 (4) Both SN^1 and SN^2

34. The carbene which adds stereo specifically to a double bond is in the state.

- (1) singlet
 (2) doublet
 (3) triplet
 (4) free radical

35. The compound which would undergo nitration at ortho and para position with rates lower than that of benzene is :

- (1) Cinnamic acid
 (2) Toluene
 (3) Phenol
 (4) Benzoic acid

36. M-effect is :

- (1) Resonance effect
 (2) Inductive effect
 (3) No bond resonance
 (4) Electromeric effect

37. The type of linkage present in portion is :

- (1) H-bonding
 (2) Covalent linkage
 (3) Ionic bond
 (4) Coordinate bond

38. Epimers differ in :
 (1) C-1
 (3) C-1 and C-2
 (2) C-2
 (4) None of the above
39. In the conversion of a Grignard reagent into an aldehyde the other component used is :
 (1) ethyl formate
 (2) ethyl acetate
 (3) ethyl cyanide
 (4) CO_2
40. Sulphonation of benzene differs from most other electrophilic substitution reaction in that the reaction :
 (1) is reversible
 (2) occurs with explosive violence
 (3) requires elevated temperature
 (4) requires Lewis acid catalyst
- PART - II**
(OPTIONAL)
OPTION - A : INORGANIC CHEMISTRY
41. The radioactivity detector based on light emission is :
 (1) Cloud Chamber
 (2) Ionization Chamber
 (3) Scintillation Counter
 (4) Solid State Detector
42. To which element, Neutron Activation Analysis is applicable ?
 (1) Magnesium
 (2) Niobium
 (3) Vanadium
 (4) Copper
43. The sensitivity of NAA depends upon :
 (1) Atomic cross section of particles
 (2) Flux of particles
 (3) Half life of Nuclide
 (4) All of these
44. Ionization Chamber uses lower operating voltage than :
 (1) Proportional Counters
 (2) Solid ion Chamber
 (3) Scintillation Counter
 (4) All of these
45. Which of the following Nuclei is *not* doubly magic ?
 (1) ${}^2_2\text{He}$
 (2) ${}^{16}_8\text{O}$
 (3) ${}^{208}_{82}\text{Pb}$
 (4) ${}^{238}_{92}\text{U}$

46. The metal species present in Nitrogenase is :
 (1) Zinc (2) Molybdenum (3) Tungsten (4) Lead
47. Which of the following is used in Psychotropic drugs ?
 (1) Sodium fluoride (2) Lithium carbonate
 (3) Barium sulphide (4) Zinc oxide
48. CYTOCHROM P-450 enzyme contains metal :
 (1) Zinc (2) Copper (3) Cobalt (4) Iron
49. Deficiency of Zn causes the disease :
 (1) Convulsions (2) Liver necrosis
 (3) Dwarfism (4) Kinky-hair syndrome
50. Oxyglobin contains :
 (1) Oxygen in hole of Porphyrin
 (2) Oxygen bonded to Mg
 (3) Oxygen at trans position to histidine chain
 (4) Oxygen not present at all
51. Photochemical Smog is caused by :
 (1) Oxides of Nitrogen
 (2) Hydrocarbons
 (3) Carbon monoxide
 (4) Oxides of N, Hydrocarbons and CO
52. Ozone depletion in Antarctica is due to the formation of :
 (1) Acrolin (2) Peroxyacetylnitrate
 (3) SO₂ and SO₃ (4) Chlorine nitrate
53. Silicosis is caused by :
 (1) Acid rain
 (2) Depletion of Ozone
 (3) Inhalation of aerosols
 (4) Inhalation of SO₂
54. Catechol type siderophore is :
 (1) Ferrichrome
 (2) Enterobactin
 (3) Ferrioxamine
 (4) None of these

55. In the resting state, the level of Ca^{2+} near the muscle fibre is :
 (1) Very low (2) Very high (3) Medium (4) No change
56. The detection limit for anodic stripping voltammetry is :
 (1) 10^{-2} to 10^{-4} m (2) 10^{-4} to 10^{-6} m
 (3) 10^{-9} to 10^{-10} m (4) 10^{-5} to 10^{-7} m
57. Which of the following can be used as end point detection technique in Coulometric titrations ?
 (1) Potentiometry (2) Amperometry
 (3) Conductometry (4) Potentiometric and conductometry
58. A rotating Pt electrode is preferred over DME in the titration involving :
 (1) Bromine (2) Ag^+ ion
 (3) Hg^{2+} ion (4) Br , Ag^+ and Fe^{2+} all
59. In nuclear medicine imaging, radiopharmaceuticals are taken :
 (1) Intravenously (2) Orally
 (3) Both (1) & (2) (4) Neither (1) nor (2)
60. The mode of decay in radio Iodine-131 is :
 (1) α -decay (2) β -decay (3) γ -decay (4) Neutron decay
61. The increased concentration of K^+ in extra cellular fluid causes :
 (1) Hypokalemia (2) Hyperkalemia
 (3) Addison's disease (4) Dyspnea
62. Liver necrosis disease is caused by deficiency of :
 (1) Calcium (2) Chromium (3) Selenium (4) Cobalt
63. Cancer causing chemicals are :
 (1) Oxines & Azo compounds (2) Urethanes & nitrosamines
 (3) Alkylating agents (4) All of these
64. Which iron salt has minimum interference with tetracycline drug absorption in gut ?
 (1) Ferrus sulphate (2) Ferrus fumarate
 (3) Ferrus succinate (4) Ferric - EDTA

65. Which of the following is an antiviral drug ?
 (1) 1-methyl-2-mercaptoimidazole
 (2) 1-methylisatin-3-thiosemicarbazone
 (3) 2-formyl-pyridine thiosemicarbazone
 (4) Aspirin

66. 1-methyl-2-mercaptoimidazole is used as potential agent for :
 (1) Anti thyroid activity
 (2) Anti cancer activity
 (3) Anti bacterial activity
 (4) Anti malarial activity

67. The concentration of Lithium in Plasma should be :
 (1) 2.0 m mol/litre
 (2) 0.4 – 1.6 m mol/litre
 (3) 0.6 – 1.2 m mol/litre
 (4) 2.0 – 2.4 m mol/litre

68. Chemical name of Vitamin B₁₂ is :
 (1) Cyanocobalamin
 (2) Hydroxycobalamin
 (3) Methylcobalamin
 (4) Cyano-, hydroxy – and methyl cobalamin

69. Recommended Dietary allowances for a male (19-70 years) for Vitamin C is :
 (1) 15 mg
 (2) 90 mg
 (3) 20 mg
 (4) 5.0 mg

70. Source for polyphenolic antioxidants are food such as :
 (1) fresh fruits and vegetables
 (2) whole wheat cereals and tea
 (3) vegetable oils
 (4) eggs

71. In CO₂ molecule, the band at 1340 cm⁻¹ due to fermiresonance, has band maxima (doublet) at :
 (1) 1286 and 1388 cm⁻¹
 (2) 1276 and 1398 cm⁻¹
 (3) 1277 and 1397 cm⁻¹
 (4) None of these

72. In AB₃ type TBP molecules, the number of IR active stretching vibrations are :
 (1) Three
 (2) Four
 (3) Two
 (4) Five

73. In thiocyanato complexes, the $C \equiv N$ stretching frequencies are than in isothiocyanato complexes.
- (1) Higher (2) Lower (3) Similar (4) None of these
74. Value of 'g' for an atom having ground state term symbol $^2F_{3/2}$ will be :
 (1) 2.0 (2) 1.33 (3) 1.73 (4) 2.25
75. In EPR spectrum of bis (salicylidamine) copper (II), the hyperfine structure of each major peak consists of :
 (1) Nine subpeaks (2) Fifteen subpeaks
 (3) Eleven subpeaks (4) Ten subpeaks
76. Quadrupole splitting is *not* observed in the MB spectrum of :
 (1) $Fe(CO)_5$ (2) $FeSO_4$ (3) $K_3[Fe(CN)_6]$ (4) $FeCl_3$
77. The radical anion $[ON(SO_3)_2]^{2-}$ shows in ESR :
 (1) A triplet hyperfine structure from nitrogen
 (2) Hyperfine splitting of 13.05 gauss
 (3) No splitting due to S and O
 (4) All of the above
78. Which is *correct* order of chemical shift (δ) decrease in MB spectra ?
 (1) $Cl^- > O_2^- > N_3^- > CN^-$
 (2) $CN^- > O_2^- > N_3^- > Cl^-$
 (3) $Cl^- > CN^- > O_2^- > N_3^-$
 (4) $CN^- > N_3^- > O_2^- > Cl^-$
79. Which does *not* apply to mass spectrometry ?
 (1) Magnetic field (2) Acceleration potential
 (3) Microwaves (4) Ionization and fragmentation
80. Which change is *not* detected by DTA ?
 (1) Polymer softening (2) Desorption
 (3) Sublimation (4) Loss of moisture
81. Stability of nucleus is due to :
 (1) Long-range forces (2) Short-range forces
 (3) Pion cloud only (4) None of the above

82. Which nuclear model can best explain that all elements with atomic number greater than 92 are radioactive ?

- (1) Liquid Drop Model
 (2) Shell Model
 (3) Collective Model
 (4) All of these

83. What is the total binding energy of ${}^6_3\text{Li}$ nucleus having atomic mass 6.0170 amu ?

- (Mass of proton = 1.00727 a.m.u. and mass of neutron = 1.008665 amu)
 (1) 28.82 MeV
 (2) 27.89 MeV
 (3) 28.69 MeV
 (4) 27.69 MeV

84. Spallation reactions are initiated by high speed :

- (1) Protons
 (2) α -particles
 (3) Both Protons and α -particles
 (4) None of these

85. ${}^{27}_{13}\text{Al}$ is a stable isotope. It is expected to disintegrate by :

- (1) α - emission
 (2) β^- emission
 (3) β^+ emission
 (4) Proton emission

86. The heptacy of tropylium ion is :

- (1) n^5
 (2) n^1
 (3) n^7
 (4) n^3

87. Fluxional behaviour in a molecule can be detected by :

- (1) IR spectroscopy
 (2) X-rays
 (3) NMR spectroscopy
 (4) UV-Vis spectroscopy

88. Ziegler-Natta catalyst is :

- (1) $\text{TiCl}_4 - \text{AlEt}_3$
 (2) $\text{RhCl}(\text{PPh}_3)_3$
 (3) $\text{CO}_2(\text{CO})_8$
 (4) PdCl_2^-

89. Electrophilic Carbene ligands are also called :

- (1) Fischer Carbene
 (2) Schrock Carbene
 (3) Homonuclear Carbene
 (4) Heteronuclear Carbene

90. In Ferrocene, which metal orbital interacts with the composite ring orbitals C_pE_{1g} of ligand for the formation of covalent bonds :

- (1) $4pz, 4px$
 (2) $3d_{xz}, 3d_{yz}$
 (3) $3d_{xy}, 3d_{x^2-y^2}$
 (4) $(DS)_x, (DS)_y$

91. The C = C infrared absorption peak of $[Mn(n^3-C_3H_5)(CO)_4]$ appears at: (1) 1620 cm^{-1} (2) 1570 cm^{-1} (3) 1505 cm^{-1} (4) 1520 cm^{-1}
92. Which metal alkynes complex is $4e^-$ donor?
 (1) $Pt^{II}Cl_2$ (p-toluidine) $Bu^+C \equiv C Bu^+$
 (2) $Pt^0(PPh_3)_2(Ph)C \equiv C Ph$
 (3) $[C_2H_2CO_2(CO)_6]$
 (4) None of the above
93. Transition metal alkene complexes are readily attacked by:
 (1) Electrophile
 (2) Nucleophile
 (3) Both Electrophile and Nucleophile
 (4) No reaction with electrophile & nucleophile
94. Which of the following does *not* obey EAN rule?
 (1) $V(CO)_3(\pi-C_5H_5)(R_2C = CR_2)_2$ (2) $Co(CO)_2(\pi-C_5H_5)$
 (3) $Fe(\sigma-C_5H_5)(\pi-C_5H_5)(CO)_3$ (4) $Cr(C_6H_6)(CO)_3$
95. Proton NMR spectrum of $(n^1Cp)(n^5Cp)Fe(CO)_2$ at ambient temperature shows:
 (1) Two singlets of almost equal intensity
 (2) A singlet and a multiplet of equal intensity
 (3) One singlet of high intensity
 (4) Two multiplets of equal intensity
96. The current due to supporting electrolyte is called:
 (1) Residual Current
 (2) Diffusion Current
 (3) Migration Current
 (4) Alternate Current
97. In anodic stripping voltametry, the concentration of metal ions is in the range of:
 (1) 10^{-3} to 10^{-6} m
 (2) 10^{-4} to 10^{-7} m
 (3) 10^{-5} to 10^{-8} m
 (4) 10^{-5} to 10^{-10} m

98. The half wave potential for Cu^{2+} in 1 M NaOH is :
 (1) -1.12 V (2) -0.41 V (3) -1.53 V (4) -1.46 V

99. The diffusion current in polarography is given by :

- (1) $i_d = i_l - i_r$ (2) $i_d = i_l + i_r$ (3) $i_d = 2i_l - i_r$ (4) $i_d = i_l - 2i_r$

100. Ion-selective membrane used in ion selective electrodes are :

- (1) Glass membranes (2) Crystalline membranes
 (3) Ion exchange resin membranes (4) All of the above

OPTION - B : PHYSICAL CHEMISTRY

41. Select the correction equation from the following :

(1) $\left(\frac{\partial V}{\partial T}\right)_S = C_p \left(\frac{\partial P}{\partial T}\right)_V$ (2) $\left(\frac{\partial V}{\partial S}\right)_T = \frac{T}{C_p} \left(\frac{\partial V}{\partial T}\right)_P$

(3) $\left(\frac{\partial T}{\partial V}\right)_V = C_v \left(\frac{\partial T}{\partial P}\right)_V$ (4) $\left(\frac{\partial V}{\partial S}\right)_P = \frac{T}{C_p} \left(\frac{\partial V}{\partial T}\right)_P$

42. Which of the following is *not* a state function ?

- (1) Work (2) Heat (3) Enthalpy (4) Entropy

43. The fundamental vibrational frequency of a molecule is 1035 cm^{-1} . Its force constant would be :

- (1) $4\pi^2 c^2 \mu (1035)^2 \times 10^4$ (2) $4\pi^2 c^2 \mu^2 (1035)^2 \times 10^2$
 (3) $4\pi^2 c^2 \mu (1035)^2 \times 10^4$ (4) $4\pi^2 c^2 \mu (1035)^2 \times 10^2$

44. The pH of a solution is 6. Acid is added to decrease the pH to 4. The increase in hydrogen ion concentration is :

- (1) Hundred times (2) Two times

- (3) Thousand times (4) Ten times

45. The quantum yield of photochemical gas reaction $2HI \rightleftharpoons H_2 + I_2$ at wavelength 2400 Å is :

- (1) 0.20 (2) 10^3 (3) 10 (4) 2

46. Which of the following statement is correct ?

- (1) A triple point is invariant
- (2) A triple point is monovariant
- (3) A triple point is also called incongruent melting point
- (4) Eutectic point is same as triple point

47. Mean free path of a gas molecule is :

- (1) independent of pressure
- (2) inversely proportional to temperature
- (3) directly proportional to pressure
- (4) None of these

48. Van't Hoff equation ; (at $c \rightarrow 0$) for predicting molar mass of a polymer solution reduces to :

$$(1) \lim_{c \rightarrow 0} \left(\frac{c}{R} \right) \left(\frac{\pi}{M} \right) = \frac{M}{T} \quad (2) \lim_{c \rightarrow 0} \left(\frac{c}{\pi} \right) \left(\frac{M}{T} \right) = \frac{M}{T}$$

$$(3) \lim_{c \rightarrow 0} \left(\frac{c}{\pi} \right) \left(\frac{M}{RT} \right) = \frac{M}{T} \quad (4) \lim_{c \rightarrow 0} \left(\frac{c}{\pi} \right) \left(\frac{RM}{T} \right) = \frac{M}{T}$$

Where π is the osmotic pressure.

49. The heterogeneity of the polymer sample is called its :

- (1) Polydispersity index
- (2) Monodispersity
- (3) Average molecular mass
- (4) Polydispersity

50. Oriental polarizability α , is related to temperature T , as :

$$(1) \alpha = \frac{3KT}{\mu} \quad (2) \alpha = \frac{3KT}{\mu^2} \quad (3) \alpha = \frac{KT}{\mu} \quad (4) \alpha = \mu KT$$

where all the symbols have usual significance.

51. $\psi_{21(-1)}$ represents :

- (1) 2s orbital
- (2) 2p_x orbital
- (3) 2p_y orbital
- (4) 2p_z orbital

52.

The average of a measurable property p_x , can be determined by employing relation :

$$(1) \langle p_x \rangle = \frac{\int \hat{p}_x \phi \phi^* d\tau}{\int \phi \phi^* d\tau}$$

$$(3) \langle p_x \rangle = \frac{\int \phi \phi^* \hat{p}_x d\tau}{\int \phi \phi^* d\tau}$$

$$(2) \langle p_x \rangle = \frac{\int \phi \hat{p}_x \phi^* d\tau}{\int \phi \phi^* d\tau}$$

(4) None of the above

53.

$\left[x, \frac{d}{dx} \right]$ will yield :

(1) zero

(2) 1

(3) -1

(4) 2

54.

The Hamiltonian operator for a Helium atom is expressed by :

$$(1) \hat{H} = -\frac{\hbar^2}{2m} (\nabla_1^2 + \nabla_2^2) + \frac{e^2}{r_{12}}$$

$$(2) \hat{H} = -\frac{\hbar^2}{2m} (\nabla_1^2 + \nabla_2^2) + \frac{ze^2}{r_1} + \frac{ze^2}{r_2}$$

$$(3) \hat{H} = -\frac{\hbar^2}{2m} (\nabla_1^2 + \nabla_2^2) - \frac{ze^2}{r_1} - \frac{ze^2}{r_2} + \frac{e^2}{r_{12}}$$

$$(4) \hat{H} = -\frac{\hbar^2}{2m} (\nabla_1^2 + \nabla_2^2) - \frac{ze^2}{r_1} - \frac{ze^2}{r_2} + \frac{e^2}{r_{12}}$$

where ∇_1 and ∇_2 are Laplacian operators for electrons 1 and 2 respectively. All other symbols have usual significance.

55.

The Eigen value is/can :

(1) always positive

(2) always negative

(3) be zero

(4) be positive as well as negative

56. The step down ladder operator is :
- (1) $\hat{J}_+ = \hat{J}_x + i\hat{J}_y$ (2) $\hat{J}_+ = \hat{J}_x - i\hat{J}_y$ (3) $\hat{J}_- = \hat{J}_x + i\hat{J}_y$ (4) $\hat{J}_- = \hat{J}_x - i\hat{J}_y$

where all the symbols have usual significance.

57. Molecules orbital theory :
- (1) underestimates the importance of covalent structures
 (2) overestimates the importance of ionic structures
 (3) puts equal importance on both ionic and covalent structures
 (4) None of the above

58. Operators \hat{A} and \hat{B} are said to be commutative, if :

- (1) $\hat{A} + \hat{B} = 0$ (2) $\hat{A} - \hat{B} = 0$
 (3) $\hat{A}\hat{B} + \hat{B}\hat{A} = 0$ (4) $\hat{A}\hat{B} - \hat{B}\hat{A} = 0$

59. Which of the following is correct ?

- (1) $[\hat{L}_x^2, \hat{L}_z] > 0$ (2) $[\hat{L}_x^2, \hat{L}_z] < 0$
 (3) $[\hat{L}_x^2, \hat{L}_z] = 0$ (4) $[\hat{L}_x^2, \hat{L}_z] = i\hbar\hat{L}_x$

60. Which of the following is true ?

- (1) $q_{tr} \gg q_{rot} \gg q_{vib} \gg q_{elect}$ (2) $q_{tr} \gg q_{vib} > q_{rot} > q_{elect}$
 (3) $q_{tr} \gg q_{rot} \gg q_{vib} \gg q_{elect}$ (4) $q_{tr} < q_{vib} < q_{rot} < q_{elect}$

where q_{tr} , q_{rot} , q_{vib} and q_{elect} are translational, rotational, vibrational and electronic partition function.

61. When Pt and Co are electrically connected, which one gets corroded ?
 (1) Pt (2) Co (3) Cannot decide (4) None

62. Pipes of different materials, such as copper and steels, should not be embedded in a trench in close proximity to avoid :

- (1) deposition of copper on steel pipe
 (2) depassivation of steel
 (3) corrosion of copper pipes
 (4) galvanic corrosion

63. If moisture and dirt entrapment is a major problem, it would be good practice to :
 (1) Spot weld (2) Skip weld (3) Stitch weld (4) Butt weld
64. The number of α and β particles emitted by $^{218}_{81}\text{Ra}$ in changing to a stable isotope of $^{206}_{82}\text{Pb}$ will be :
 (1) 3 and 2 (2) 2 and 4 (3) 3 and 4 (4) 3 and 1
65. Milk is a/an :
 (1) Emulsion (2) Gel (3) Suspension (4) Pure solution
66. At temperature near absolute zero, gaseous particles possess only :
 (1) Translational energy (2) Vibrational energy
 (3) Rotational energy (4) Rotational and vibrational energy
67. Lattice strength of various types of crystals vary as :
 (1) Ionic > covalent > metallic > molecular
 (2) Covalent > metallic > ionic > molecular
 (3) Metallic > covalent > ionic > molecular
 (4) Covalent > ionic > metallic > molecular
68. The energy per mole of light having wavelength of 85 nm is :
 (1) $1.207 \times 10^6 \text{ J mole}^{-1}$ (2) $1.307 \times 10^6 \text{ J mole}^{-1}$
 (3) $1.407 \times 10^6 \text{ J mole}^{-1}$ (4) $1.507 \times 10^6 \text{ J mole}^{-1}$
69. Which of the following has been used in the manufacture of non-inflammable photographic films ?
 (1) Cellulose nitrate (2) Cellulose xanthate
 (3) Cellulose perchlorate (4) Cellulose acetate
70. Which of the following is an irreversible cell ?
 (1) $\text{Zn}/\text{Zn}^{2+}/\text{AgCl}/\text{Ag}$ (2) $\text{Zn}/\text{H}_2\text{SO}_4/\text{Ag}$
 (3) $\text{Zn}/\text{Zn}^{2+} // \text{Cd}^{2+}/\text{Cd}$ (4) $\text{Cd}/\text{Cd}^{2+} // \text{KCl}, \text{Hg}_2\text{Cl}_2(\text{s})/\text{Hg}$

71. The radius of ${}^{27}_{13}\text{Al}$ nucleus is :
 (1) 4.5×10^{-15} m
 (2) 4.5×10^{-14} m
 (3) 4.5×10^{-16} m
 (4) 4.5×10^{-13} m
72. Let a molecule AB_6 belongs to O_h point group. The point group that result if it is changed to AB_5C would be :
 (1) D_{4h}
 (2) C_{2v}
 (3) C_{4v}
 (4) None of these
73. Water molecule belongs to point group :
 (1) C_{3v}
 (2) C_{2v}
 (3) D_{4h}
 (4) D_{2h}
74. The hyperfine splitting constant, 'a' utilized to map the molecular orbital occupied by unpaired electron is related by :
 (1) $a = Q^e$
 (2) $A = Q/e$
 (3) $a = Q + e$
 (4) $A = Q - e$
 where e is the unpaired density on a carbon atom.
75. The Mossbauer spectra of $K_4Fe(CN)_6$ and $[K_3Fe(CN)_5NO]$ consist of, respectively :
 (1) one line each
 (2) two lines each
 (3) two and four lines
 (4) one and two lines
76. The power output of a laser in which a 2.0 J pulse can be delivered in one nanosecond is :
 (1) 2.0 GW
 (2) 0.20 GW
 (3) 20.0 GW
 (4) 0.02 GW
77. The Miller indices of crystal plane which cut through the crystal axis at $(2a, 3b, c)$ are :
 (1) (236)
 (2) (326)
 (3) (623)
 (4) (362)
78. Frenkel defects appear in crystals, in which :
 (1) positive ions are much larger than the negative ions
 (2) positive ions are equal to negative ions in size
 (3) negative ions are much larger than the positive ions
 (4) None of the above
79. The coordination number of an atom in a face-centred cubic unit cell is :
 (1) 1
 (2) 6
 (3) 8
 (4) 12

80. The probability factor in collision theory of reaction rates should be interpreted in terms of :
 (1) Enthalpy (2) Free energy (3) Entropy (4) Viscosity
81. NMR transition is shifted from the reference in a 400 MHz spectrometer by 529 Hz. The chemical shift is :
 (1) 1.32 (2) 5.29 (3) 1.82 (4) 7.58
82. If activation energy of a certain reaction is zero, then rate constant will be equal to :
 (1) infinity (2) A (3) zero (4) A^{-1}
 where A is the frequency factor.
83. Which one of the following statements about ionization in mass spectrometer is *incorrect* ?
 (1) Gaseous atoms are ionized by bombarding them with high energy electrons
 (2) Atoms are ionized so they can be accelerated
 (3) Atoms are ionized so they can be deflected
 (4) It doesn't matter how much energy you use to ionize atoms
84. The region of an infra-red spectrum where many absorptions takes place is known as :
 (1) Thumb print region
 (2) Hand print region
 (3) Finger print region
 (4) Foot print region
85. No diffraction would result, if :
 (1) $\lambda < 2d$ (2) $\lambda > 2d$ (3) $\lambda = 2d$ (4) $\lambda > d$
86. Marcus refined the RRR theory by taking into consideration :
 (1) vibrations of the energized molecule
 (2) rotations of the energized molecule
 (3) all vibrations and rotation of the energized molecule
 (4) None of these
 which in turn led to RRKM theory
87. The steric factor, P is related to Entropy of activation, ΔS^\ddagger by :
 (1) $P = \frac{RT}{ZNh} \cdot e^{\Delta S^\ddagger/R}$
 (2) $P = \frac{RT}{ZNh} \cdot e^{-\Delta S^\ddagger/R}$
 (3) $P = \frac{RT}{h} \cdot e^{\Delta S^\ddagger/R}$
 (4) $P = \frac{RT}{ZNh} \cdot e^{\Delta S^\ddagger/RT}$

88. The Gibbs adsorption equation is :
- $$(1) \Gamma = -\frac{C}{RT} \cdot \frac{d\mu}{dC}$$
- $$(2) \Gamma = -\frac{R}{CT} \cdot \frac{d\mu}{dC}$$
- $$(3) \Gamma = -\frac{C}{RT} \cdot \frac{d\mu}{dC}$$
- $$(4) \Gamma = -\frac{R}{CT} \cdot \frac{d\mu}{dC}$$
- where all the notations have usual significance.
89. The cell potential is a :
- (1) Thermodynamic property
 - (2) Colligative property
 - (3) Extensive property
 - (4) Intensive property
90. How many normal modes of vibration are possible for benzene molecule ?
- (1) 6
 - (2) 30
 - (3) 12
 - (4) 8
91. Synthetic fibres like nylon-66 are very strong because :
- (1) They have linear molecules consisting of very long chains
 - (2) They have high molecular weights and high melting points
 - (3) They have a high degree of cross-linking by strong carbon-carbon bond
 - (4) They have linear molecules interlinked with forces like hydrogen bonding
92. Polyethene is :
- (1) Thermosetting
 - (2) Thermoplastic
 - (3) Both (1) and (2)
 - (4) None of these
93. A solid acts as an adsorbent because it has :
- (1) a definite shape
 - (2) a high lattice energy
 - (3) unsaturated valencies
 - (4) small pores in it
94. According to Langmuir adsorption isotherm, the amount of gas adsorbed at very high pressure :
- (1) goes on decreasing with pressure
 - (2) goes on increasing with pressure
 - (3) increases first and decreases later with pressure
 - (4) reaches a constant limiting value

95. Lyophobic sols are more stable than lyophobic sols because :
 (1) The colloidal particles are solvated
 (2) The colloidal particles have positive charge
 (3) The colloidal particles have no charge
 (4) There are strong electrostatic repulsions between the negatively charged colloidal particles
96. Which statement corresponds to the case where the chemical shift difference between two coupling protons is less than five times the coupling constant ?
 (1) An Ax pattern is observed
 (2) An AB pattern is observed
 (3) A first order spectrum is expected
 (4) An undistorted binomial pattern is expected
97. Which of the following statement is false about NMR experiment ?
 (1) The energy difference between two spin states depends on the strength of magnetic field
 (2) When energy absorption occurs, the nuclei are said to be in resonance with the electromagnetic radiation
 (3) The energy required to flip the spin of a proton is in the infrared region of the electromagnetic radiation
 (4) None of these
98. The number of microstates for distributing three atoms among energy states, having three quanta of energy are :
 (1) 1
 (2) 6
 (3) 10
 (4) 3
99. The rotational energy possessed by atom having one degree of atom is :
 (1) RT
 (2) kT
 (3) $\frac{1}{2}RT$
 (4) $\frac{1}{2}kT$
100. Translational partition function, q_t is expressed by :
 (1) $q_t = \frac{RT}{(2\pi mkT)^{3/2} V}$
 (2) $q_t = \frac{RT}{(2\pi mkT)^{3/2}}$
 (3) $q_t = \frac{RT}{(2\pi mkT)^{3/2} V}$
 (4) $q_t = \frac{J}{(2\pi mkT)^{3/2}}$

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41. By which of these, acetophenone can be converted to phenol :
 (1) m-CPBA followed by base catalyzed hydrolysis
 (2) Conc. HNO_3
 (3) Iodine and $NaOH$
 (4) singlet oxygen followed by base catalyzed hydrolysis
42. Diazomethane with acetylene gives :
 (1) Pyrazole (2) Pyrazoline (3) Piperidine (4) Pyrimidine
43. Which is used for treating Gout ?
 (1) Reserpine (2) Atropine (3) Colchicine (4) None
44. Cinnamoyl alcohol upon treatment with lead tetraacetate gives :
 (1) Acetophenone (2) Cinnamic acid
 (3) Propanal (4) Cinnamaldehyde
45. Which is a strong base ?
 (1) Aniline (2) Cyclohexylamine
 (3) Pyrrole (4) Quinoline
46. In SN^2 displacement on methyl bromide, which is most effective ?
 (1) $C_2H_5O^-$ (2) HO^- (3) $C_6H_5O^-$ (4) CH_3COO^-
47. Of these which reacts fastest with N-bromosuccinimide (NBS) ?
 (1) Toluene (2) Methane (3) Pyridine (4) Benzene
48. Generally, an increase in solvent polarity for the reaction between alkylhalide and OH^- :
 (1) Increases the rate of SN^1 reaction
 (2) Decreases the rate of SN^2 reaction
 (3) Increases the rate of SN^2 reaction
 (4) Does not change the rate of SN^1 and SN^2 reactions

49. Which of these is the best leaving group?
 (1) Chloride (2) Fluoride (3) Tosylate (4) None
50. Of these which is least reactive?
 (1) CH_2N_2 (2) $CH_2 = C = O$ (3) $:CH_2$ (4) $\cdot CH_2$
51. By adding sodium dodecyl sulfate during the electrophoresis of proteins, it is possible to:
 (1) determine a protein's isoelectric point
 (2) determine an enzyme's specific activity
 (3) preserve a protein's native structure
 (4) determine the amino acid composition
52. The triplet carbene with cis-alkene gives:
 (1) cis-product
 (2) trans-product
 (3) both cis and trans products
 (4) no product
53. DNFB is used to identify the N-terminal amino acid of peptides. What is this reagent called?
 (1) Van-Slyke Reagent
 (2) Sorenson Reagent
 (3) Sanger's Reagent
 (4) None of these
54. Internal reference for F-19 is:
 (1) NaF (2) CF_4 (3) $CFCl_3$ (4) NH_4F
55. What is the internal reference for N-15?
 (1) Liq. NH_3 (2) NH_4OH (3) NH_4Cl (4) NH_4F
56. Magic angle in degrees along z-direction in NMR is:
 (1) 45.1 (2) 54.7 (3) 135.3 (4) 125.3
57. Boltzmann population excess for protons at 800 MHz at 298 K is:
 (1) 16 (2) 32 (3) 48 (4) 128

66. Which is a better Diels-Alder diene for reaction with maleic anhydride ?
 (1) Furan
 (2) Pyrrole
 (3) Thiophene
 (4) Pyridine
65. Continuous wave NMR spectroscopy gives a spectrum which is :
 (1) Frequency domain
 (2) Time domain
 (3) Both of these
 (4) None of these
64. The number of orientations for B-11 with respect to applied field is :
 (1) 2
 (2) 3
 (3) 4
 (4) 5
63. The general chemical shift range for P-31 in ppm is :
 (1) 0 - 500
 (2) 0 - 600
 (3) 0 - 700
 (4) 0 - 1000
62. The NH protons in coproporphyrin absorb at about what ppm ?
 (1) + 1.0
 (2) (-) 2.0
 (3) (+) 3.0
 (4) (-) 4.0
61. Which is *correct* pair about the use of a matrix in mass spectrometry ?
 (1) ESI + MALDI
 (2) FAB + MALDI
 (3) EI + MALDI
 (4) CI + MALDI
60. What is *incorrect* about electron impact ionization technique ?
 (1) It always leads to the appearance of the parent peak in the mass spectrum
 (2) It is a "hard" technique
 (3) It involves more fragmentation of the parent peak in comparison to the Chemical Ionization (CI) technique
 (4) It involves a potential of 50 - 70 eV for ionization
59. Which aromatic band shows fine structure in UV spectrum ?
 (1) primary
 (2) secondary
 (3) tertiary
 (4) none
58. ROH signal appears at about what ppm range in NMR ?
 (1) 0.5 - 5.0
 (2) 0.1 - 8.0
 (3) 0.3 - 4.0
 (4) 0.3 - 10.0

67. The thermal ring opening reactions of cyclobutenes are :
 (1) Conrotatory
 (2) Disrotatory
 (3) Conrotatory or disrotatory depending upon the reaction temperature
 (4) Cannot be predicted
68. Which is *not* used in treatment of arthritis ?
 (1) Glucosamine sulfate
 (2) Chondroitin sulfate
 (3) Methylsulfonyl methane
 (4) Tosylchloride
69. Hexene-1 after reaction with metachloroperoxybenzoic acid followed by treatment with Lithium aluminium hydride and then with water in acidic medium gives :
 (1) Hexane
 (2) Hexan-1-ol
 (3) Hexan-2-ol
 (4) None
70. Betaine is an intermediate in :
 (1) Wittig Reaction
 (2) Stobbe Reaction
 (3) Stephenson Reduction
 (4) MPV Reduction
71. Which is *not* an anticancer drug ?
 (1) Vincristine
 (2) Cyclophosphamide
 (3) Doxorubicin
 (4) Gabapentin
72. What kind of spectroscopy is FT NMR ?
 (1) Absorption
 (2) Emission
 (3) Both of these
 (4) None
73. The presence of a bromine is indicated in a compound if its mass spectrum shows M and M + 2 peaks in the intensity ratio :
 (1) 2 : 1
 (2) 3 : 1
 (3) 1 : 1
 (4) 1 : 2
74. LAH in combination with $AlCl_3$ can be used to convert diarylketone (Ar_2CO) into :
 (1) Ar_2CHOH
 (2) Ar_2CH_2
 (3) $ArCHOAr$
 (4) $Ar - Ar$
75. 1,3-Dithiane is a structural equivalent of :
 (1) Acylcarbanion
 (2) Formylcarbanion
 (3) Acyl carbonium ion
 (4) Formylcarbonium ion

76. Select the right decreasing order of nucleophilicity :
- (1) $\text{CH}_3-\overset{\ominus}{\text{C}}\text{H}_2 > \overset{\ominus}{\text{N}}\text{H}_2 > \overset{\ominus}{\text{C}}\text{H} > \overset{\ominus}{\text{O}}\text{H}$
 - (2) $\overset{\ominus}{\text{C}}\text{H} > \overset{\ominus}{\text{N}}\text{H}_2 > \overset{\ominus}{\text{C}}\text{H} > \overset{\ominus}{\text{O}}\text{H}$
 - (3) $\overset{\ominus}{\text{O}}\text{H} > \overset{\ominus}{\text{N}}\text{H}_2 > \overset{\ominus}{\text{C}}\text{H} > \overset{\ominus}{\text{C}}\text{H}_3-\overset{\ominus}{\text{C}}\text{H}_2$
 - (4) $\overset{\ominus}{\text{N}}\text{H}_2 > \overset{\ominus}{\text{C}}\text{H} > \overset{\ominus}{\text{O}}\text{H} > \overset{\ominus}{\text{C}}\text{H}_3-\overset{\ominus}{\text{C}}\text{H}_2$
77. The ratio $M|M + 2$ for the presence of chlorine in a compound in its mass spectrum is :
- (1) 3 : 1
 - (2) 1 : 2
 - (3) 4 : 2
 - (4) 2 : 1
78. Which is right about stretching frequencies of C = C and C = O in i. r. spectroscopy from intensity point of view ?
- (1) $\nu_{\text{C}=\text{O}}$ is stronger than $\nu_{\text{C}=\text{C}}$
 - (2) $\nu_{\text{C}=\text{O}}$ is weaker than $\nu_{\text{C}=\text{C}}$
 - (3) $\nu_{\text{C}=\text{O}}$ and $\nu_{\text{C}=\text{C}}$ have equal intensity
 - (4) None of these
79. What is the decreasing order of chemical shifts for protons among these compounds ?
- (1) Alkynes > Alkanes > Alkenes
 - (2) Alkynes > Alkenes > Alkanes
 - (3) Alkanes > Alkynes > Alkenes
 - (4) Alkenes > Alkynes > Alkanes
80. Mass spectroscopy requires a minimum sample size of :
- (1) Micrograms
 - (2) Nanograms
 - (3) Picograms
 - (4) Grams
81. Internal reference for phosphorus-31 is :
- (1) H_3PO_2 (85%)
 - (2) H_3PO_4 (85%)
 - (3) H_3PO_3 (85%)
 - (4) None of these
82. Oct-4-ene shows C = C frequency in its i. r. spectrum at :
- (1) 1680 - 1600 cm^{-1} (vw)
 - (2) 1680 - 1600 cm^{-1} (s)
 - (3) 1680 - 1600 cm^{-1} (m)
 - (4) No peak in this region
83. Continuous wave NMR spectroscopy involves :
- (1) simultaneous detection of all resonances
 - (2) sequential detection of resonances of nuclei
 - (3) first simultaneous followed by sequential detection of resonances
 - (4) sometimes sequential and sometimes simultaneous detection of resonances

84. The C_{60} fullerene shows lesser number of peaks in the i. r. spectrum because :
 (1) It contains a graphite like structure
 (2) It is asymmetric
 (3) It contains sp^3 , sp^2 and sp carbons
 (4) It has a symmetrical structure
85. Carbonyl compounds exhibit the transition :
 (1) $\sigma - \sigma^* 2 \pi - \pi^*$
 (2) $\sigma - \pi^*$, $\pi - \pi^*$, $n - \pi^*$
 (3) $\sigma - \sigma^*$, $n - \sigma^*$, $\pi - \pi^*$
 (4) None of these
86. What is *incorrect* for SN^1 reactions ?
 (1) Rearrangement is possible
 (2) Rate is affected by solvent polarity
 (3) The strength of the nucleophile is important in determining the rate
 (4) The order of reactivity is $3^\circ > 2^\circ > 1^\circ$
87. Number of orientations with respect to applied magnetic field for deuterium is :
 (1) 2
 (2) 3
 (3) 1
 (4) 4
88. Aspartic acid shows :
 (1) pK_{a1}
 (2) pK_{a2}
 (3) pK_{a1} and pK_{a2}
 (4) pK_{a1} , pK_{a2} and pK_{a3}
89. Which is *incorrect* regarding grading of sugars ?
 (1) Sucrose-1
 (2) Fructose-1.75
 (3) Lactose-6
 (4) Saccharin-3500
90. In trimethylaluminium cation, the o, m and p-protons are deshielded because of :
 (1) Resonance
 (2) Inductive effect
 (3) Both of these
 (4) None of these
91. The protons of the middle carbon in allyl carbanion absorb at what ppm ?
 (1) 2.46
 (2) 4.75
 (3) 1.5
 (4) 6.28
92. Which of these enhances the absorption of Vitamin A ?
 (1) Vit. E
 (2) Vit. K
 (3) DMG
 (4) None

93. The CH proton in isopropyl carbocation absorbs at what ppm ?
 (1) 5.06 (2) 6.28 (3) 4.75 (4) 13.50
94. What is the *correct* decreasing order of reactivity towards electrophilic aromatic substitution ?
 (1) Indole > Pyrrole > Pyridine
 (2) Pyrrole > Pyridine > Indole
 (3) Pyrrole > Indole > Pyridine
 (4) Indole > Pyridine > Pyrrole
95. Which is an Anti-cancer drug ?
 (1) Camptothecin (2) Captopril
 (3) Carprofen (4) Etodolac
96. Which is a formylanion equivalent ?
 (1) 1,4-dithiane
 (2) Ethyl chloroformate
 (3) Nitromethane
 (4) Acetylene
97. The CH proton in allyl carbocation absorbs at what ppm ?
 (1) 2.56 (2) 9.64 (3) 8.97 (4) 3.56
98. The carboxypeptidase enzyme contains :
 (1) Zinc (II) and hydrolyzes COO bond
 (2) Mg (II) and hydrolyzes COO bond
 (3) Zinc (II) and hydrolyzes peptide bond
 (4) Mg (II) and hydrolyzes peptide bond
99. What is *correct* about relaxation times ?
 (1) $T_2 = T_1$ (2) $T_2 > T_1$ (3) $T_2 < T_1$ (4) None of these
100. CMR spectrum of camphor shows how many peaks for carbons ?
 (1) 10 (2) 9 (3) 8 (4) 7