

TEACHERS' RECRUITMENT BOARD

WRITTEN COMPETITIVE EXAMINATION

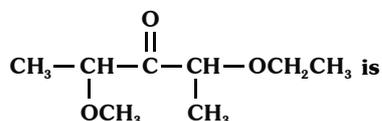
FOR POST GRADUATE ASSISTANTS (2006 - 2007)

TIME ALLOWED : 3 HOURS

CHEMISTRY

MAX. MARKS : 150

1. The IUPAC name of the compound:

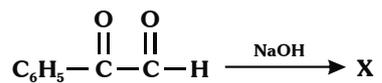


- A) 2-ethoxy-4-methoxy pentan-3-one
 B) 2-methoxy-4-ethoxy pentan-3-one
 C) 2-ethoxy-4-methoxy 4-methyl butanone
 D) 2-methoxy-4-ethoxy 4-methyl butanone

2. Which of the following alkyl halides would be the most reactive in an S_N2 reaction?

- A) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$
 B) $\begin{array}{c} \text{C}_6\text{H}_5 - \text{CH} - \text{CH}_2\text{Br} \\ | \\ \text{CH}_3 \end{array}$
 C) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{C}_6\text{H}_5 - \text{C} - \text{Br} \\ | \\ \text{CH}_3 \end{array}$
 D) $\begin{array}{c} \text{C}_6\text{H}_5\text{CH}_2 - \text{CH} - \text{CH}_3 \\ | \\ \text{Br} \end{array}$

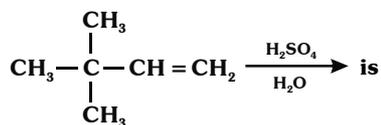
3. In the reaction



the predominant product X formed is

- A) $\begin{array}{c} \text{O} \\ \parallel \\ \text{C}_6\text{H}_5 - \text{C} - \text{COONa} \end{array}$
 B) $\begin{array}{c} \text{O} \\ \parallel \\ \text{C}_6\text{H}_5 - \text{C} - \text{CH}_2\text{OH} \end{array}$
 C) $\begin{array}{c} \text{C}_6\text{H}_5 - \text{CH} - \text{COONa} \\ | \\ \text{OH} \end{array}$
 D) $\begin{array}{c} \text{O} \quad \text{O} \\ \parallel \quad \parallel \\ \text{C}_6\text{H}_5 - \text{C} - \text{C} - \text{C}_6\text{H}_5 \end{array}$

4. The major product obtained in the reaction



- A) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH} - \text{CH}_3 \\ | \quad | \\ \text{CH}_3 \text{OH} \end{array}$
 B) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH}_2\text{OH} \\ | \\ \text{CH}_3 \end{array}$
 C) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH} - \text{CH}_3 \\ | \quad | \\ \text{OH} \quad \text{CH}_3 \end{array}$
 D) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH} - \text{CH} - \text{CH}_2\text{OH} \\ | \\ \text{CH}_3 \end{array}$

5. Which of the following is an example of Hunsdiecker reaction?

- A) $\text{CH}_2(\text{COOH})_2 \xrightarrow{\Delta} \text{CH}_3\text{COOH}$
 B) $\text{CH}_3\text{COCH}_2\text{COOH} \xrightarrow{\Delta} \text{CH}_3\text{COCH}_3$
 C) $2\text{C}_6\text{H}_5\text{Cl} \xrightarrow{\text{Na}} \text{C}_6\text{H}_5 - \text{C}_6\text{H}_5$
 D) $\text{CH}_3\text{CH}_2\text{COOH} \xrightarrow[\text{ii) Br}_2/\text{CCl}_4]{\text{i) Ag}_2\text{O}} \text{CH}_3\text{CH}_2\text{Br}$

6. In the Baeyer-Villiger oxidation of alkyl aryl ketones, the migratory aptitude of the aryl groups is in the order

- A) p-chlorophenyl > p-anisyl > p-tolyl > phenyl
 B) phenyl > p-tolyl > p-anisyl > p-chlorophenyl
 C) p-anisyl > p-tolyl > phenyl > p-chlorophenyl
 D) p-chlorophenyl > phenyl > p-tolyl > p-anisyl

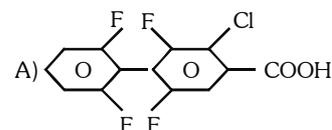
7. Arrange the following in the order of acidity :

- H_2O , $\text{HC} \equiv \text{CH}$, NH_3 , $\text{CH}_3 - \text{CH}_3$
 A) $\text{H}_2\text{O} > \text{HC} \equiv \text{CH} > \text{NH}_3 > \text{CH}_3\text{CH}_3$
 B) $\text{HC} \equiv \text{CH} > \text{H}_2\text{O} > \text{NH}_3 > \text{CH}_3\text{CH}_3$
 C) $\text{CH}_3\text{CH}_3 > \text{HC} \equiv \text{CH} > \text{NH}_3 > \text{H}_2\text{O}$
 D) $\text{H}_2\text{O} > \text{NH}_3 > \text{HC} \equiv \text{CH} > \text{CH}_3\text{CH}_3$

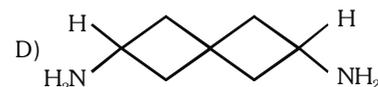
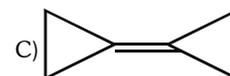
8. Orlon is obtained by the polymerisation of

- A) $\text{CH}_2 = \text{CH} - \text{Cl}$
 B) $\text{CH}_2 = \text{CH} - \text{CN}$
 C) $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$
 D) $\text{C}_6\text{H}_5 - \text{CH} = \text{CH}_2$

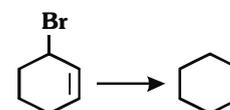
9. Which of the following compounds exhibit optical isomerism?



- B) $\text{CH}_2 = \text{C} = \text{CH}_2$



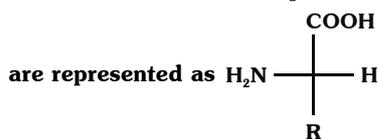
10. The transformation



can be brought about by using

- A) Zn / H^+
 B) Na
 C) $\text{H}_2 / \text{Raney Ni}$
 D) $(\text{CH}_3)_2\text{CuLi} / \text{NaOH}$

11. L-Amino acids found in proteins



In which one of the following amino acids the group R contains a basic group?

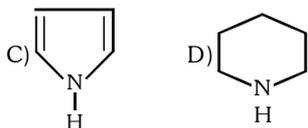
- A) Cysteine B) Lysine
C) Aspartic acid D) Valine

12. The pK_{a1} and pK_{a2} values of alanine (an amino acid) are 2.3 and 9.7 respectively. The isoelectric point (pI) of alanine is

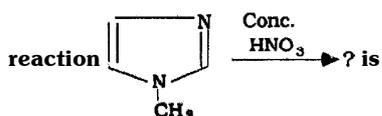
- A) 7.4 B) 3.0
C) 7.0 D) 6.0

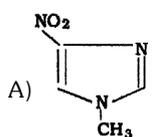
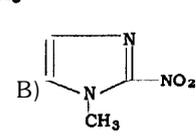
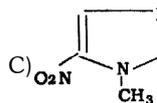
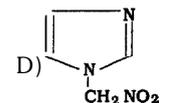
13. Which one of the following will react with cyclohexanone in the enamine formation?

- A) $\text{CH}_3-\text{CH}_2\text{NH}_2$ B) $\text{CH}_3-\text{NH}-\text{CH}_3$

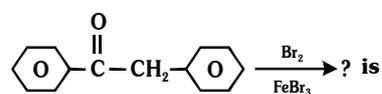


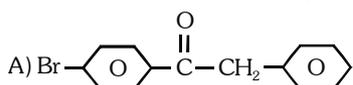
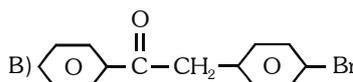
14. The product formed in the reaction

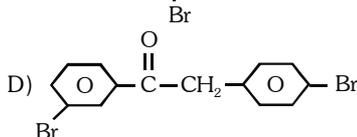
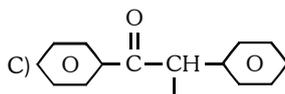


- A)  B) 
C)  D) 

15. The major product formed in the reaction



- A)  B) 



16. The oxidation number of sulphur is +6 in

- A) Caro's acid
B) Marshall's acid
C) Sulphurous acid
D) Hyposulphurous acid

17. All spinal structures have a

- A) ccp array of anions
B) simple cubic structure
C) bcc array of anions
D) hcp array of anions

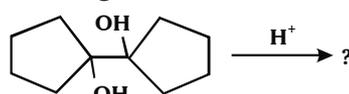
18. Boric acid belongs to which point group?

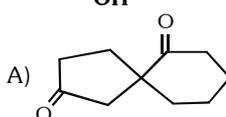
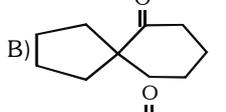
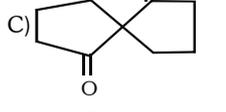
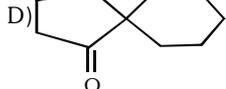
- A) C_{3v} B) C_{3h}
C) D_{3h} D) D_{3v}

19. The polymerisation of two or more different monomers is called

- A) Copolymerisation
B) Addition polymerisation
C) Stepwise polymerisation
D) Homopolymerisation

20. What is the product formed in the following reaction?



- A) 
B) 
C) 
D) 

21. In which of the following molecules are all the vibrations IR active as well as Raman active?

- A) H_2O B) CO_2
C) $\text{trans-N}_2\text{F}_2$ D) C_2H_4 (ethylene)

22. The particle (mass m) moving in a cubical box of side a has energy

$\frac{14h^2}{8ma^2}$. How many degenerate levels are possible?

- A) Two B) Three
C) Six D) Four

23. A photon has a wavelength of 400nm. What is its frequency in cm^{-1} ?

- A) 20,000 B) 25,000
C) 40,000 D) 50,000

24. The ESR spectrum of deuterated methyl (CD_3) radical consists of (Nuclear spin of $^2\text{D} = 1$)

- A) 3 signals B) 4 signals
C) 7 signals D) 6 signals

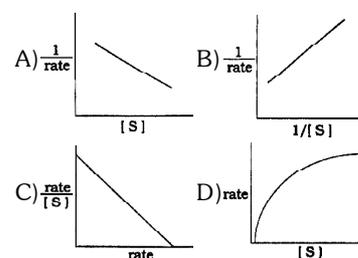
25. Which of the following thermodynamic functions is called 'the arrow of time'?

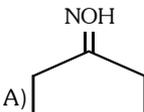
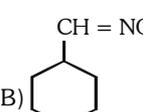
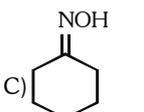
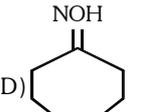
- A) Enthalpy
B) Gibbs' free energy
C) Entropy
D) Helmholtz free energy

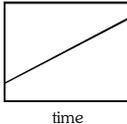
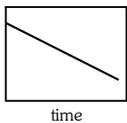
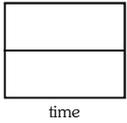
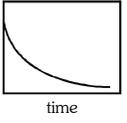
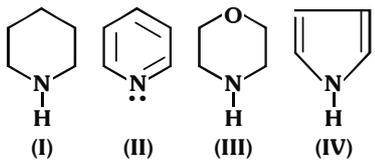
26. One gram sample of a radioactive element ($t_{1/2} = 1$ hour) is taken at 8am. How much of the element would remain at 6pm on the same day?

- A) 200 mg. B) 100 mg.
C) 10 mg. D) 1 mg.

27. Which one of the following represents Eadie plot in enzyme catalysed reactions?



28. Which method yields mass average molar mass of a polymer?
 A) Light scattering method
 B) Osmometry
 C) Sedimentation velocity method
 D) Viscometry
29. The symmetry factor for H-Cl molecule used in the calculation of rotational partition function is
 A) one
 B) two
 C) three
 D) zero
30. Which of the following is incorrect in terms of partition function?
 A) It is defined as $Q = \sum g_i e^{-\epsilon_i/kT}$
 B) It increases with increase in temperature
 C) As $T \rightarrow 0$, the partition function also tends to zero
 D) For any molecular system translational partition is always greater than rotational partition function at a given temperature
31. Which of the following is a high-spin complex?
 A) $[\text{Fe}(\text{CN})_6]^{4-}$
 B) $[\text{Ni}(\text{CN})_4]^{2-}$
 C) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$
 D) $[\text{Co}(\text{NH}_3)_6]^{3+}$
32. The experimental density of a solid crystal is found to be less than the calculated density. This indicates the presence of
 A) external impurities
 B) a line defect
 C) Frenkel defect
 D) Schottky defect
33. Caprolactam, the monomer used in the preparation of nylon 6 can be obtained by the Beckmann rearrangement of
 A)  B) 
 C)  D) 
34. Vermilion is
 A) HgS
 B) HgCl_2
 C) Hg_2Cl_2
 D) $\text{Hg}(\text{O COCH}_3)_2$
35. Amphiboles are
 A) single chain silicates
 B) double chain silicates
 C) sheet silicates
 D) network silicates
36. VCl_4 has a spin only magnetic moment (in BM) of
 A) 1.73
 B) 3.87
 C) 4.90
 D) 5.92
37. Choose the molecule that belongs to C_{2v} point group :
 A) CO_2
 B) BF_3
 C) PCl_3
 D) CH_2Cl_2
38. The ground state term symbol of hydrogen atom is
 A) 1S_0
 B) $^2S_{1/2}$
 C) $^2D_{3/2}$
 D) 2P_0
39. The maximum bond strength is in
 A) O_2
 B) O_2^+
 C) O_2^-
 D) O_2^{2-}
40. The ratio of the energy of the second energy level to the first energy level of a particle in one dimensional box of infinite height is
 A) 1
 B) 2
 C) $\frac{1}{4}$
 D) 4
41. The indicator used in the titration of Ca^{2+} against EDTA is
 A) Diphenyl amine
 B) Bromothymol blue
 C) Eriochrome Black-T
 D) Methylene blue
42. The solubility of lead chloride in water is $1 \times 10^{-3} \text{ M}$ at 25°C . What is the value of solubility product of lead chloride at 25°C ?
 A) 1×10^{-6}
 B) 1×10^{-9}
 C) 4×10^{-6}
 D) 4×10^{-9}
43. Given standard electrode potentials
 $\text{Fe}^{2+} + 2e^- \rightarrow \text{Fe}; E^0 = -0.44 \text{ V}$
 $\text{Fe}^{3+} + 3e^- \rightarrow \text{Fe}; E^0 = -0.036 \text{ V}$
 The standard electrode potential (E^0) for $\text{Fe}^{3+} + e^- \rightarrow \text{Fe}^{2+}$ is
 A) -0.476 V
 B) -0.404 V
 C) $+0.404 \text{ V}$
 D) $+0.772 \text{ V}$
44. In the radioactive decay ${}_{92}\text{X}^{232} \rightarrow {}_{89}\text{Y}^{220}$ how many α and β particles are ejected from X to form Y?
 A) $3\alpha, 3\beta$
 B) $5\alpha, 3\beta$
 C) $3\alpha, 5\beta$
 D) $5\alpha, 5\beta$
45. The heterogeneous catalyst ZSM-5 is used to convert
 A) Acetylene to benzene
 B) Benzene to toluene
 C) Toluene to benzoic acid
 D) Alcohol to synthetic petrol
46. Railway wagon axles are made by heating rods of iron embedded in charcoal powder. The process is called
 A) Case hardening
 B) Sheradizing
 C) Annealing
 D) Tempering
47. Which lanthanoid compound is used as a most powerful liquid laser after dissolving it in selenium oxychloride?
 A) Cerium oxide
 B) Neodymium oxide
 C) Promethium sulphate
 D) Gadolinium sulphate
48. The actinides showing +7 oxidation state are
 A) U, Np
 B) Pu, Am
 C) Np, Pu
 D) Am, Cm
49. Cementite is
 A) Fe_3O_4
 B) Fe_2O_3
 C) FeCO_3
 D) Fe_3C
50. Which one of the following is the smallest ion?
 A) Mn^{2+}
 B) Ti^{2+}
 C) Fe^{2+}
 D) Fe^{3+}

51. Cobalt metal ion is present in
 A) Chlorophyll B) Ferridoxin
 C) Vitamin B₁₂ D) Catalase enzyme
52. Which of the following molecules can act as an oxidising as well as a reducing agent?
 A) Cl₂ B) SO₃
 C) H₂O₂ D) F₂
53. Which of the following plots best describes the rate at which N₂O₄ decomposes to NO₂ if the reaction is first order in N₂O₄?
- A) 
 B) 
 C) 
 D) 
54. Consider the reaction 2A + 3B → 4C + 2D. The rate with respect to A is r₁ and the rate with respect to B is r₂. The rates r₁ and r₂ are related as
 A) 3r₁ = 2r₂ B) r₁ = r₂
 C) 2r₁ = 3r₂ D) r₁² = 2r₂²
55. Which of the following statements is false?
 A) For 1 mole of an ideal gas C_p - C_v = R
 B) For an ideal gas $\left(\frac{\partial E}{\partial V}\right)_T = 0$
 C) First law of thermodynamics is represented as dq = dW + PdV
 D) For reversible isothermal expansion of 1 mole of an ideal gas from volume V₁ to V₂, work done is equal to $-R T \ln \left(\frac{V_2}{V_1}\right)$
56. Calcium hydride is an example of
 A) Saline hydride
 B) Molecular hydride
 C) Interstitial hydride
 D) Polymeric hydride
57. Which of the following does not exist as dimeric molecule in the solid state?
 A) Copper (I) chloride
 B) Mercury (II) chloride
 C) Aluminium (III) chloride
 D) Iron (III) chloride
58. In the following compounds :
- 
- The correct order of basic strength is
 A) IV > I > III > II B) III > I > IV > II
 C) II > I > III > IV D) I > III > II > IV
59. Which of the following is true for the adsorption of gases on solids?
 A) ΔG < 0, ΔH > 0, ΔS < 0
 B) ΔG < 0, ΔH < 0, ΔS < 0
 C) ΔG < 0, ΔH > 0, ΔS > 0
 D) ΔG > 0, ΔH > 0, ΔS > 0
60. The standard reduction potentials of four elements P, Q, R and S are -3.04, -1.90, 0.00 and +1.90V respectively. The most effective reducing agent is
 A) R B) Q
 C) P D) S
61. Cassiterite is an ore of
 A) manganese B) nickel
 C) antimony D) tin
62. In alkaline condition KMnO₄ acts as an oxidising agent. Its equivalent weight in alkaline solution is
 A) 31.6 B) 158
 C) 79 D) 63.2
63. The Baeyer's strain angle is expected to be maximum in
 A) Cyclodecane B) Cyclopentane
 C) Cyclohexane D) Cyclooctane
64. An organic compound X (M.F. = C₅H₈) reacts with ammoniacal AgNO₃ to give a white precipitate and on oxidation with hot alkaline KMnO₄ gives isobutyric acid X is
 A) Penta 1, 3-diene
 B) 1-pentyne
 C) 3-methyl 1-butyne
 D) 2-pentyne
65. The major product formed when 2-chlorobutane is treated with alcoholic KOH is
 A) 1-butene
 B) cis 2-butene
 C) trans 2-butene
 D) sec-butyl alcohol
66. The dissociation constant (K_b) is the lowest for which of the following amines?
 A) Benzyl amine B) aniline
 C) p-toluidine D) p-nitro aniline
67. In nucleic acids, the sequence is
 A) Phosphate - base - sugar
 B) Sugar - base - phosphate
 C) Base - sugar - phosphate
 D) Base - phosphate - sugar
68. The decrease in mass in a nuclear reaction is 0.01 amu. How much energy in MeV would be released in that reaction?
 A) 9.31 B) 93.1
 C) 0.931 D) 931
69. Phenformin is a biguanide drug used as
 A) antihypertensive
 B) hypoglycemic
 C) antimalarial
 D) antihistamin

- 70. Pyrrole reacts with I_2 in aqueous KI solution to give mostly**
 A) N-iodopyrrole
 B) 2-iodopyrrole
 C) 3-iodopyrrole
 D) 2, 3, 4, 5-tetra-iodopyrrole
- 71. o-Amino benzaldehyde condenses with acetaldehyde in the presence of alkali to give quinoline. This reaction is an example of**
 A) Friedlander synthesis
 B) Biscular-Napieralski synthesis
 C) Lipp synthesis
 D) Reissert synthesis
- 72. A solution of $Na_2 [Fe(Co)_4]$ in 1, 5-dioxane is useful in the synthesis of aliphatic aldehydes, ketones and carboxylic acids from alkyl halides. This reagent is called**
 A) Millon's reagent
 B) Fischer's solution
 C) Collman's reagent
 D) Vaska's complex
- 73. According to band theory of metals there are closely spaced energy levels called bands. The top of the filled energy levels is known as**
 A) Pauling level B) Boltzmann level
 C) Fermi level D) Boson level
- 74. In a given borane, the number of frameworks of electrons equals $(2n+8)$, where n is an integer. It belongs to which series?**
 A) Closo B) Nido
 C) Hypho D) Arachno
- 75. In polarographic analysis supporting electrolyte is used to minimize**
 A) migration current
 B) convection current
 C) diffusion current
 D) residual current
- 76. The weight of the element (W) produced in an electrolysis involving Q coulombs is related to its atomic mass (M) and valency n as**
 A) $W = \frac{MQ}{96487n}$
 B) $W = \frac{96487n}{MQ}$
 C) $W = \frac{M}{96487nQ}$
 D) $W = \frac{Q}{96487 \times nM}$
- 77. The square of standard deviation is called**
 A) coefficient of variance
 B) absolute deviation
 C) variance
 D) relative standard deviation
- 78. The values of mean and median of the data 5.1, 6.4, 8.0, 4.5, 10.0 are respectively**
 A) 6.8, 6.3 B) 6.8, 6.4
 C) 6.4, 6.4 D) 6.4, 6.8
- 79. The number of weight losses observed in the TG thermogram of $CaC_2O_4 \cdot H_2O$ when heated to $900^\circ C$ is**
 A) two B) one
 C) three D) four
- 80. The reagent used in the gravimetric estimation of copper is cupron. Its chemical name is**
 A) 8-hydroxy quinoline
 B) Benzoin α -oxime
 C) 1, 2-diaminoethane
 D) Cyclohexane 1, 2-dioneoxime
- 81. Value Education means**
 A) Religious Education
 B) Moral Education
 C) Cost Education
 D) Economics of Education
- 82. Punishment is**
 A) Reinforcement
 B) Negative Reinforcement
 C) Positive Reinforcement
 D) Encouragement
- 83. Growth and development of the child are determined by two factors**
 A) heredity and school
 B) school and home
 C) home and society
 D) heredity and environment
- 84. Learning in free atmosphere was advocated by**
 A) Montessori B) Gagne
 C) J. Krishnamurthy D) Gandhiji
- 85. Thematic Apperception Test (TAT) is conducted to test the**
 A) intelligence of a person
 B) personality of a person
 C) memory of a person
 D) achievement of a person
- 86. There is a tendency for all of us to seek our faults in others' is termed as**
 A) introjection B) repression
 C) projection D) rationalisation
- 87. What is the principle behind individualised instruction?**
 A) Reinforcement and learning
 B) Accommodation
 C) Adaptation
 D) Schemes
- 88. Who advocated the method of 'Learning by doing'?**
 A) A.S. Neil B) John Dewey
 C) Bertrand Russell D) Kilpatrick
- 89. Which of the following plays the major role in social development of a child?**
 A) School B) Family
 C) Society D) Neighbours

90. An objective factor which determines attention in the classroom is

- A)interest B) novelty
C)sentiment D)attitude

91. A useful teaching-learning method for slow learners is

- A)Lecture B)Self-learning
C)Memorising D)Group learning

92. There is a story about a fox, who unable to reach some grapes, proclaimed that they were sour. This is a kind of

- A)intellectualization
B)rationalization
C)negativism
D)egocentrism

93. Attempts to train defectives and delinquents, so as to make them, as far as possible, useful and efficient members of the community is called

- A)Remedial instruction
B)Programmed instruction
C)Physical instruction
D)Religious instruction

94. In an intelligence test a ten year old boy is found to have a mental age of 11. This I.Q. is calculated as

- A)100 B)120
C)110 D)90

95. DIET stands for

- A)District Institute for Employment of Teachers
B)District Institute of Education and Training
C)District Institute of Elementary Teacher Education
D)District Institute of Educational Technology

96. Self actualisation is defined as “the full development of personal potential” by

- A)Rotter B)Maslow
C)McClelland D)Hull

97. Educationist Froebel is

- A)an idealist B)a naturalist
C)a realist D)a pragmatist

98. School started by Madam Montessori was known as

- A)Children’s House
B)Boy’s School
C)Summer Hill School
D)Girls’ School

99. MLL represents

- A)Marginal Level of Learning
B)Maximum Level of Learning
C)Motor Learning Level
D)Minimum Level of Learning

100.The name of the educational policy of Gandhiji is

- A)Social Education
B)Basic Education
C)Technical Education
D)Rural Education

101.A period showing no progress in a learning curve is termed as

- A)error B)inhibition
C)plateau D)terminal point

102.Group factor theory of intelligence was proposed by

- A)Spearman B)Thorndike
C)Thurstone D)Guilford

103.I.Q. can be calculated using the formula

- A) $\frac{\text{Mental Age}}{\text{Chronological Age}} \times 100$
B) $\frac{\text{Chronological Age}}{\text{Mental Age}} \times 100$
C) $\frac{\text{Mental Age}}{\text{Chronological Age}}$
D) $\frac{\text{Chronological Age}}{\text{Mental Age}}$

104.Which type of thinking is very essential for creativity?

- A)Positive thinking
B)Convergent thinking
C)Practical thinking
D)Divergent thinking

105.Robert Gagne’s theory of hierarchical learning consists of

- A)7 types of learning
B)2 types of learning
C)8 types of learning
D)10 types of learning

106.Which Article of the Constitution of India advocates free and compulsory school education?

- A)Article 354 B)Article 45
C)Article 30 D)Article 31

107.The most effective way of character formation in students is to

- A)advise the students frequently
B)narrate about the lives of great men and women
C)organise religious functions in the school
D)make them sing songs

108.A loud explosion is heard as you are teaching the class. What would you do?

- A)Stay in the class and send the class leader to find the details
B)Walk out of the class to know details
C)Run to neighbouring class for information
D)Advise the students to get away from the class in an orderly manner

109.The agency which helps to improve the quality of school education at state level is

- A)NCERT B)NCTE
C)SCERT D)DTE

110.Education leads to the modification of

- A)Attitude B)Behaviour
C)Life D)Interest

- 111. In Indian history, who is known as the 'Indian Napoleon'?**
 A) Asoka B) Chandragupta II
 C) Chanakya D) Samudragupta
- 112. Who of the following is associated with the theory of "Laissez-faire" in Economics?**
 A) Malthus B) Marshall
 C) Adam Smith D) Keynes
- 113. The boundary line between India and China is known as**
 A) Radcliffe line B) Durand line
 C) McMahon line D) Maginot line
- 114. Which of the following countries is called the "Land of White Elephants"?**
 A) Malaysia B) Thailand
 C) Canada D) Ethiopia
- 115. Who was the founder of Brahmo Samaj?**
 A) Raja Rammohan Roy
 B) Rabindranatha Tagore
 C) Keshab Chandra Sen
 D) M.G. Ranade
- 116. Malaria is caused by**
 A) Plasmodium B) Virus
 C) DNA D) Bacterium
- 117. Article 14 of the Constitution of India deals with**
 A) Equality before law
 B) Abolition of untouchability
 C) Freedom of speech
 D) Freedom of religion
- 118. Dynamo is a device for converting**
 A) electricity to mechanical energy
 B) mechanical energy to electrical energy
 C) magnetism to electricity
 D) electricity to magnetism
- 119. Which of the following dynasties was *not* in power during the Sangam age?**
 A) Pandyas B) Cheras
 C) Cholas D) Pallavas
- 120. Which country did Italy beat in the finals of the FIFA World Cup 2006?**
 A) Germany B) France
 C) Portugal D) Spain
- 121. The number of signals obtained in the ¹H NMR spectrum of chloroethene is**
 A) one B) two
 C) three D) four
- 122. Which among the following has a bond order of 2.5?**
 A) O₂ B) O₂⁻
 C) O₂⁻ D) O₂⁺
- 123. The equivalent weight of reducing agent in the following reaction $\text{NH}_3 + 3\text{Cl}_2 \rightarrow \text{NCl}_3 + 3\text{HCl}$ is**
 A) $\frac{17}{3}$ B) $\frac{17}{6}$
 C) 35.5 D) 71
- 124. The oxidation numbers of nitrogen atoms in ammonium nitrate are**
 A) -3, +3 B) +3, +5
 C) -3, +5 D) +5, +5
- 125. Which of the following has a diamond-like structure?**
 A) ZnS B) CaF₂
 C) NaCl D) LiCl
- 126. Copper crystallises in lattice.**
 A) simple cubic
 B) hexagonal close packed
 C) face centred cubic
 D) body centred cubic
- 127. An isotone of ⁷⁶₃₂Ge is**
 A) ⁷⁷₃₂Ge B) ⁷⁷₃₃Ge
 C) ⁷⁶₃₁Ge D) ⁷⁷₃₄Ge
- 128. The thermal neutrons are associated with energy of the order of**
 A) 10 MeV B) 1 MeV
 C) 100 eV D) less than 1 eV
- 129. Klystron produces electromagnetic radiation in the region.**
 A) radiowave B) microwave
 C) infrared D) ultraviolet
- 130. Lithium dialkyl cuprate is used in**
 A) Grignard reaction
 B) Hunsdiecker reaction
 C) Leuckart synthesis
 D) Posner-Whitesides-House synthesis
- 131. The hydroboration reaction**
 A) occurs according to Markovnikoff rule
 B) is non-regioselective
 C) proceeds via a six-membered transition state
 D) is regioselective and anti-Markovnikoff addition
- 132. The structure of Fe₂(CO)₉ involves**
 A) three ketonic carbonyl groups
 B) only one ketonic carbonyl group
 C) two ketonic carbonyl groups
 D) all terminal carbonyl groups
- 133. The EAN of Fe in Fe₂(CO)₉ is**
 A) 34 B) 35
 C) 36 D) 37
- 134. The actinides may be extracted with**
 A) benzene
 B) dithizone
 C) tributyl phosphate
 D) hexane
- 135. The uranyl ion is represented as**
 A) UO₂⁺ B) UO₂²⁺
 C) UO⁺ D) UO²⁺ :

136. Which of the following is stable due to half filled 4f orbitals?

- A) Ce^{4+} B) La^{3+}
C) Gd^{3+} D) Lu^{3+}

137. Molecular orbital theory is better than crystal field theory of complexes because it explains

- A) stability
B) magnetic properties
C) charge transfer bands
D) labile nature of complexes

138. The crystal field stabilisation energy for a d^6 ion in low spin octahedral complex is

- A) $-18 Dq$ B) $+24 Dq$
C) $-24 Dq$ D) $-24D + 2P$

139. Identify the complex which will absorb light of shorter wavelength:

- A) $[\text{Fe}(\text{CN})_6]^{4-}$ B) $[\text{FeF}_6]^{4-}$
C) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ D) $[\text{Fe}(\text{NCS})_6]^{4-}$

140. Platinum is present in

- A) Vaska's complex
B) Zeise's salt
C) Rochelle salt
D) Prussian blue

141. The highest oxidation state for any element is exhibited by

- A) Ruthenium B) Gold
C) Osmium D) Platinum

142. Which among the following does not form hexafluoride?

- A) Platinum B) Rhodium
C) Osmium D) Palladium

143. Calcium titanate is known as

- A) Perovskite B) Ilmenite
C) Rutile D) Siderite

144. Coloured ion is

- A) Sc^{3+} B) Ag^+
C) Ti^{4+} D) V^{3+}

145. The rate constant, the activation energy and the pre-exponential factor of a chemical reaction at 25°C are $8.0 \times 10^{-4} \text{ s}^{-1}$, 125 kJ mol^{-1} and $4.2 \times 10^{15} \text{ s}^{-1}$ respectively. The value of rate constant as $T \rightarrow \infty$ is

- A) $1.25 \times 10^5 \text{ s}^{-1}$
B) $4.2 \times 10^{15} \text{ s}^{-1}$
C) $3.36 \times 10^{11} \text{ s}^{-1}$
D) $1.0 \times 10^5 \text{ s}^{-1}$

146. In an exothermic reaction $A \rightarrow B$ the activation energy of the reaction is 100 kJ mol^{-1} and the enthalpy change of the reaction is -180 kJ mol^{-1} . The activation energy for the reaction $B \rightarrow A$ is

- A) 80 kJ mol^{-1} B) unpredictable
C) 280 kJ mol^{-1} D) 140 kJ mol^{-1}

147. Choose the false statement :

- A) The half-life period of a zero order reaction is directly proportional to the initial concentration of the reactant
B) The activation energy of termolecular reaction that occurs at measurable rate is very small
C) Acid catalysed hydrolysis of methyl acetate is an example of pseudo-first order reaction
D) The rate of the reaction
$$\text{S}_2\text{O}_8^{2-} + \text{I}^- \rightarrow 2\text{SO}_4^{2-} + \text{I}_2$$
decreases with increase in ionic strength

148. A weak monobasic acid has $\text{pK}_a = 6$. What is the pH in 0.01 M solution of the acid?

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

149. NiO adopts a rock-salt structure.

The coordination number of Ni^{2+} ion in NiO crystal is

- A) two B) four
C) six D) eight

150. The unit cell of dry ice is

- A) fcc B) bcc
C) simple cubic D) hcp

POST GRADUATE ASSISTANTS (2006 - 2007) – CHEMISTRY – ANSWERS

1 A	2 A	3 C	4 C	5 D	6 C	7 B	8 B	9 A	10 A
11 B	12 D	13 D	14 C	15 B	16 B	17 A	18 C	19 A	20 B
21 A	22 C	23 B	24 B	25 C	26 D	27 B	28 A	29 A	30 C
31 C	32 D	33 C	34 A	35 B	36 A	37 D	38 B	39 B	40 C
41 C	42 D	43 D	44 A	45 D	46 C	47 B	48 C	49 D	50 D
51 C	52 C	53 D	54 D	55 D	56 A	57 A	58 D	59 B	60 C
61 D	62 A	63 A	64 C	65 C	66 A	67 C	68 C	69 C	70 C
71 A	72 C	73 C	74 C	75 A	76 D	77 C	78 B	79 B	80 B
81 B	82 B	83 D	84 C	85 B	86 C	87 A	88 B	89 C	90 A
91 D	92 A	93 A	94 C	95 B	96 B	97 B	98 A	99 D	100 B
101 C	102 C	103 A	104 D	105 C	106 B	107 B	108 B	109 A	110 B
111 D	112 C	113 C	114 B	115 A	116 A	117 A	118 B	119 D	120 B
121 C	122 D	123 B	124 C	125 A	126 C	127 B	128 D	129 B	130 D
131 D	132 A	133 B	134 C	135 B	136 C	137 C	138 C	139 D	140 B
141 C	142 D	143 C	144 D	145 A	146 C	147 D	148 B	149 D	150 A