

16P/206/22(i)

(To be filled up by the candidate by blue/black ball-point pen)

Roll No.

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Serial No. of OMR Answer Sheet (216)

Day and Date

(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

(Use only **blue/black ball-point pen** in the space above and on both sides of the **Answer Sheet**)

1. Within 30 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope*.
3. *A separate Answer Sheet is given. It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*
4. Write your Roll Number and Serial Number of the Answer Sheet by pen in the space provided above.
5. *On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.*
6. *No overwriting is allowed in the entries of Roll No., Question Booklet no. and Set no. (if any) on OMR sheet and Roll No. and OMR sheet no. on the Question Booklet.*
7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.*
8. *Each question in this Booklet is followed by four alternative answers. For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet.*
9. For each question, **darken only one circle** on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. *Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).*
11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.
12. Deposit only **OMR Answer Sheet** at the end of the Test.
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

Total No. of Printed Pages : 40

[उपर्युक्त निर्देश हिन्दी में अन्तिम आवरण पृष्ठ पर दिये गए हैं।]

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No. of Questions : 150

प्रश्नों की संख्या : 150

Time : $2 \frac{1}{2}$ Hours

Full Marks : 450

समय : $2 \frac{1}{2}$ घण्टे

पूर्णाङ्क : 450

Note : (1) Attempt as many questions as you can. Each question carries **3 (Three)** marks. **One mark will be deducted for each incorrect answer. Zero** mark will be awarded for each unattempted question.

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

01. Which of the following sets of quantum numbers is possible for an electron in '4f' orbital :

(1) $n = 4, l = 3, m = 4, s = +\frac{1}{2}$ (2) $n = 4, l = 4, m = +4, s = +\frac{1}{2}$

(3) $n = 4, l = 3, m = +1, s = -\frac{1}{2}$ (4) $n = 4, l = 2, m = 2, s = +\frac{1}{2}$

02. In a three component system of phase equilibria the maximum number of degree of freedom can be :

(1) 4 (2) 3 (3) 2 (4) 1

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19. The energy of a rigid rotator is :

$$(1) E = \frac{n^2 h^2}{2m} J$$

$$(2) E = \frac{h^2}{2 \pi I} J(J+1)$$

$$(3) E = \frac{n^2 h^2}{2m a^2}$$

$$(4) E = \frac{h^2}{\pi I} J(J+1)$$

20. The decrease in free energy is equal to :

(1) mechanical work

(2) Maximum work

(3) net work

(4) zero

21. If Weiss indices of a face of a crystal are 1, ∞ , ∞ , then its Miller indices will be :

(1) 1, 0, 0

(2) 0, 1, 1

(3) 0, 1, 0

(4) 1, 0, 1

22. Maximum number of α and β particles emitted when ${}_{92}^{238}\text{U}$ changes

to ${}_{82}^{206}\text{Pb}$ are :

(1) 6α and 8β

(2) 8α and 8β

(3) 6α and 6β

(4) 8α and 6β

23. The relation between e.m.f. and concentration for a cell is :

(1) Linear

(2) Exponential

(3) Logarithmic

(4) no relation

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24. The spin only magnetic moment is given by :

- (1) $\sqrt{45(S+1)}$ (2) $\sqrt{5(S+1)}$ (3) $\sqrt{25(S+1)}$ (4) $\sqrt{5(S+3)}$

25. The pH of a solution by mixing 50 cc of 0.2 M HCl and 50cc of 0.1 M NaOH will be :

- (1) 1.8 (2) 2.4 (3) 1.3 (4) 4.2

26. If the value of $\frac{r_c}{r_a}$ (radius ratio of cation and anion) is equal to 0.213 then coordination number of cation is :

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

27. How many normal modes are possible for water molecule ?

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

28. What will be the ESR frequency of a free electron in a magnetic field of 0.34 T. Given that $g = 2.0023$ and $\beta = 9.273 \times 10^{-24} \text{ JT}^{-1}$, $h = 6.626 \times 10^{-34} \text{ JS}$:

- (1) 20.0 GHz (2) 09.50 GHz
(3) 19.0 GHz (4) 09.50 MHz

29. The selection rule for transition in rotational energy levels in Raman spectrum is :

- (1) $\Delta J = \pm 1$ (2) $\Delta J = +1$ (3) $\Delta J = +2$ (4) $\Delta J = \pm 2$

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35. The energy of a particle in a l - dimensional box is given by :

(1) $\frac{n^2 h^2}{m L^2}$ (2) $\frac{n h^2}{4 m L^2}$ (3) $\frac{n^2 h^2}{8 m^2 L^2}$ (4) $\frac{n^2 h^2}{8 m L^2}$

36. Radius of orbit in Bohr's hydrogen atom is :

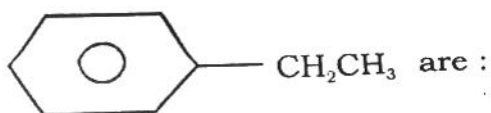
(1) $r = \frac{n^2 h^2}{4 \pi e^2 m}$ (2) $r = \frac{n^2 h^2}{4 \pi e m^2}$

(3) $r = \frac{n^2 h^2}{8 \pi^2 e^2 m^2}$ (4) $r = \frac{n^2 h^2}{4 \pi^2 e^2 m}$

37. Assuming that the force constant for $c \equiv c$, $c = c$, $c - c$ are in ratio 3:2:1 and normal range of $c = c$ sketch absorption is $1630 - 1690 \text{ cm}^{-1}$, what range would you expect for $c \equiv c$ stretch vibration ?

(1) $1152 - 1195 \text{ cm}^{-1}$ (2) $1195 - 2005 \text{ cm}^{-1}$
 (3) $2005 - 2080 \text{ cm}^{-1}$ (4) $3260 - 3380 \text{ cm}^{-1}$

38. The number of NMR signals in the spectrum of



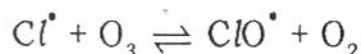
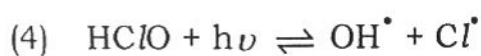
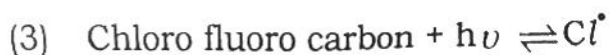
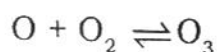
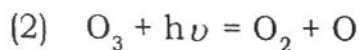
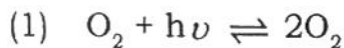
(1) 4 (2) 3 (3) 2 (4) 1

39. A what field would methyl radical come into resonance in spectrometer operating at 9.5 GHz ($g = 2.0026$) ?

(1) 0.34 T (2) 0.68 T (3) 1.02 T (4) 0.17 T

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45. Which one of the following reactions saves us from the damaging effect of solar u.v. radiations ?



46. Iodine in (A) oxidation state is easily stabilized by complexation as in $[ICl_2]^{+1}$ ion which is stable in concentrated HCl. In concentrated and strong acids $[I_2]^+$ is (B) cation dimerizing to (C) species $(I_4)^+$. Here (A), (B) and (C) are respectively :

(1) - 1, unstable, paramagnetic

(2) + 1, paramagnetic, diamagnetic

(3) - 1, diamagnetic, paramagnetic

(4) + 1, diamagnetic, stable

47. H_3PO_3 and H_3AsO_3 are :

(1) both tribasic

(2) H_3PO_3 dibasic and H_3AsO_3 tribasic

(3) H_3PO_3 tribasic and H_3AsO_3 , dibasic

(4) Both are dibasic in which H^+ is bonded to P and As

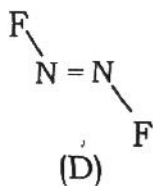
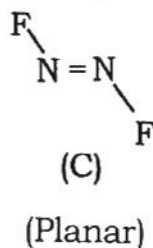
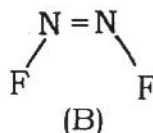
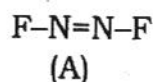
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48. It is possible to prepare a complex (Octahedral or tetrahedral) of d^6 metal ion with a magnetic moment of 2.6 B.M. under the following conditions. Which one of the following alternative is correct ?

- (1) An Octahedral complex of d^6 metal ion with weak field legands.
- (2) A tetrahedral complex of d^6 metal ion with weak field legands.
- (3) An Octahedral complex of d^6 metal ion with strong field legands.
- (4) A tetrahedral complex of d^6 metal ion with strong field legands.

(10 $D_q^T \gg$ Pairing energy)

49. The structures of two forms of N_2F_2 out of the following four structures are :



(N-F bonds in different planes)

Pick the correct choice out of the following ones

- | | |
|-----------------|-----------------|
| (1) (A) and (B) | (2) (A) and (C) |
| (3) (B) and (C) | (4) (C) and (D) |

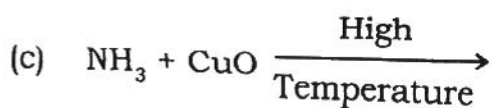
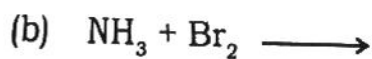
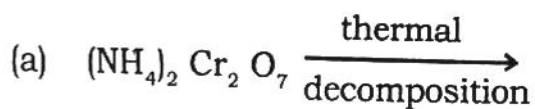
50. On hydrolysis $(\text{CH}_3 - \text{Li})_4$ gives :

- | | |
|--|--|
| (1) $\text{Li OH} + \text{CH}_4$ | (2) $\text{C}_2 \text{H}_6 + \text{Li CH}_3 + \text{Li (OH)}$ |
| (3) $\text{CH}_3 \text{OH} + \text{Li OH} + \text{Li H}$ | (4) $\text{C}_2 \text{H}_5 \text{OH} + \text{Li OH} + \text{Li H}$ |

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54. The reason for (A) P_2 which is similar to N_2 molecule is not stable because (what is (A)):
- (1) The bond energy of three (P - P) bonds is more than (P - P) triple bond as opposed to $N \equiv N$ bond energy which is more than three (N - N) bond energy (A - gaseous)
 - (2) Lattice energy of P - P is more than N - N bond energy (A = Solid state)
 - (3) Lone pairs of electrons in $\ddot{P} \equiv \ddot{P}$ is kinetically more reactive than those present on N_2 in $\ddot{N} \equiv \ddot{N}$ (A - solid state)
 - (4) Kinetically P - P bond is more reactive than N - N bond (A = liquid)

55. The following three reactions give one common molecule (A). What is (A) ?



Pick the correct choice out of the following :

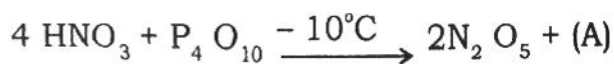
- | | |
|----------------------|------------|
| (1) N_2O | (2) NO |
| (3) N_2 (nitrogen) | (4) NH_3 |

56. The magnetic moment of Mn^{2+} (d^5 case) complexes of weak field ligands (Octahedra and Tetrahedral) is :

- (1) Very close to spin only value
- (2) Spin only value plus a large orbital contribution
- (3) Spin only value plus variable orbital contribution
- (4) Spin only value of one electron

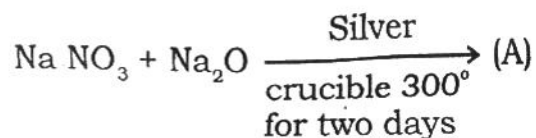
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57. What is (A) in the following reaction :



- (1) H_3PO_4 (2) H_3PO_3
 (3) HPO_3 (4) P_2O_3

58. What is (A) in the following reaction :



- (1) N_2O_5 + Some Sodium Salt (2) No reaction
 (3) Na_3NO_4 (orthonitrate) (4) $\text{N}_2\text{O}_3 + \text{N}_2 + \text{Na}_2\text{NO}_2$

59. $(\text{N}_5)^+$ cationic species exists in compounds $[\text{N}_5^+][5\text{b}_2\text{F}_{11}]^-$ or in $(\text{N}_5)^+[\text{A}_5\text{F}_6]^-$. The structure of $(\text{N}_5)^+$ in these compounds is :

- (1) linear
 (2) Angular
 (3) Cyclopentadienyl type
 (4) Square planar with N - N⁺ side chain

60. HF in liquid state self - ionizes as :

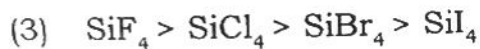
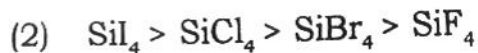
- (1) $\text{HF}(\text{liq}) \rightleftharpoons \text{H}^+ + \text{F}^-$
 (2) $2\text{HF}(\text{liq}) \rightleftharpoons (\text{H}_2\text{F})^+ + \text{F}^-$
 (3) $3\text{HF}(\text{liq}) \rightleftharpoons (\text{H}_2\text{F})^+ + (\text{HF}_2)^-_{(\text{Solvated})}$
 (4) $4\text{HF}(\text{liq}) \rightleftharpoons (\text{H}_3\text{F}_2)^+ + (\text{HF}_2)^-$

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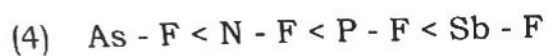
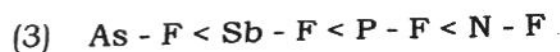
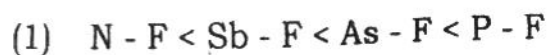
61. Arrange the hydrides CH_4 , H_2O , GeH_4 , H_2Se in order of increasing acid strength. Which one is correct order in the following given orders :
- (1) $\text{CH}_4 < \text{H}_2\text{Se} < \text{H}_2\text{O} < \text{GeH}_4$
 - (2) $\text{CH}_4 < \text{GeH}_4 < \text{H}_2\text{O} < \text{H}_2\text{Se}$
 - (3) $\text{GeH}_4 < \text{CH}_4 < \text{H}_2\text{Se} < \text{H}_2\text{O}$
 - (4) $\text{GeH}_4 < \text{CH}_4 < \text{H}_2\text{Se} < \text{H}_2\text{O}$
62. In octahedral complexes of d^1 metal ions, the net total energy of the d- electron in the complex as compared to that in the free ion :
- (1) increases with respect to unbonded state
 - (2) varies with the nature of legands, sometimes increase and some times decreases
 - (3) remains the same
 - (4) Increases with respect to a state when only metal bond energy is considered with no electronic effects of the legands (i.e. repulsion due to legand electrons)
63. According to M.O. theory, the bond order of diatomic molecules can be (A) which is not so according to valence bond theory. Here (A) is :
- | | |
|--------------|----------------|
| (1) Integral | (2) Two |
| (3) Three | (4) Fractional |

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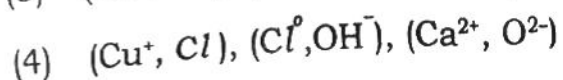
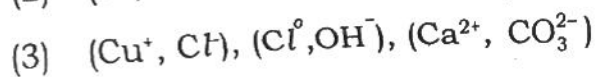
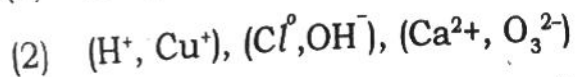
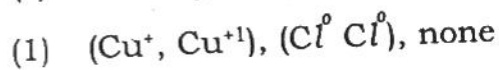
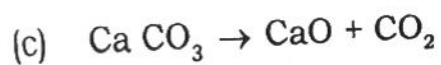
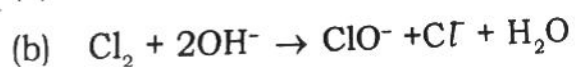
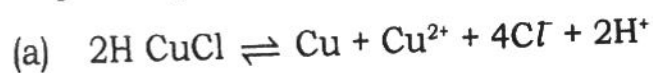
64. Lewis acidity of silicon tetrahalides [SiF_4 , SiCl_4 , SiBr_4 , SiI_4] decreases in the order :



65. Arrange the single bond energy of the following fluorides in increasing order : N - F, P - F, As - F, Sb - F.

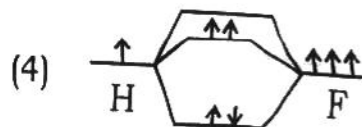
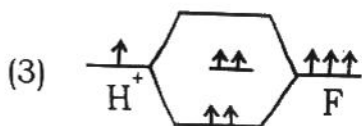
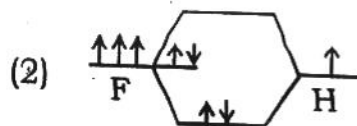
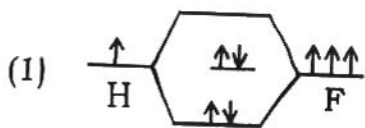


66. The oxidizing and the reducing agent in the following redox reactions respectively are :



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67. In compounds containing X - H and X - D bonds, which one (X - H or X - D) will be stronger and why ?
- (1) (X - D) because of higher contribution of covalency in X - H bond
 - (2) (X - H) because of greater mobility of H compared to D
 - (3) (X - H) because of its lower zero point energy compared to that of X-D
 - (4) (X - D) because of its lower zero point energy compared to that of X-H
68. Which one of the following molecules will show optical isomerism ?
- (1) $[\text{Co}(\text{en})_3]^3$ (octahedral)
 - (2) $[\text{Mn}(\text{CN})(\text{NO}_2)(\text{H}_2\text{O})(\text{NH}_3)]$ (tetrahedral)
 - (3) $[\text{Co}(\text{en})\text{Cl}_3\text{Br}]^-$ (octahedral)
 - (4) Cis $[\text{Co}(\text{en})_2\text{Cl}_2]$ (octahedral) (trans)
69. What happens when in the absence of air B_2H_6 is heated to 100°C ?
If:
- (1) decomposes to B and H_2
 - (2) explodes and gives a number of products
 - (3) forms $\text{B}_{10}\text{H}_{14}$
 - (4) forms $(\text{BH}_4)^-$, B + H_2
70. Which one of the following M, O.'s of $(\text{HF}_2)^-$ is correct ?



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71. What product one forms by absorbing nitrous acid fumes in Na_2CO_3 aqueous solution ?

- (1) NaNO_3 (2) NaNO_2
 (3) $\text{H}_2\text{N}_2\text{O}_2$ (4) $\text{NO} + \text{N}_2\text{O}$

72. SO_3 , exists in three forms which have the molecular formula SO_3 , S_3O_9 and $(\text{SO}_3)_n$. Their structures belong to three of the following ones. The structures of these forms respectively are.

- (a) atomic, (b) molecular (c) oligomeric (linear, cyclic, cluster)
 (d) Polymer (one dimensional chain)

Which one out of the three you will expect to be a gas your choices are the following. Pick up the right choice ?

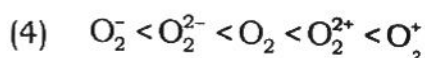
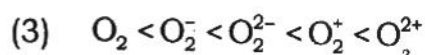
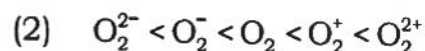
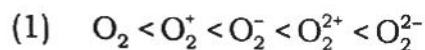
- (1) monomeric molecular, Oligomeric (Chain), polymer (linear) (SO_2)
 (2) atomic, polymeric (Cyclic), 3- dimensional polymeric (S_3O_9)
 (3) molecular, polymer (Cyclic), polymer (3 - dimensional) (S_3O_9)
 (4) molecular (monomeric), polymer (chain), polymer (3-dimensional).
 SO_3

73. Out of C, Si, Sn, Pb and B, the element with the highest atomization energy and the element with the lowest atomization energy are :

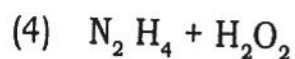
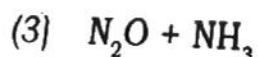
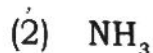
- (1) Carbon and Tin (2) B and Pb
 (3) C and Pb (4) B and Sn

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74. Arrange the following oxygen molecular ions and the molecule in order of increasing bond energy or in decreasing order of (O-O) bond length. The molecular ions and the molecule are : O_2^{2+} , O_2^+ , O_2 , O_2^- and O_2^{2-} . The possible orders are given below. Choose the correct one :



75. What is (A) in the following equation $(Ti_3 N_4)_5 + H_2O \rightarrow (A) + Ti O_2$
Here A is :



76. C_2 , BN , $Be O$ and $Li F$ molecules are isoelectronic and their valence electron orbital energies are quite different. The difference between orbital energies of A and B of AB type molecules increases from carbon to Li - F. It implies that the degree of overlap of the parent orbitals (A and B) :

(1) decreases

(2) Increases

(3) Zero in C_2 and infinite in LiF

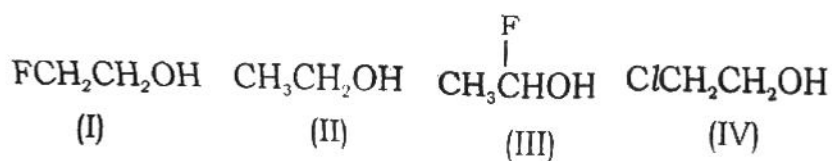
(4) Zero in Li F and infinite in C_2

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77. For a given legand, the order of metal ions producing increasing $10Dq$ value for octahedral complexes is (A) and for a given metal ion, the order of legands producing increasing $10Dq$ for octahedral complexes is (B). Here (A) and (B) :
- (1) Both (A) and (B) constant
 - (2) (A) - changes and B = constant
 - (3) (A) - constant and B = changes
 - (4) Both (A) and (B) = changes
78. In Li_3N , nitrogen is present as (A) and (B) than L_i^+ ion. Pick up the correct alternative from the following alternatives. Here (A) and (B) respectively are :
- (1) N_2^-, N_2^- is greater than
 - (2) N^{3-}, N^{3-} is greater
 - (3) N^{3-}, N^{3-} is smaller
 - (4) N_3^-, N_3^- is smaller
79. The third conization energy of the first transition series show a sharp drop at Fe^{2+} , ($3d^6$) ion. The reason for this drop is due to :
- (1) Increased electron-electron repulsion energy caused due to pairing of d- electrons
 - (2) drop in effective nuclear charge
 - (3) the presence of large number of electrons
 - (4) increased electronegativity of Fe^{2+} ion
80. The following two equations are given :
- (a) $Na(g) \rightleftharpoons Na^+(g) + e^- \dots\dots \Delta H = + 495 \text{ KJ/mol}$
 - (b) $Cl^-(g) \rightleftharpoons Cl(g) + e^- \dots\dots \Delta H = 348.9 \text{ KJ/mol}$
- The reactions (a) and (b) respectively are known as :
- (1) Electron affinity of sodium and electron affinity of Cl^- ion
 - (2) Ionization energy of sodium and Ionization energy of Cl^- ion
 - (3) Ionization energy of sodium and Electron affinity of Cl^- ion
 - (4) Electron affinity of Na and Ionization energy of $Cl^-(g)$

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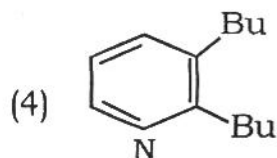
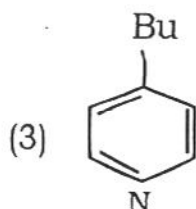
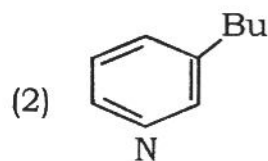
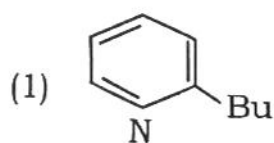
81. Which of the following species is formed when both atoms / groups are eliminated from the same carbon ?
- (1) carbocation (2) carbene
(3) carbanion (4) ketene
82. The stereochemical outcome of the S_N2 reaction on an optically active substrate will be :
- (1) Inversion in configuration
(2) Retention in configuration
(3) Partial racemization
(4) Complete racemization
83. The designation D or L before the name of a monosaccharide indicates :
- (1) The length of the carbon chain in the sugar
(2) the direction of rotation of polarized light
(3) the position of the -OH group on the carbon chain next to the primary alcohol group
(4) The position of the chiral carbon atoms in the carbohydrate
84. The S_N2 mechanism best applies to the reaction between :
- (1) cyclopropane and H_2
(2) methane and Cl_2
(3) 2-chloro - 2 - methylpropane and dilute OH^-
(4) 1 - chlorobutane and aqueous $NaOH$
85. List the following compounds in order of decreasing acidity :



- (1) I > III > IV > II (2) III > IV > I > II
(3) III > I > IV > II (4) I > IV > II > III

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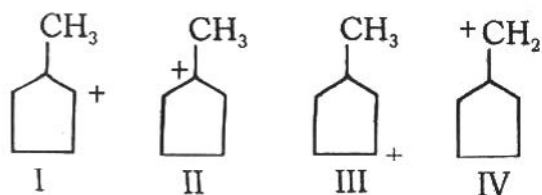
86. When heated with n-butyl lithium at 100° C pyridine forms :



87. Conversion of cyclohexanone oxime to caprolactam can be effected by :

- (1) Beckmann rearrangement (2) Hofmann rearrangement
 (3) Claisen rearrangement (4) Claisen condensation

88. The decreasing order of stability of the following carbocations is :



- (1) I > II > III > IV (2) II > III > I > IV
 (3) II > I > III > IV (4) III > I > II > IV

89. Bimolecular reduction of acetone in the presence of Mg amalgam in ether gives :

- (1) Isopropanol (2) Propane -1, 2 - diol
 (3) Pinacol (4) Propane

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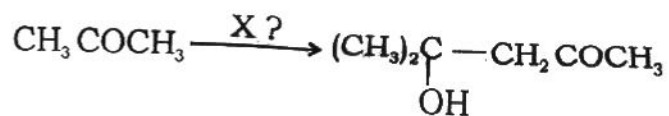
90. Which of the following statements is wrong about citral ?

- (1) The molecule has two double bonds
- (2) An aldehyde group is present
- (3) One of the products obtained from ozonolysis of citral is acetone
- (4) It is an optically active compound

91. Proteins on heating with conc. HNO_3 produce yellow colour. This is known as :

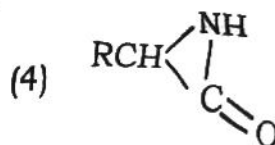
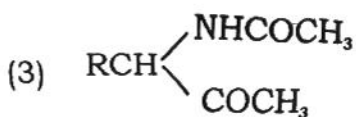
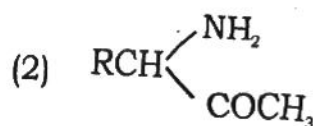
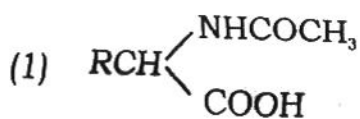
- | | |
|--------------------|------------------------|
| (1) Millon's test | (2) Hopkin's test |
| (3) Ninhydrin test | (4) Xanthoproteic test |

92. The reagent 'X' in the following reaction is :



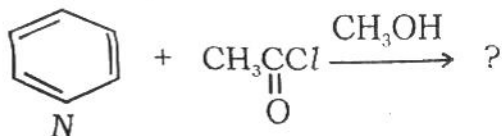
- | | |
|-----------------------------|------------------------------|
| (1) HCl | (2) $\text{Ba}(\text{OH})_2$ |
| (3) H_2SO_4 | (4) NaBH_4 |

93. When heated with acetic anhydride in pyridine solution, α -aminoacids are converted into :



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94. Give the product of the following reaction :

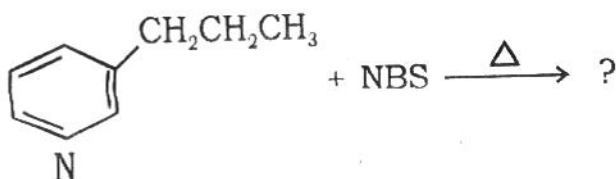


- (1) 2 - acetylpyridine (2) 3 - acetylpyridine
 (3) 4 - acetylpyridine (4) CC(=O)C

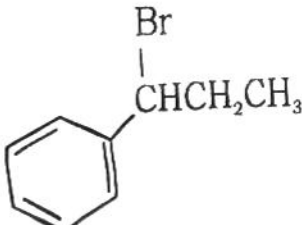
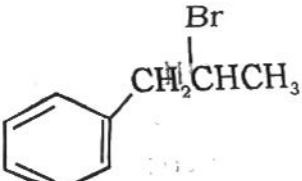
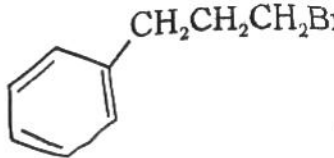
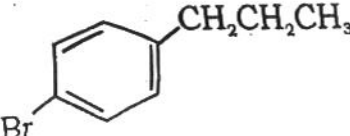
95. The decreasing order of reaction rate of the following benzyl alcohols with HBr is :

- (I) C6H5CH2OH (II) p-NO2C6H4CH2OH
 (III) p-CH3OC6H4CH2OH (IV) p-ClC6H4CH2OH
 (1) III > IV > I > II (2) III > I > IV > II
 (3) III > I > II > IV (4) I > III > IV > II

96. In the following reaction :

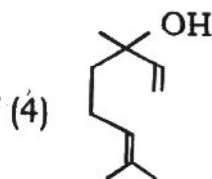
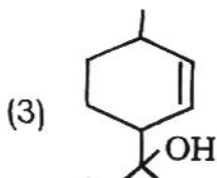
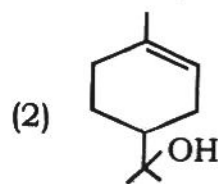
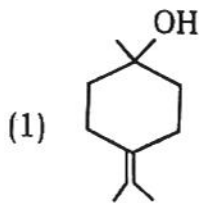


the major product is :

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

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97. One of the following structures is that of α -Terpineol. Which one ?



98. The major product obtained on treatment of 2-bromobutane with alcoholic KOH is :

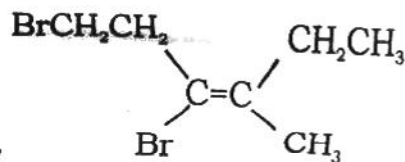
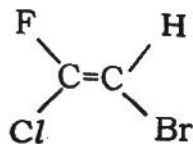
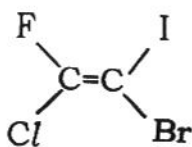
(1) 1-butane

(2) cis - 2 - butane

(3) trans - 2 - butane

(4) 2 - butanol

99. Which of the following alkenes have E - configuration ?



(1) I and II

(2) I and III

(3) II and III

(4) All I, II and III

100. Rapid interconversion of α -D-glucose and β -D-glucose in aqueous solution is known as :

(1) inversion

(2) epimerization

(3) racemization

(4) mutarotation

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106. Identify the compounds which fail to undergo Friedel-Crafts reaction :

Naphthalene	Pyridine	Aniline	Phenanthrene
(I)	(II)	(III)	(IV)

- | | |
|------------------|--------------------|
| (1) II and III | (2) II, III and IV |
| (3) I, II and IV | (4) II and IV |

107. Which of the following is a false statement about the alkaloid piperine ?

- (1) This occurs in black pepper
- (2) The molecule has a methylenedioxy group
- (3) It is a secondary amide
- (4) Piperine can be easily synthesized starting from catechol

108. Teflon is obtained by polymerization of the monomer :

- | | |
|---------------------------------|---|
| (1) $\text{CH}_2 = \text{CF}_2$ | (2) $\text{CF}_2 = \text{CF}_2$ |
| (3) $\text{CH}_2 = \text{CHF}$ | (4) $\text{CH}_2 = \text{C}(\text{CH}_3)\text{COOCH}_3$ |

109. Stereochemically controlled polymers can be made by polymerization process involving :

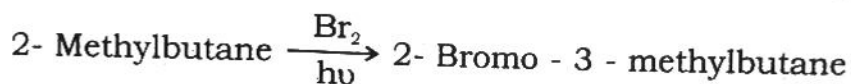
- | | |
|----------------------------|------------------------------|
| (1) Anionic mechanism | (2) Cationic mechanism |
| (3) Coordination mechanism | (4) Free - radical mechanism |

110. Which one of the following is classified as a dye from xanthen group ?

- | | |
|---------------------|-------------------|
| (1) Malachite green | (2) Methyl orange |
| (3) Indigo | (4) Fluorescein |

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114. Which reactive intermediate is involved in the following reaction ?



(not the major product)

- (1) A secondary radical (2) A tertiary radical
 (3) A secondary carbocation (4) A tertiary carbocation

115. The number of chiral carbon atoms present in the *D*-glucopyranose molecule is :

- (1) three (2) four (3) five (4) six

116. Naphthalene undergoes nitration with a mixture of conc. HNO_3 and H_2SO_4 at 50°C to give mainly :

- (1) 1-Nitronaphthalene (2) 2-Nitronaphthalene
 (3) 1,3-Dinitronaphthalene (4) 1,8-Dinitronaphthalene

117. Identify the most reactive compound toward dehydrohalogenation by a strong base :

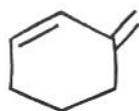
- (1) 1-Bromopentane (2) 2-Bromopentane
 (3) 3-Bromopentane (4) 2-Bromo-2-methylbutane

118. When aniline is heated with glycerol in the presence of sulphuric acid and nitrobenzene, it gives quinoline. This reaction is called :

- (1) Chichibabin reaction
 (2) Skraup synthesis
 (3) Fischer synthesis
 (4) Bischler - Napieralski synthesis

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119. Which of the following conjugated dienes would not react with a dienophile in Diels-Alder reaction ?



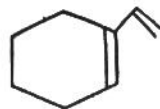
(1)



(2)

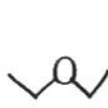


(3)



(4)

120. Two of the following four compounds are more acidic than methanol. Which ones ?



A



B



C



D

(1) B, C

(2) C, D

(3) D, A

(4) D, B

121. Serum is the fluid :

- (1) Supernated from the blood
- (2) Separated from the clotted blood
- (3) Separated from the unclotted blood
- (4) Separated from the mixture of clotted blood and unclotted blood

122. Standard addition calibration is used :

- (1) to obtain precised result
- (2) to obtain accurate result
- (3) to overcome sample matrix effects
- (4) to enhance sensitivity of the result

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128. The correlation between distribution ratio (D) and distribution coefficient (K_D) can be represented as :

- (1) $D = K_D / \{1 + K_a / [H^+]\}$ (2) $K_D = D / \{1 + K_a / [H^+]\}$
 (3) $K_D = D / \{K_a / [H^+]\}$ (4) $D = K_D / \{K_a / [H^+]\}$

129. Craig counter current distribution involves :

- (1) no extraction (2) single extraction
 (3) Successive extractions (4) solute dissolution

130. The van Deemter equation is :

- (1) $HETP = A + \frac{\bar{\mu}}{B} + \frac{C}{\bar{\mu}}$ (2) $HETP = A\bar{\mu} + B + \frac{C}{\bar{\mu}}$
 (3) $HETP = A + \frac{B}{\bar{\mu}} + C\bar{\mu}$ (4) $HETP = \frac{A}{B} + \frac{1}{\bar{\mu}} + \frac{\bar{\mu}}{C}$

131. The retention time in column chromatography can be defined as :

- (1) the time required for the mobile phase to traverse the column
 (2) the time required for the stationary phase to elute the analyte
 (3) the time required for the stationary phase to bind the analyte
 (4) the time required for the analyte peak to appear

132. The unit of specific absorptivity is :

- (1) $\text{Cm}^{-1} \text{mol}^{-1} \text{L}$ (2) $\text{Cm}^{-1} \text{g}^{-1} \text{L}$
 (3) $\text{Cm}^{-1} \text{mol L}^{-1}$ (4) $\text{Cm}^{-1} \text{g L}^{-1}$

133. In spectrophotometric analysis, the minimum relative error in the concentration occurs when percent transmittance measured is :

- (1) 20% (2) 80% (3) 37% (4) 50%

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134. Which is main ingredient of ferroin ?
(1) oxine (2) dithiozone
(3) o-phenanthroline (4) ferrocene
135. Five mole of KBrO_3 in bromate - bromide reaction produces :
(1) one mole Br_2 (2) four mole Br_2
(3) fifteen mole Br_2 (4) no Br_2
136. Metal - EDTA complexation is a pH-controlled process. Can you use an acid indicator if you do not have suitable metal indicator ?
(1) Yes
(2) No
(3) Can not say
(4) wait till arrangement of metal ion indicator is made
137. Chloramine-T and Eriochrome Black-T are used in chemical analysis because :
(1) both are indicators
(2) both are redox reagents
(3) one is redox reagent and other is an indicator
(4) both are same but called by different names
138. Which one acts as a sink of CO_2 gas ?
(1) Ocean (2) River (3) Glaciers (4) Land
139. Which reaction represents the process of respiration ?
(1) $\text{CO}_2 + \text{H}_2\text{O} + h\nu = (\text{CH}_2\text{O}) + \text{O}_2$
(2) $(\text{CH}_2\text{O}) + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O} + \text{CO}_2$
(3) $\text{CH}_4 + 2\text{O}_2 = \text{CO}_2 + 2\text{H}_2\text{O}$
(4) $\text{O}_2 + 4\text{FeO} = 2\text{Fe}_2\text{O}_3$
140. The altitude range of troposphere is :
(1) 0 - 11 Km (2) 11 - 50 Km
(3) 50 - 85 Km (4) 85 - 500 Km

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141. Aitken particles are actually :

- (1) aerosols with diameter more than 0.2μ
- (2) aerosols with diameter less than 0.2μ
- (3) aerosols with diameter more than 2.0μ
- (4) aerosols with diameter less than 2.0μ

142. Van Allen belts are :

- (1) Consisted of two belts of ionizing particles encircling the earth
- (2) Consisted of two belts of ionizing particles encircling the moon
- (3) Consisted of more than two belts of ionizing particle encircling the sun
- (4) Consisted of a single belt of ionizing particle encircling the uncharged particulates

143. Which one does **not** affect the Ozone deterioration ?

- (1) HO
- (2) NO
- (3) O
- (4) H₂

144. Atmospheric window which do not allow to escape of infrared radiation emitting from the earth is in between :

- (1) 4000 — 8000 nm
- (2) 8000 — 16000 nm
- (3) 16000 — 20000 nm
- (4) 20000 — 24000 nm

145. Which one is man culprit to contribute greenhouse effect ?

- (1) CH₄
- (2) O₃
- (3) CFC
- (4) CO₂

146. El Nino is due to :

- (1) warming of waters of the Eastern Pacific ocean
- (2) cooling of waters of the Eastern Pacific ocean
- (3) warming of waters of the Western Pacific ocean
- (4) cooling of waters of the Western Pacific ocean

147. The pH of sea water is constant as :

- (1) 7.0
- (2) 8.1
- (3) 6.5
- (4) 10.2

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148. Which metal is responsible for the manifestation of itai itai diseases ?

- (1) As (2) Pb (3) Hg (4) Cd

149. Quadrivalent cerium is best oxidising reagent because :

- (1) it is easily available
(2) its aqueous solution is highly stable at high temperature
(3) it is cheaper
(4) it does not require any primary standard for standardization

150. Oxine is a precipitating reagent. How can you easily determine this reagent quantitatively at trace level ?

- (1) Precipitation method (2) Spectrophotometric method
(3) Conductometric method (4) $\text{BrO}_3^- - \text{Br}^-$ reaction method

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ROUGH WORK

रफ़ कार्य

16P/206/22(i)

ROUGH WORK
रफ़ कार्य

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली-काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 30 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में लिफाफा रहित प्रवेश-पत्र के अतिरिक्त, लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा। केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।
4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।
5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।
6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।
9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।
12. परीक्षा के उपरान्त केवल ओ एम आर उत्तर-पत्र परीक्षा भवन में जमा कर दें।
13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।