B

Subject Code
વિષય કોડ :- 21018

Chemistry
(Science)

Que. Paper Series
પ્રશ્નપુસ્તિકા કોડ

Candidate's Roll No.

Supervisor's Signature

Time : 1 Hours
Total Ques. : 50
Total Marks : 50

1202297074

Do not open the Question Booklet until ask to do so.

Instructions to Candidates / ઉમેદવારોને સૂચના

(1) There are **50** questions in the Test Booklet. The answer of each question is any **one** out of **A, B, C** and **D**. Four alternatives are given with the question. You have to answer all the questions.

(2) Each correct answer carries **(1)one** mark. For each wrong multiple answer for each question will be treated as wrong. No negative marking for wrong answer.

(3) You have to answer on the OMR Sheet is given separately to you. **For example** : Which State of India has the longest Sea Coast ?

(A) Maharashtra (B) Tamil Nadu
(C) Gujarat (D) Andra Pradesh

In OMR Answer Sheet :

The true answer is **"C"**. Hence circle of **"C"** is blackened (encode).

(4) Don't write anything on the Test Booklet.

(5) Use **blue/black inked ballpoint pen** for filling responses in the OMR Answer Sheet. Any other ink, pen or Pencil is strictly prohibited.

(6) During exam from candidate, if any false matter, guide, cheats, slips, any handwritten material, any printed material, mobile phone, pager, calculator or any electronic equipments are found he/she will be disqualified.

(7) Gossips, making noise or disobeying instructions given by Invigilator will be considered disobedience.

(8) Do Rough Work on last page.

(1) આ પ્રશ્નપુસ્તિકામાં કુલ **50** પ્રશ્નો છે. પ્રત્યેક પ્રશ્નનો સાચો ઉત્તર **A, B, C** અને **D** પૈકી કોઈ એક છે. પ્રશ્નની સાથે જ ચારેય વિકલ્પો આપવામાં આવેલા છે. તમારે બધા જ પ્રશ્નોના ઉત્તર આપવાના છે.

(2) પ્રત્યેક પ્રશ્નના સાચા ઉત્તર માટે **1(એક)** ગુણ છે. એક કરતા વધુ વિકલ્પ ડાર્ક કરનાર જવાબને ખોટો ગણવામાં આવશે. ખોટા જવાબ માટે કોઈ ગુણ કપાત થશે નહીં.

(3) ઉત્તર આપવા માટે **અલગ ઉત્તરવહી (OMR SHEET) આપી છે.**
ઉત્તર નીચેના ઉદાહરણ પ્રમાણે આપવાના છે.
ભારતનું કયું રાજ્ય સૌથી લાંબો દરિયા-કિનારો ધરાવે છે ?

(A) મહારાષ્ટ્ર (B) તામિલનાડું
(C) ગુજરાત (D) આંધ્રપ્રદેશ

ઉત્તરવહી (OMR SHEET)માં

ઉપરોક્ત પ્રશ્નનો સાચો ઉત્તર **"C"** છે. આથી **"C"**નું વર્તુળ કાળું (encode) કરેલ છે.

(4) આ પ્રશ્નપુસ્તિકામાં કશું જ લખવાનું નથી.

(5) ઉત્તરવહીમાં ઉત્તરો **વાદળી / કાળી શાહીની બોલપોઈન્ટ** પેનથી આપવાનાં છે. અન્ય શાહી, પેન કે પેન્સિલનો ઉપયોગ કરી શકાશે નહીં.

(6) પરીક્ષા દરમ્યાન ઉમેદવાર પાસેથી કોઈ પણ સાહિત્ય, ગાઇડ, માર્ગદર્શિકા, કાપલી, સ્લીપો, અન્ય હસ્તલિખિત કે પ્રિન્ટેડ સાહિત્ય, મોબાઇલ ફોન, પેજર, કેલ્ક્યુલેટર કે અન્ય વીજાણુ ઉપકરણો હોવાનું જણાશે તો ઉમેદવારને ગેરલાયક ગણવામાં આવશે.

(7) ચાલુ પરીક્ષા દરમ્યાન અંદરોઅંદર ગુસપુસ કરવી, અવાજ કરવો કે નિરીક્ષકની સૂચનાઓનું ઉલ્લંઘન કરવું તે ગેરશિસ્ત ગણાશે.

(8) રફકામ છેલ્લાં પેજ પર કરવું.

ઉત્તરવહી **(OMR Answer sheet)** બે પ્રતમાં છે. પરીક્ષા પૂરી થયા બાદ ઉત્તરવહી (OMR Answer Sheet)ની પ્રથમ સ્કેનીંગ પ્રત (Scaning Copy) વર્ગ નિરીક્ષકને પરત કર્યા બાદ જ વર્ગખંડ છોડવાનો રહેશે. તેમ કરવામાં કસૂર થયેથી શિસ્તભંગનાં પગલાં ગણી પરીક્ષા માટે જે તે ઉમેદવારને ગેરલાયક ઠેરવવામાં આવશે. બીજી ઉમેદવાર પ્રત (Candidate Copy) ઉમેદવાર સાથે લઈ જઈ શકશે. પ્રશ્નપુસ્તિકા અને બીજી પ્રત ઉમેદવાર પોતાની જોડે લઈ જઈ શકશે.

1 When 1-chloro-3-phenylpropan-2-one heated with in presence of NaOEt to give,

(A) Ethyl 3-phenylpropanoate
(B) Ethyl 2-phenylpropanoate
(C) Ethyl 2-methoxy-2-phenylacetate
(D) 1-ethoxy-3-phenylpropan-2-one

2 An organic compound exhibits the $[M]^+$, $[M+2]^+$, $[M+4]^+$, peaks with intensity ratio 9:6:1 in the mass spectrum and shows a singlet at δ 7.51 ppm in the 1H NMR spectrum in $CDCl_3$, the compound is:

(A) 1,2-dichlorobenzene (B) 1,4-dichlorobenzene
(C) 1,2-dibromobenzene (D) 1,4-dibromobenzene

3 The species ^{19}Ne and ^{14}C emit a positron and β-particle respectively. The resulting species formed are respectively

(A) ^{19}Na and ^{14}B (B) ^{19}F and ^{14}N
(C) ^{19}Na and ^{14}N (D) ^{19}F and ^{14}B

4 Among the following drugs, the anticancer agents is:

(A) Captopril (B) Chloroquine
(C) Camptothecin (D) Ranitidine

5 The concentration of a reactant undergoing decomposition was 0.1, 0.08 and 0.067 mol L^{-1} after 1.0, 2.0 and 3.0 hr respectively. The order of the reaction is,

(A) Zero (B) First
(C) Second (D) Third

6 "Phosphorescence" is represented as

(A) $T_1 \rightarrow S_0 + hv$ (B) $T_1 \rightarrow S_0 + \Delta$
(C) $S_1 \rightarrow S_0 + hv$ (D) $S_1 \rightarrow T_1 + \Delta$

7 According to Arrhenius equation (k = rate constant and T = temperature)

(A) ln k decreases linearly with 1/T
(B) ln k decreases linearly with T
(C) ln k increases linearly with 1/T
(D) ln k increases linearly with T

8 Which one of the following conductometric titrations will show a linear increase of the conductance with a volume of the titrant added up to the breaking point and an almost constant conductance afterward?

(A) A strong acid with a strong base
(B) A strong acid with a weak base
(C) A weak acid with a strong base
(D) A weak acid with a weak base.

9 The standard cell potential for the reaction $Zn(s) + Cu^{2+}(aq) \rightleftharpoons Zn^{2+}(aq) + Cu(s)$ is +1.10 V. The Gibbs free energy change during the reaction is (F = 96500 coulomb mol^{-1})

(A) –21.2 kJ mol^{-1} (B) +212 kJ mol^{-1}
(C) –212 kJ mol^{-1} (D) –212 J mol^{-1}

10 The adsorption of a gas is described by the Langmuir isotherm with the equilibrium constant K= 0.9 kPa^{-1} at 25°C. The pressure (in kPa) at which the fractional surface coverage is 0.95, is

(A) 1/11.1 (B) 21.1
(C) 11.1 (D) 42.2

11 The number-average molar mass (M_N) and weight-average molar mass (M_W) of a polymer are obtained respectively by

(A) Osmometry and light scattering measurements
(B) Osmometry and viscosity measurements
(C) Light scattering and sedimentation measurements
(D) Viscosity and light scattering measurements

12 The value of $\Delta U - \Delta H$ for the reaction Fe_2O_3 (s) + 3C (s) → 2Fe (s) + 3CO (g) is

(A) –3RT (B) +3RT
(C) +RT (D) –RT

13 Entropy of a perfect gas is,

(A) Independent of V (B) Proportional to V
(C) Proportional to ln V (D) Proportional to V^2

14 In IR spectrum of $[Co(CN)_5H]^{3-}$ the Co-H stretch is observed at 1840 cm^{-1}. The (Co-D) stretch in $[Co(CN)_5D]^{3-}$ will appear at nearly,

(A) 1300 cm^{-1} (B) 1400 cm^{-1}
(C) 1500 cm^{-1} (D) 1600 cm^{-1}

15 The orbital with two radial and two angular nodes is

(A) 3p (B) 5d

(C) 5f (D) 8d

16 The molecule with a C_2 axis of symmetry among the following is

(A) BH_2Cl (B) CH_3Cl

(C) NH_2Cl (D) HOCl

17 How to achieve a –70 °C temperature of the reaction bath?

(A) Ice bath

(B) Solid Carbon dioxide

(C) Five parts $CaC1_2$ + 3.5 – 4 parts crushed ice

(D) Crushed ice with NaCl

18 The compound formed upon subjecting an aliphatic amine to Lassaigne's test is

(A) $NaNO_2$ (B) NaCN

(C) NaN_3 (D) $NaNH_2$

19 In qualitative inorganic analysis of metal ions, the ion which precipitates as sulfide in the presence of H_2S in warm dilute HCl is

(A) Cr^{+3} (B) Al^{+3}

(C) Bi^{+3} (D) Co^{+2}

20 A mixture of ethanol and water is separated by,

(A) Simple distillation

(B) Extraction with chloroform

(C) Steam distillation

(D) Fractional distillation

21 The correct order of d-orbital splitting in a trigonal bipyramidal geometry is:

(A) $d_{z^2} > d_{xz} > d_{x^2-y^2}, d_{xy}$

(B) $d_{xz}, d_{yz} > d_{x^2-y^2}, d_{xy} > d_{z^2}$

(C) $d_{x^2-y^2}, d_{xy} > d_{z^2} > d_{xz}, d_{yz}$

(D) $d_{z^2} > d_{x^2-y^2}, d_{xy} > d_{xz}, d_{yz}$

22 An octahedral metal ion M^{+2} has a magnetic moment of 4.0 B.M. The correct combination of metal ion and d-electron configuration is given by

(A) $Co^{2+}, t_{2g}^5 e_g^2$ (B) $Cr^{2+}, t_{2g}^4 e_g^2$

(C) $Mn^{2+}, t_{2g}^3 e_g^1$ (D) $Fe^{2+}, t_{2g}^4 e_g^2$

23 The term symbol that is NOT allowed for the np^2 configuration is

(A) ^1D (B) ^3P

(C) ^1S (D) ^3D

24 Identify the correct statement about $[Ni(H_2O)_6]^{+2}$ and $[Cu(H_2O)_6]^{+2}$

(A) All Ni-O and Cu-O bond lengths of individual species are equal

(B) Ni-O(equatorial) and Cu-O(equatorial)

(C) All Ni-O bond lengths are equal whereas Cu-O (equatorial) bonds are shorter than CuO(axial) bonds

(D) All Cu-O bond lengths are equal whereas Ni-O(equatorial) bonds are shorter than Ni-O(axial)bonds

25 The complex that shows orbital contribution to the magnetic moment, is

(A) $[Cu(H_2O)_6]^{+2}$ (B) $[Ni(H_2O)_6]^{+2}$

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

26 The compound(M) i.e., $[Re_2(Me_2PPh)_2Cl_4]$ having a configuration of $\sigma^2\pi^4\delta^2\delta^{*2}$ can be oxidized to M^+ and M^{2+}. The formal metal-metal order in M, M^+ and M^{+2} respectively, are

(A) 3.0, 3.5 and 4.0

(B) 3.5, 4.0 and 3.0

(C) 4.0, 3.5 and 3.0

(D) 3.0, 4.0 and 3.5

27 The binding modes of NO in 18 electron compounds $[Co(CO)_3(NO)]$ and $[Ni(\eta^5\text{-}Cp)(NO)]$, respectively, are

(A) linear and bent

(B) bent and linear

(C) linear and linear

(D) bent and bent

28 The correct of C-O bond length is

(A) $H_3B.CO > [Mn(CO)_6]^{+1} > [Cr(CO)_6] > [V(CO)_6]^{-1}$

(B) $[V(CO)_6]^{-1} > [Cr(CO)_6] > [Mn(CO)_6]^{+1} > H_3B.CO$

(C) $[Mn(CO)_6]^{+1} > H_3B.CO > [V(CO)_6]^{-1} > [Cr(CO)_6]$

(D) $[Cr(CO)_6] > [V(CO)_6]^{-1} > H_3B.CO > [Mn(CO)_6]^{+1}$

29 The electronegativity differences is the highest for the pair

(A) Li, Cl

(B) K, F

(C) Na, Cl

(D) Li, F

30 The correct order of the size of S, S^{2-}, S^{2+} and S^{4+} species is,

(A) $S > S^{2+} > S^{4+} > S^{2-}$

(B) $S^{2+} > S^{4+} > S^{2-} > S$

(C) $S^{2-} > S > S^{2+} > S^{4+}$

(D) $S^{4+} > S^{2-} > S > S^{2+}$

31 The molecule with highest number of lone-pairs and has a linear shape based on VSEPR theory is:

(A) CO_2

(B) I_3^-

(C) NO^{-2}

(D) NO^{+2}

32 The δ-bond is formed via the overlap of

(A) $d_{x^2-y^2}$ and $d_{x^2-y^2}$ orbitals

(B) d_{xz} and d_{xz} orbitals

(C) d_{z^2} and d_{z^2} Orbitals

(D) d_{yz} and d_{yz} orbitals

33 The ion having the highest bond order is

(A) NO^+

(B) O_2^+

(C) N_2^+

(D) C_2^+

34 The compound that will behave as an acid in H_2SO_4 is

(A) CH_3COOH

(B) HNO_3

(C) $HClO_4$

(D) H_2O

35 The ligand system present in vitamin-B_{12} is:

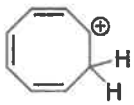
(A) Porphyrin

(B) Corrin

(C) Phthalocyanine

(D) Crown ether

36 Choose correct option for following carbocations.

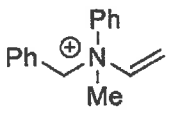

[X]

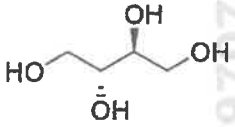

[Y]

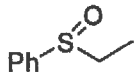

[Z]

(A) X is homoaromatic, Y is antiaromatic and Z is aromatic.
(B) X is aromatic, Y is antiaromatic and Z is homoaromatic.
(C) X is antiaromatic, Y is aromatic and Z is homoaromatic.
(D) X is homoaromatic, Y is aromatic and Z is antiaromatic.

37 Among the following compounds which shows optically activity are

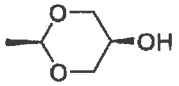

[X]

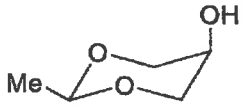

[Y]

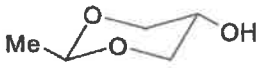

[Z]

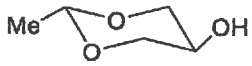
(A) X, Y and Z
(B) X and Y only
(C) X and Z only
(D) Y and Z only

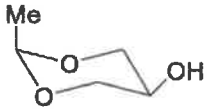
38 Among the following option, the one that corresponds to the most stable conformation of compound [X] is


[X]

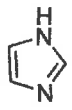
(A) 

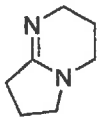
(B) 

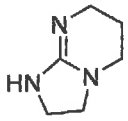
(C) 

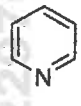
(D) 

39 The decreasing order of basicity of the following compounds is


(I)

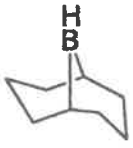

(II)


(III)


(IV)

(A) I > II > III > IV
(B) IV > I > II > III
(C) III > II > I > IV
(D) IV > III > II > I

40 The IUPAC name of the following compound is



(A) 9-borabicyclo [3.3.1] nonane
(B) 1-borabicyclo [3.3.1] nonane
(C) 9-borabicyclo [3.3.0] octane
(D) 1-borabicyclo [3.3.0] octane

41 Correct characteristics of the functional groups of adenine in DNA base pair are

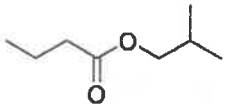
(A) N(3) is a hydrogen bond acceptor and C(6)NH_2 is a hydrogen bond donor

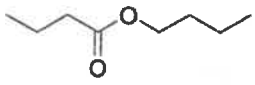
(B) N(1) is a hydrogen bond acceptor and C(6)NH_2 is a hydrogen bond donor

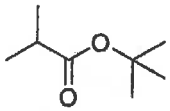
(C) Both N(3) and C(6)NH_2 are hydrogen bond acceptors

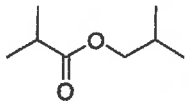
(D) Both N(1) and C(6)NH_2 are hydrogen bond acceptors

42 An organic compound P ($C_8H_{16}O_2$) on treatment with an excess of MeMgCl generated two alcohols Q and R, whereas reaction of P with $LiHAl_4$ generated only a single alcohol R. Compound Q on treatment with an acid yielded an olefin (C_6H_{12}), which exhibited only a singlet at δ = 1.6 ppm in the ^1H NMR spectrum. The compound P is:

(A) 

(B) 

(C) 

(D) 

43 The most appropriate mode of cyclisation in the following transformation is

(A) con-rotatory in photochemical; and dis-rotatory in thermal conditions.

(B) dis-rotatory in photochemical; and dis-rotatory in thermal conditions.

(C) con-rotatory in thermal; and con-rotatory in photochemical conditions.

(D) con-rotatory in thermal; and dis-rotatory in photochemical conditions.

44 Which rearrangement takes place in the following transformation ?

(A) [1, 3]-D shift

(B) [1, 5]-D shift

(C) [1, 3]-methyl shift

(D) [1, 5]-methyl shift

45 The frontier orbital interactions involved in the formation of the carbocation intermediate in the reaction of isobutylene with HCl are,

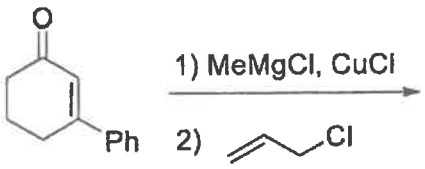
(A) π of olefin and σ^* of HCl

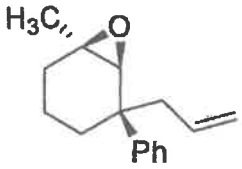
(B) π of olefin and σ of HCl

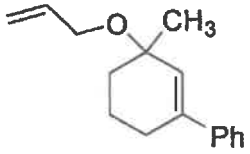
(C) π^* of olefin and σ^* of HCl

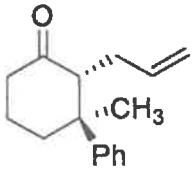
(D) π^* of olefin and σ of HCl

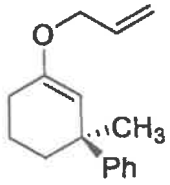
46 The major product formed in the following transformation is:



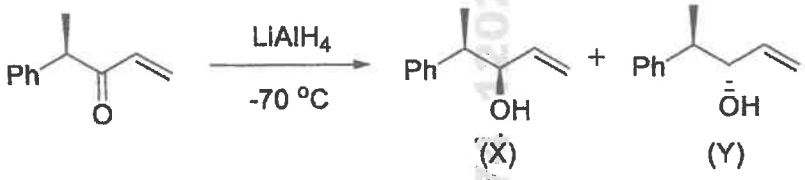
(A)


(B)


(C)


(D)


47 Choose the correct option for the following reaction,



(X) (Y)

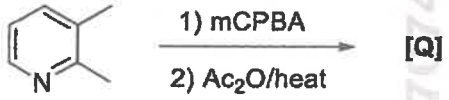
(A) X is major product obtained through Re face attack

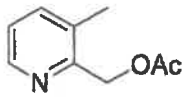
(B) Y is major product obtained through Re face attack

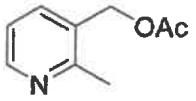
(C) X is major product obtained through Si face attack

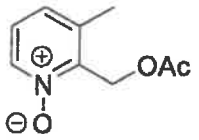
(D) Y is major product obtained through Si face attack

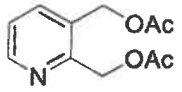
48 In the following transformation, product [Q] is,



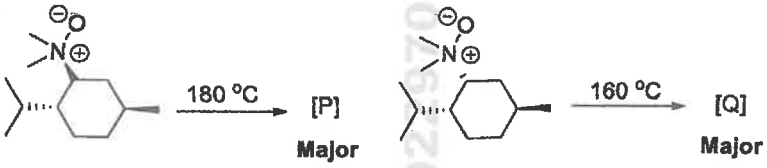
(A) 

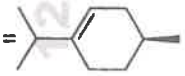
(B) 

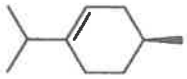
(C) 

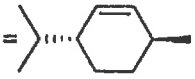
(D) 

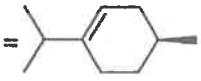
49 The structures of P and Q in the following reaction sequence are



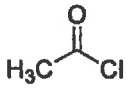
(A) [P] =  [Q] = 

(B) [P] =  [Q] = 

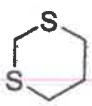
(C) [P] = [Q] = 

(D) [P] = [Q] = 

50 Among the following, the synthetic equivalent of acetyl anion is

(A) 

(B) CH_3CN

(C) 

(D) $CH_3CH_2NO_2$

SPACE FOR ROUGH WORK