TEACHERS' RECRUITMENT BOARD, CHENNAI - 6

WRITTEN COMPETITIVE EXAMINATION FOR DIRECT RECRUITMENT OF POST GRADUATE ASSISTANTS (2011-12) - 12PG-05

TIME ALLOWED : 3 HOURS **CHEMISTRY** **MAXIMUM MARKS : 150**

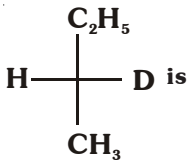
1. Which among the following is a superconductor?
A) Ag B) Pt
C) Hg D) Au

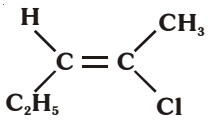
2. $[Co(NH_3)_5NO_3]SO_4$ and $[Co(NH_3)_5SO_4]NO_3$ are ..... isomers
A) Linkage B) Co-ordination
C) Ionisation D) Geometrical

3. Ni^{2+} ion is estimated gravimetrically by using
A) EDTA B) oxine
C) ethylene diamine D) DMG

4. Magnetic moment of $[Mn(H_2O)_6]SO_4$ is
A) 2.83 B) 3.87
C) 4.90 D) 5.92

5. The possible stereoisomers of 2, 4 pentane diol are
A) 4 B) 3
C) 2 D) 5

6. The configuration of  **is**
A) R B) S
C) D D) L

7.  **is ..... isomer.**
A) cis B) trans
C) E D) Z

8. Which among the following is optically active?
A) Allene B) Biphenyl
C) Sec butyl chloride D) Isopropyl chloride

9. Addition of singlet carbene to trans 2-butene gives ..... isomer.
A) cis B) trans
C) 50% cis and 50% trans D) 60% trans & 40% cis

10. The stable conformation of ethylene glycol is
A) anti B) gauche
C) partially eclipsed D) fully eclipsed

11. Which among the following is a purine base?
A) Cytosine B) Uracil
C) Thymine D) Guanine

12. ..... is synthesised by Skraup synthesis.
A) Indole B) Quinoline
C) Flavones D) Furan

13. Proteins on reaction with Ninhydrin gives ..... colouration.
A) White B) Yellow
C) Violet D) Red

14. $E=h\nu_0+\frac{1}{2}mv^2$ is
A) de-Broglie effect B) Photoelectric effect
C) Compton effect D) Uncertainty principle

15. The eigenvalue of $\frac{d}{dx}\sin 3x$ is
A) 3 B) –3
C) 9 D) –9

16. Which among the following has D_{∞} h point group?
A) F_2 B) HI
C) HCN D) H_2O

17. For C_{3V} point group, whose order is 6 and class is 3, the sum of the squares of the dimension is equal to
A) 3 B) 6
C) 2 D) 0

18. The line spectrum observed when electron falls from higher quantum levels to M level is
A) Lyman B) Paschen
C) Balmer D) Pfund

19. Which among the following is eigen function of $\frac{d}{dx}$?
A) sin kx B) cos kx
C) kx^2 D) e^{ikx}

20. By solving the Schrödinger equation for Simple Harmonic Oscillator, the expression for vibrational energy is

A) nhv_0 B) $\left(n+\frac{1}{2}\right)hv_0$

C) $\frac{1}{2}hv_0$ D) $\left(n+\frac{1}{2}\right)h\omega$

21. The unit of rate constant of a second order reaction is

A) Ms^{-1} B) s^{-1} C) $M^{-1}s^{-1}$ D) M^{-1}

22. For specific base catalysis, the effective catalyst is

A) OH^+ B) H_3O^+ C) H_2O D) OH^-

23. The conjugate acid of $C_6H_5NH_2$ is

A) $C_6H_5NH_2^-$ B) $C_6H_5NH_3^+$

C) $C_6H_5NH^-$ D) $C_6H_5NH_2^+$

24. Activation energy is obtained as ..... by plotting *ln* k vs $\frac{1}{T}$.

A) –R (slope) B) –R / slope

C) slope D) R / intercept

25. Enzyme catalysis reaction mechanism was proposed by

A) Arrhenius B) Lindemann

C) Michaelis-Menten D) Taft

26. The cell reaction $Zn+Cu^{2+}\rightarrow Zn^{2+}+Cu$ is best represented by

A) $Cu|Cu^{2+}||Zn^{2+}|Zn$ B) $Zn|Zn^{2+}||Cu^{2+}|Cu$

C) $Cu^{2+}|Cu||Zn||Zn^{2+}$ D) $Pt|Zn^{2+}||Pt|Cu^{2+}$

27. The equation which describes how the electrical current on an electrode depends on the electrode potential considering that both a cathodic and anodic reaction occur on the same electrode is

A) Illkovic B) Butler-Volmer

C) Nernst D) Taft

28. The cell reaction is spontaneous when

A) E^o is –ve B) ΔG is +ve

C) E^o is +ve D) $(\Delta G+E^o)$ is +ve

29. The working electrode in polarography is

A) Pt electrode

B) glassy carbon electrode

C) DME

D) H_2 electrode

30. An infrared spectrum exhibits a broad band in the 3000–3500 cm^{-1} region and a strong peak at 1710 cm^{-1}. The substance is

A) $C_6H_5CH_2CH_2OH$ B) $C_6H_5CH_2\overset{\overset{O}{\|}}{C}-CH_3$

C) $C_6H_5CH_2-\overset{\overset{O}{\|}}{C}-OH$ D) $C_6H_5CH_2-\overset{\overset{O}{\|}}{C}-OCH_3$

31. BF_3 has ..... C_2 axis perpendicular to C_3 axis

A) 4 B) 3

C) 2 D) 1

32. If $T_R=A_{ig}+T_2$ where $(A_{ig}=x^2+y^2+z^2)[T_2=(x, y, z)$ and $(xy, xz, yz)]$

A) sp^3 B) sd^3

C) sp^3 or sd^3 D) dsp^2 or d^2p^2

33. For a particle in cubic box of side a if $E=\frac{11h^2}{8ma^2}$, then the degeneracy is

A) 1 B) 3

C) 5 D) 7

34. The number of modes of vibration for PH_3 is

A) 4 B) 5

C) 6 D) 7

35. Open system is one which follows :

A) $dE=0$ and $dm=0$ B) $dE\neq0$ and $dm=0$

C) $dE\neq0$ and $dm\neq0$ D) $dE=0$ and $dm\neq0$

36. The variation of chemical potential with pressure at constant temperature is

A) partial molar free energy

B) partial molar entropy

C) partial molar volume

D) partial molar enthalpy

37. Which among the following is a Boson?

A) Proton B) Photon

C) Electron D) Neutron

38. The escaping tendency of a substance from a given state is

A) activity B) fugacity

C) chemical potential D) entropy

39. The number of microstates possible for d^2 electronic configuration is

A) 55 B) 45

C) 15 D) 10

40. The first weight loss in the TGA of $CaC_2O_4.H_2O$ is due to loss of

A) CO_2 B) CO
C) CaO D) H_2O

41. The most electronegative element is

A) Calcium B) Fluorine
C) Cesium D) Hydrogen

42. The values of IE_1, IE_2, IE_3, IE_4 and IE_5 of an element are 7.1 eV, 14.3 eV, 14.5 eV, 46.8 eV and 162.2 eV respectively. The element is likely to be

A) Na B) Si
C) K D) Ca

43. Which among the following is polar aprotic solvent?

A) Ethanol B) Water
C) Acetonitrile D) Carbon tetrachloride

44. Which has minimum internuclear distance?

A) O_2 B) N_2
C) H_2 D) F_2

45. Which among the following exhibits Frenkel defect?

A) NaCl B) AgCl
C) KCl D) CsCl

46. Effective nuclear charge of chlorine is

A) 7.0 B) 6.1
C) 12.9 D) 11.4

47. Which among the following is inverse spinel?

A) $CoFe_2O_4$ B) Co_3O_4
C) $ZnAl_2O_4$ D) Mn_3O_4

48. The hybridisation of IF_5 is

A) sp^3 B) sp^3d
C) sp^3d^2 D) dsp^2

49. The radius of the Cs^+ ion is 167 pm and that of Cl^- ion is 202 pm. What is the coordination number?

A) 4 B) 6
C) 8 D) 2

50. A p-type semiconductor is obtained by doping silicon with

A) Arsenic B) Antimony
C) Gallium D) Germanium

51. Oxo process is sued for

A) hydrogenation of olefins
B) hydroformylation
C) polymerisation of olefins
D) isomerisation of olefins

52. Which among the following is unstable 17 electron species?

A) $[Cr(CO)_6]$ B) $[Cr(CO)_6]^+$
C) $[Mn(CO)_5Cl]$ D) $[Fe(CO)_6]^{2+}$

53. Ziegier-Natta catalyst is a polymerisation catalyst which results in ..... polymer.

A) atactic B) isotactic
C) syndiotactic D) irregular

54. $[Rh(PPh_3)_3\,H(CH_2CH_3)Cl] \rightarrow [Rh(PPh_3)_3Cl] + CH_3CH_3$ is an example of

A) elimination B) reductive elimination
C) addition D) oxidative addition

55. In presence of sunlight $[Co(NH_3)_5(H_2O)]^{3+} + Cl^- \rightarrow [Co\,Cl(NH_3)_5]^{2+} + H_2O$ is

A) Photoaquation B) photoanation
C) photoreduction D) photo-oxidation

56. Transition from T_1 to S_0 is

A) Fluorescence B) Phosphorescence
C) ISC D) IC

57. The ground state term symbol for $[Cr(H_2O)_6]^{2+}$ is

A) $^5D_0$ B) $^4F_{3/2}$
C) $^3F_4$ D) $^5D_4$

58. Which among the following has minimum stretching frequency?

A) $[Fe(CO)_6]^{2+}$ B) $[Mn(CO)_6]^+$
C) $[V(CO)_6]^+$ D) $[Ti(CO)_6]^{2+}$

59. LMCT is not observed in

A) HgI_2 B) PbI_2
C) MnO_4^- D) $[Ru(bpy)_3]^{2+}$

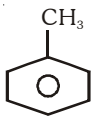
60. Jahn Teller distortion is not observed in

A) d^1 B) d^2
C) d^4 D) d^5 (HS)

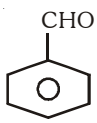
61. Pyrrole undergoes electrophilic substitution at ..... position.

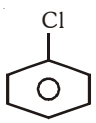
A) 1 B) 2
C) 3 D) 4

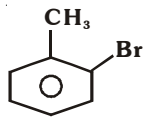
62. Which among the following will undergo nitration fastest?

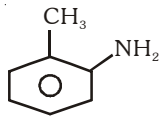
A) 

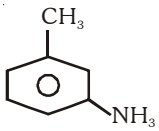
B) 

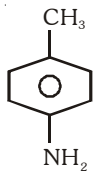
C) 

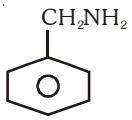
D) 

63.  $\xrightarrow[NH_3]{NaNH_2}$? (major product)

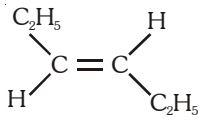
A) 

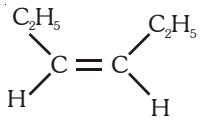
B) 

C) 

D) 

64. $CH_3CH_2 - C \equiv C - CH_3 + H_2$ / Lindlar catalyst $\rightarrow$?

A)  B) C_6H_{14}

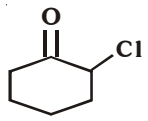
C)  D) $C_6H_{13}OH$

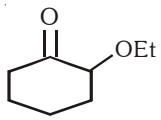
65. **Which among the following are not pericyclic reactions?**

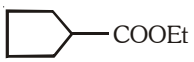
A) Cycloaddition
B) Sigmatropic rearrangment
C) Electrocyclic
D) Photosubstitution

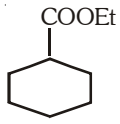
66. **3-methyl pent-2-ene** $\xrightarrow{O_3}$ $\xrightarrow{Zn/H_2O}$?

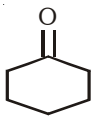
A) Butanone+Formaldehyde
B) Propionaldehyde+acetone
C) Butanone+Acetaldehyde
D) Butanal+Formaldehyde

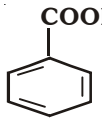
67.  $\xrightarrow{C_2H_5O^-}$?

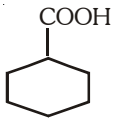
A) 

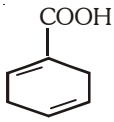
B) 

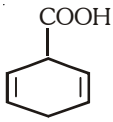
C) 

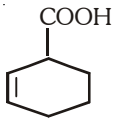
D) 

68.  $\xrightarrow[liq.NH_3]{Na}$?

A) 

B) 

C) 

D) 

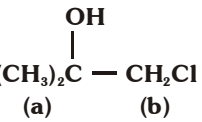
69. **If the solubility of CaF_2 is 2×10^{-4} mole/litre, then its solubility product is**

A) 2.0×10^{-4} B) 4.0×10^{-8}
C) 4.0×10^{-11} D) 3.2×10^{-11}

70. **The Hammett equation is**

A) $\log\left(\frac{k_0}{k}\right)=\frac{\sigma}{\rho}$ B) $\log\left(\frac{k_0}{k}\right)=\sigma\rho$

C) $\log\left(\frac{k}{k_0}\right)=\frac{\sigma}{\rho}$ D) $\log\left(\frac{k}{k_0}\right)=\sigma\rho$

71. **The multiplicity of the a proton in the $_1H^1$ NMR spectrum of** 

A) singlet B) doublet
C) triplet D) quartet

72. **When $\nu_t - \nu_s$ is negative, then the line is**

A) Rayleigh B) Stokes
C) anti-Stokes D) Jean

73. **Which among the following does not show quadrupole splitting in Mossbauer spectroscopy?**

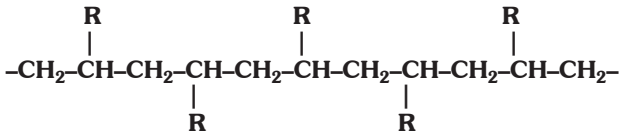
A) $K_3[Fe(CN)_5H_2O]$ B) $K_3[Fe(CN)_6]$
C) $K_4[Fe(CN)_6]$ D) $FeSO_4.7H_2O$

74. **The ionisation energy can be found by using**

A) NMR B) Raman
C) ESR D) PES

75. **The source for NQR spectroscopy is**

A) Microwave B) IR
C) Radiowave D) X-ray

76. 

is

A) isotactic polymer B) atactic polymer
C) syndiotactic polymer D) irregular polymer

77. Which among the following is inorganic polymer?

A) PVC B) Bakelite
C) Nylon D) Silicones

78. Which among the following is not condensation polymer?

A) Polyester B) Nylon 66
C) Polystrene D) Bakelite

79. Which is inorganic benzene?

A) B_2H_6 B) B_6H_6
C) $B_3N_3H_6$ D) $B_2N_2H_6$

80. Bakelite is

A) amino-resin B) phenol-resin
C) epoxy-resin D) silicon-resin

81. Which among the following forms stable complex with NH_3 ligand?

A) MN^{2+} B) Fe^{2+}
C) Ni^{2+} D) Co^{2+}

82. If 2g of a substance is dissolved in 100 ml of the solvent and the path length is 2 dm, the optical rotation is –5.20°, then the specific rotation is

A) 130° B) –130°
C) 52° D) –52°

83. $CH_2 = CH–CH=CH_2 + Br_2$ at high temperature→

A) 3, 4 dibromo 1-butane
B) 1, 4 dibromo 2-butane
C) 1, 2 dibromo 1-butene
D) 1, 4 dibromo 1-butene

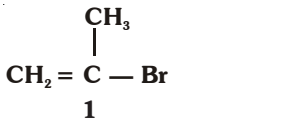
84. The addition of HBr/peroxide to pentene-1 will give the major product

A) 3-bromopentane
B) 2-bromopentane
C) 1, 2 dibromopentane
D) 1-bromopentane

85. S_NI mechanism leads to

A) inversion B) retention
C) racimisation D) meso

86. The rate of hydrolysis of the following compounds by S_NI follows :



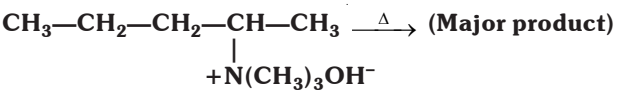
1

2

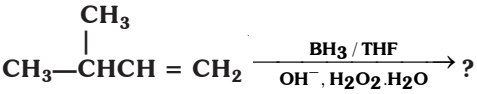
3

4

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

87. 

A) 1-pentene B) 2-pentene
C) 1-pentanol D) 2-pentanol

88. 

A) 3-methyl-1-butanol B) 3-methyl-2-butanol
C) 2-methyl propanal D) formaldehyde

89. Which among the following is an alkaloid?

A) Squalene B) Cholesterol
C) Morphine D) Zingeberene

90. Polymer of α-glucose is

A) maltose B) starch
C) sucrose D) cellulose

91. The number of lines in the ESR spectrum of $[C_6H_6]^0$ is

A) 3 B) 6
C) 9 D) 7

92. The signal for CH_2 will be split into ..... in the PMR spectrum of $C_6H_5OCH_2CH_3$

A) 3 B) 4
C) 2 D) 5

93. Which among the following will have highest crystal field splitting?

A) $K_4[FeCl_6]$ B) $K_4[FeBr_6]$
C) $K_4[Fe(CN)_6]$ D) $K_4[FeF_6]$

94. Which among the following will show minimum Mossbauer isomer shift?

A) $[Fe(CN)_5NH_3]^{3-}$ B) $[Fe(CN)_5PPh_3]^{3-}$
C) $[Fe(CN)_6]^{4-}$ D) $[Fe(CN)_5CO]^{3-}$

95. Which of the following is colourless in aqueous solution?

A) V^{2+} B) Cu^{+}
C) Fe^{2+} D) Co^{3+}

96. The number of $_1H^1$ NMR signals observed for cyclopentanone is

A) 5 B) 4
C) 3 D) 2

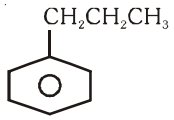
97. DPPH is used as standard in ..... spectroscopy.

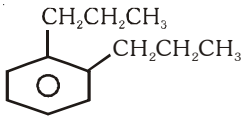
A) NMR B) EPR
C) IR D) UV

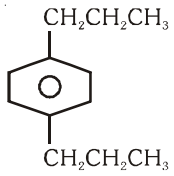
98. Which among the following are not aromatic?

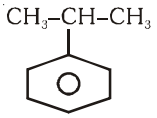
A) [8] Annulene B) Napthalene
C) [18] Annulene D) Tropylium ion

99. Benzene reacts with n-propyl chloride in the presence of anhydride $AlCl_3$ to yield

A) 

B) 

C) 

D) 

100. Which among the following is an electrophile in aromatic sulphonation reaction?

A) SO_3^+ B) HSO_4^-
C) HSO_3^+ D) SO_3

101. For ternary system at 1 atm pressure, maximum phases that can co-exist when F=0 is

A) 5 B) 4
C) 3 D) 2

102. Distance moved by the sample / distance moved by the solvent is

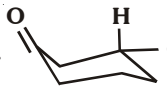
A) R_a B) R_j
C) R_x D) R_g

103. Bragg's equation is

A) $n=2d \sin \theta$ B) $n\lambda = d \sin \theta$
C) $n\lambda = 2d/\sin \theta$ D) $n\lambda = 2d \sin \lambda$

104. Substance used as reference in DTA is

A) Benzene B) α–Alumina
C) TMS D) Hexane

105. 

exhibits ..... cotton effect.

A) positive B) negative
C) no D) plain

106. Atomic power project is at

A) Tiruchi B) Kannyakumari
C) Kalpakkam D) Chidambaram

107. $_{92}U^{238} \rightarrow {}_{82}Pb^{206} + x\alpha + y\beta$ where *x* and y are

A) 5 and 3 B) 6 and 4
C) 6 and 8 D) 8 and 6

108. In 1.5 years half of 128 mg of a radioactive isotope decays. The amount present after 6 years is ..... mg.

A) 2 B) 4
C) 8 D) 16

109. Volume of the blood in a body can be found out by

A) Neutron activation analysis
B) Isotopic dilution analysis
C) Tracer technique
D) Nuclear isomerisation

110. Nuclear reaction energy in MeV can be calculated by multiplying Δm in amu with

A) 913.5 B) 931.5
C) 391.5 D) 139.5

111. How many chromosomes are there in human body?

A) 26 B) 36
C) 46 D) 39

112. When learnt material is reproduced without any manipulation, it is called

A) whole memory B) rote memory
C) perfect memory D) immediate memory

113. Non-verbal test of intelligence is suitable for

A) deaf & dumb B) illiterates
C) younger children D) all of them

114. The book "Theory of Motivation" is written by

A) Madson B) Maslow
C) Murray D) Hull

115. Wechsler developed an intelligence test for children in the year

A) 1939 B) 1949
C) 1955 D) 1956

116. Pace setting school is renamed as

A) Primary school B) Pre-primary school
C) Nursery school D) Navodaya school

117. How many open schools are there in Tamil Nadu?

A) 25 B) 26 C) 27 D) 28

118. Functional Literacy Programme had been started for

A) workers B) farmers
C) tribal people D) all of them

119.National Policy on Education was adopted in the year

A) 1981 B) 1983
C) 1986 D) 1989

120.In which level, Mahila Mandals are organised for adult education?

A) Block level B) Village level
C) District level D) State level

121.Which media is suitable for distance education?

A) Postal B) Radio
C) Television D) Newspaper

122.The book "Education of Man" is written by

A) John Dewey B) Montessori
C) Froebel D) Gandhi

123.Open university was started in England on

A) 1979 B) 1969
C) 1981 D) 1982

124.Mobile school was first recommended by

A) McDonald B) Ivan
C) Neil D) Parker

125.Who said 'Education is related to life'?

A) Gandhi B) Nehru
C) Tagore D) Russel

126.The UNESCO has supported the proposal of

A) women education B) adult education
C) education for all D) none of these

127.Which district has the lowest density of population in Tamil Nadu?

A) Nilgiris B) Perambalur
C) Sivagangai D) Dharmapuri

128.Which country started experiments in Distance Education in the year 1873?

A) UK B) USA
C) USSR D) Japan

129.Child Labour Eradication Day is held on

A) June 12 B) July 12
C) August 12 D) November 12

130.Which is called formal agency of Education ?

A) School B) Home
C) Society D) None of these

131.Rousseau's Educational Philosophy is

A) Negative education B) Basic education
C) Vocational education D) Secondary education

132.Self-education is related to

A) Russel B) Aurobindo
C) Tagore D) Rousseau

133.Mahila Samakhya is a plan for the development of

A) Backward people B) SC/ST people
C) Women D) Rural students

134.Viswabharati is located at

A) West Bengal B) Maharashtra
C) Bihar D) Delhi

135.Who is related to freedom in learning situation?

A) Krishnamoorthy B) Aurobindo
C) Radhakrishnan D) Tagore

136.Span of vision is measured by

A) Memory drum B) Tachistoscope
C) Mason's disk D) Metronome

137.Which theory of intelligence was supported by Alfred Binet?

A) Single factor B) Two factor
C) Group factor D) Multifactor

138.Psychoanalytic approach of personality was first introduced by

A) Adler B) Jung
C) Freud D) none of them

139.In Gagne's hierarchy learning has been divided into

A) 8 types B) 9 types
C) 7 types D) 10 types

140.A superior child is advanced to a normal child by at least

A) 1 year B) 1½ years
C) 2 years D) 2½ years

141.The seaport of Pandiyas was

A) Thondi B) Musiri
C) Korkai D) Poompukar

142.Who wrote the book "Gora"?

A) Dr.S. Radhakrishnan
B) Rabindranath Tagore
C) Mulk Raj Anand
D) L.K. Advani

143.The name by which Ashoka is generally referred to in his inscriptions is

A) Chakravarthi B) Dharmadeva

C) Priyadarshi D) Dharmakirti

144.Which of the following provided the revenue for the Delhi Sultanate?

A) Kharaj B) Khams

C) Jiziya D) Zakat

145.The common refrigerant in domestic refrigerator is

A) Neon B) Oxygen

C) Nitrogen D) Freon-12

146.The present Secretary General of the United Nations Organisation is

A) Ban Ki-moon

B) Shashi Tharoor

C) Kofi Annan

D) Ashraf Ghani

147.The Constitution of India came into force on

A) 26th November, 1949

B) 26th January, 1950

C) 26th January, 1949

D) 15th August, 1949

148.The President of India can nominate how many members to Rajya Sabha?

A) 2

B) 4

C) 6

D) 12

149.India won World Cup Hockey in the year

A) 1971 B) 1973

C) 1978 D) 1975

150.The full form of NABARD is

A) National Bank for Agriculture and Rural Development

B) National Books and Research Department

C) National Bharat Radar Defence

D) Nuclear and Bharat Radar Defence

PG - CHEMISTRY (2011-12) – ANSWERS

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