Test Paper : **II**

Test Subject : **CHEMICAL SCIENCE**

Test Subject Code : **K-2713**

Test Booklet Serial No. : _____

OMR Sheet No. : _____

Roll No. | | | | | | | | |

(Figures as per admission card)

Name & Signature of Invigilator/s

Signature: _____ Signature : _____

Name : _____ Name : _____

Paper : II

Subject : CHEMICAL SCIENCE

Time : 1 Hour 15 Minutes Maximum Marks : 100

Number of Pages in this Booklet : **8** Number of Questions in this Booklet : **50**

ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಸೂಚನೆಗಳು

1. ಈ ಪುಟದ ಮೇಲ್ತುದಿಯಲ್ಲಿ ಒದಗಿಸಿದ ಸ್ಥಳದಲ್ಲಿ ನಿಮ್ಮ ರೋಲ್ ನಂಬರನ್ನು ಬರೆಯಿರಿ.
2. ಈ ಪತ್ರಿಕೆಯು ಬಹು ಆಯ್ಕೆ ವಿಧದ ಐವತ್ತು ಪ್ರಶ್ನೆಗಳನ್ನು ಒಳಗೊಂಡಿದೆ.
3. ಪರೀಕ್ಷೆಯ ಪ್ರಾರಂಭದಲ್ಲಿ, ಪ್ರಶ್ನೆಪುಸ್ತಿಕೆಯನ್ನು ನಿಮಗೆ ನೀಡಲಾಗುವುದು. ಮೊದಲ 5 ನಿಮಿಷಗಳಲ್ಲಿ ನೀವು ಪುಸ್ತಿಕೆಯನ್ನು ತೆರೆಯಲು ಮತ್ತು ಕೆಳಗಿನಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಪರೀಕ್ಷಿಸಲು ಕೋರಲಾಗಿದೆ.
   (i) ಪ್ರಶ್ನೆಪುಸ್ತಿಕೆಗೆ ಪ್ರವೇಶಾವಕಾಶ ಪಡೆಯಲು, ಈ ಹೊದಿಕೆ ಪುಟದ ಅಂಚಿನ ಮೇಲಿರುವ ಪೇಪರ್ ಸೀಲನ್ನು ಹರಿಯಿರಿ. ಸ್ಟಿಕ್ಕರ್ ಸೀಲ್ ಇಲ್ಲದ ಪ್ರಶ್ನೆಪುಸ್ತಿಕೆ ಸ್ವೀಕರಿಸಬೇಡಿ. ತೆರೆದ ಪುಸ್ತಿಕೆಯನ್ನು ಸ್ವೀಕರಿಸಬೇಡಿ.
   (ii) **ಪುಸ್ತಿಕೆಯಲ್ಲಿನ ಪ್ರಶ್ನೆಗಳ ಸಂಖ್ಯೆ ಮತ್ತು ಪುಟಗಳ ಸಂಖ್ಯೆಯನ್ನು ಮುಖಪುಟದ ಮೇಲೆ ಮುದ್ರಿಸಿದ ಮಾಹಿತಿಯೊಂದಿಗೆ ತಾಳೆ ನೋಡಿರಿ. ಪುಟಗಳು/ಪ್ರಶ್ನೆಗಳು ಕಾಣೆಯಾದ, ಅಥವಾ ದ್ವಿಪ್ರತಿ ಅಥವಾ ಅನುಕ್ರಮವಾಗಿಲ್ಲದ ಅಥವಾ ಇತರ ಯಾವುದೇ ವ್ಯತ್ಯಾಸದ ದೋಷಪೂರಿತ ಪುಸ್ತಿಕೆಯನ್ನು ಕೂಡಲೆ 5 ನಿಮಿಷದ ಅವಧಿ ಒಳಗೆ, ಸಂವೀಕ್ಷಕರಿಂದ ಸರಿ ಇರುವ ಪುಸ್ತಿಕೆಗೆ ಬದಲಾಯಿಸಿಕೊಳ್ಳಬೇಕು. ಆ ಬಳಿಕ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಬದಲಾಯಿಸಲಾಗುವುದಿಲ್ಲ, ಯಾವುದೇ ಹೆಚ್ಚು ಸಮಯವನ್ನೂ ಕೊಡಲಾಗುವುದಿಲ್ಲ.**
4. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಗೂ (A), (B), (C) ಮತ್ತು (D) ಎಂದು ಗುರುತಿಸಿದ ನಾಲ್ಕು ಪರ್ಯಾಯ ಉತ್ತರಗಳಿವೆ. ನೀವು ಪ್ರಶ್ನೆಯ ಎದುರು ಸರಿಯಾದ ಉತ್ತರದ ಮೇಲೆ, ಕೆಳಗೆ ಕಾಣಿಸಿದಂತೆ ಅಂಡಾಕೃತಿಯನ್ನು ಕಪ್ಪಾಗಿಸಬೇಕು.
   ಉದಾಹರಣೆ: (A) (B) ● (D)
   (C) ಸರಿಯಾದ ಉತ್ತರವಾಗಿದ್ದಾಗ.
5. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ I ರಲ್ಲಿ ಕೊಟ್ಟಿರುವ OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ, **ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ I ಮತ್ತು ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ II ರಲ್ಲಿ ಇರುವ ಪ್ರಶ್ನೆಗಳಿಗೆ ನಿಮ್ಮ ಉತ್ತರಗಳನ್ನು ಸೂಚಿಸತಕ್ಕದ್ದು.** OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಅಂಡಾಕೃತಿಯಲ್ಲದೆ ಬೇರೆ ಯಾವುದೇ ಸ್ಥಳದಲ್ಲಿ ಉತ್ತರವನ್ನು ಗುರುತಿಸಿದರೆ, ಅದರ ಮೌಲ್ಯಮಾಪನ ಮಾಡಲಾಗುವುದಿಲ್ಲ
6. OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಕೊಟ್ಟ ಸೂಚನೆಗಳನ್ನು ಜಾಗರೂಕತೆಯಿಂದ ಓದಿರಿ.
7. ಎಲ್ಲಾ ಕರಡು ಕೆಲಸವನ್ನು ಪುಸ್ತಿಕೆಯ ಕೊನೆಯಲ್ಲಿ ಮಾಡತಕ್ಕದ್ದು.
8. ನಿಮ್ಮ ಗುರುತನ್ನು ಬಹಿರಂಗಪಡಿಸಬಹುದಾದ ನಿಮ್ಮ ಹೆಸರು ಅಥವಾ ಯಾವುದೇ ಚಿಹ್ನೆಯನ್ನು, ಸಂಗತವಾದ ಸ್ಥಳ ಹೊರತು ಪಡಿಸಿ, OMR ಉತ್ತರ ಹಾಳೆಯ ಯಾವುದೇ ಭಾಗದಲ್ಲಿ ಬರೆದರೆ, ನೀವು ಅನರ್ಹತೆಗೆ ಬಾಧ್ಯರಾಗಿರುತ್ತೀರಿ.
9. ಪರೀಕ್ಷೆಯು ಮುಗಿದನಂತರ, ಕಡ್ಡಾಯವಾಗಿ OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ಸಂವೀಕ್ಷಕರಿಗೆ ನೀವು ಹಿಂತಿರುಗಿಸಬೇಕು ಮತ್ತು ಪರೀಕ್ಷಾ ಕೊಠಡಿಯ ಹೊರಗೆ OMR ನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ಕೊಂಡೊಯ್ಯ ಕೂಡದು.
10. ಪರೀಕ್ಷೆಯ ನಂತರ, ಪರೀಕ್ಷಾ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಮತ್ತು ನಕಲು OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.
11. **ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರವೇ ಉಪಯೋಗಿಸಿರಿ.**
12. **ಕ್ಯಾಲ್ಕುಲೇಟರ್ ಅಥವಾ ಲಾಗ್ ಟೇಬಲ್ ಇತ್ಯಾದಿಯ ಉಪಯೋಗವನ್ನು ನಿಷೇಧಿಸಲಾಗಿದೆ.**
13. **ಸರಿ ಅಲ್ಲದ ಉತ್ತರಗಳಿಗೆ ಋಣ ಅಂಕ ಇರುವುದಿಲ್ಲ.**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.**
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the oval as indicated below on the correct response against each item.
   Example : (A) (B) ● (D)
   where (C) is the correct response.
5. Your responses to the questions are to be indicated in the **OMR Sheet kept inside the Paper I Booklet only**. If you mark at any place other than in the ovals in the Answer Sheet, it will not be evaluated.
6. Read the instructions given in OMR carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test OMR Answer Sheet to the invigilators at the end of the examination compulsorily and must NOT carry it with you outside the Examination Hall.
10. You can take away question booklet and carbon copy of OMR Answer Sheet soon after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator or log table etc., is prohibited.**
13. **There is no negative marks for incorrect answers.**

CHEMICAL SCIENCE
Paper – II

Note : This paper contains **(50) fifty** objective type questions, **each** question carrying **two (2)** marks. Attempt **all** the questions.

1. The point group symmetry of $XeOF_4$ is
(A) D_3h
(B) D_4v
(C) C_4v
(D) C_3v

2. The square of the wave function in quantum mechanics represents
(A) A state of the system
(B) Shape of the system
(C) Probability of the system
(D) Energy of the system

3. The correct ground state configuration for Chromium is
(A) $[Ar]\ 3d^4 4s^2$
(B) $[Ar]\ 3d^5 4s^1$
(C) $[Ne]\ 3d^5 4s^1$
(D) $[Ne]\ 3d^4 4s^2$

4. The crystal structure of diamond is less closely packed than that of Cu, because the C-C bonds are
(A) Shorter than Cu-Cu bonds
(B) Directional in nature
(C) Non-directional in nature
(D) Only partially covalent

5. The dipole moment of HBr is 0.78×10^{-8} e.s.u.cm and interatomic spacing is 1.41 $\mathring{A}$. The ionic character of HBr is
(A) 11.7
(B) 7.5
(C) 15
(D) 27

6. Match List – I (ions) with List – II (shapes) and select the correct answer using the codes given below the list.

List – I	List – II
a) ICl_2^-	1) Linear
b) BrF_2^+	2) Pyramidal
c) ClF_4^-	3) Tetrahedral
d) $AlCl_4^-$	4) Square planer
	5) Angular

Codes :

	(a)	(b)	(c)	(d)
(A)	1	2	4	5
(B)	4	5	2	3
(C)	1	5	4	3
(D)	5	1	3	4

7. The dark purple colour of $KMnO_4$ is due to
(A) d-d transition
(B) ligand field transition
(C) charge transfer transition
(D) $\sigma - \pi^*$ transition

8. The crystal field splitting energy for Cr^{3+} ion in octahedral field increases for ligands I^-, H_2O, NH_3, CN^- and the order is
(A) $I^- < H_2O < NH_3 < CN^-$
(B) $CN^- < I^- < H_2O < NH_3$
(C) $CN^- < NH_3 < H_2O < I^-$
(D) $NH_3 < H_2O < I^{-2} < CN^-$

9. An element crystallizes both in FCC and BCC lattices. If the density of the element in the two forms is the same, the ratio of unit cell length of FCC to that of BCC lattice is
(A) $(2)^{1/3}$
(B) $\left(1/2\right)^{1/3}$
(C) $(4)^{1/3}$
(D) $\left(\frac{1}{4}\right)^{1/3}$

10. An example of a metal cluster is

(A) $Fe_2(CO)_9$ (B) $Fe_3(CO)_{12}$

(C) $Mn_2(CO)_{10}$ (D) $Co_2(CO)_8$

11. In the first transition series, the paramagnetism is due to the unpaired spins, being approximately equal to $n = 2\sqrt{s(s+1)}$ magnetons where s is the total spin. On this basis Cu^+ ion has

(A) 3.88 magnetons

(B) 1.41 magnetons

(C) 2.83 magnetons

(D) zero magnetons

12. The nomenclature for $Fe_4[Fe(CN)_6]_3$ is

(A) Ferric-ferrous hexacyanato

(B) Hexacyano ferrate (III, II)

(C) Ferroso ferric cyanide

(D) Iron (III) hexacyano ferrate (II)

13. The formula of the complex tris-(ethylene diamine) cobalt (III) sulphate is

(A) $[Co(en)_3SO_4]$

(B) $[Co(en)_3]SO_4$

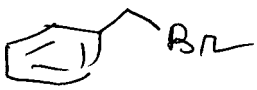
(C) $[Co(en)_3]_2SO_4$

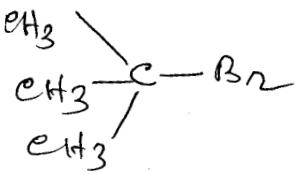
(D) $[Co(en)_3]_2(SO_4)_3$

14. Which one of the following will NOT undergo S_N1 or S_N2 reaction ?

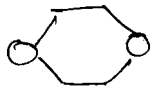
(A) 

(B) CH_3Br

(C) 

(D) 

15. The IUPAC name of the following compound is



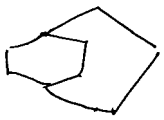
(A) Dioxane

(B) 1, 4-Dioxane

(C) Diethylene-1, 4-dioxane

(D) 1, 4-dioxacyclohexane

16. The IUPAC name of the following molecule is



(A) Bicyclo [2.2.2] octane

(B) Bicyclo [2.2.3] octane

(C) Bicyclo [3.2.1] heptane

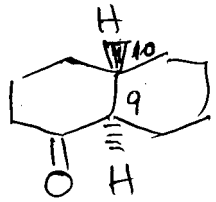
(D) Bicyclo [3.2.2] nonane

17. How many stereoisomers are possible for the following molecule ?

(A) 2 (B) 4

(C) 1 (D) 6

18. The absolute configuration (R, S–notation) at C_9 and C_{10} of the following is



(A) 9R, 10S (B) 9S, 10R

(C) 9S, 10S (D) 9R, 10R

19. The most destabilizing interaction in the boat conformation of cyclohexane is

(A) 1, 3-diaxial

(B) Gauche n-butane type

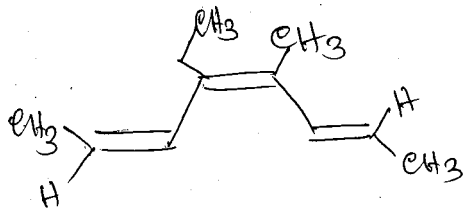
(C) Pitzer strain

(D) Bowsprit-flagpole

20. The following molecule has

(A) $1\sigma, 2C_2$, i and $1S_4$ axis of symmetry
(B) $2\sigma, 1C_2$ and i only
(C) $1\sigma, 1C_2$, i and $1S_2$ axis of symmetry
(D) $2\sigma, 2C_2$ and $1S_2$ axis of symmetry

21. What is the configuration (E, Z notations) of the following molecule ?

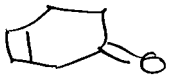


(A) 2Z, 4Z, 6E (B) 2Z, 4E, 6Z
(C) 2E, 4Z, 6Z (D) 2E, 4E, 6E

22. Which of the following reactions involve carbon free radicals intermediate ?
(A) Hunsdiecker reaction
(B) Acyloim condensation
(C) Sandmeyer reaction
(D) All the above reactions

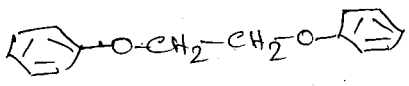
23. Ketones and aldehydes reacts with α -bromoesters and zinc metal powder to give
(A) β-Hydroxy ethers
(B) β-Hydroxy esters
(C) α-Hydroxy esters
(D) β-Hydroxy acids

24. Anisole on Birch reduction gives

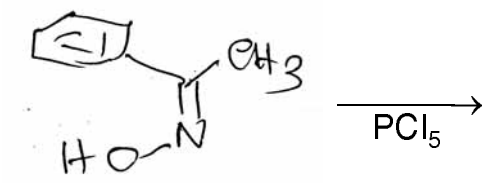
(A) 

(B) 

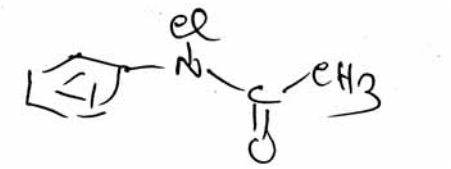
(C) 

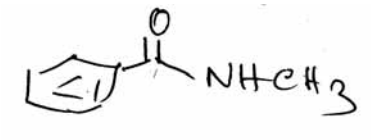
(D) 

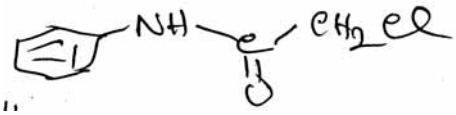
25. The product of the following reaction is



(A) 

(B) 

(C) 

(D) 

26. Pick the correct match

a)	Wolf-Kishner reduction	I)	Na/EtOH
b)	Rosenmunel reaction	II)	NH_2NH_2/KOH
c)	Hoffman rearrangement	III)	$Al(-O-\langle)_3$
d)	Meerweim-Pondorf-Verley reduction	IV)	$H_2/BaSO_4$ quinoline/Pd,C
		V)	Br_2/NaOH

(A) a = V, b = III, c = IV, d = I
(B) a = II, b = IV, c = V, d = III
(C) a = II, b = I, c = V, d = III
(D) a = II, b = IV, c = III, d = V

27. Friedel-Crafts reaction of benzene with propene in the presence of $AlCl_3$ gives

(A) n-Propyl benzene

(B) 4-Ethyl toluene

(C) Isopropylbenzene

(D) 2-Ethyl toluene

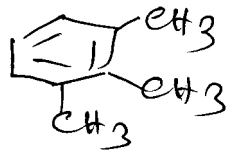
28. The structure of the compound which exhibited the following spectral data is

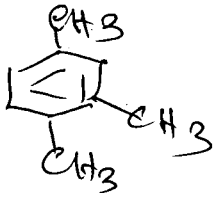
UV : X_{max}^{EtOH} 268 nm (φ 480)

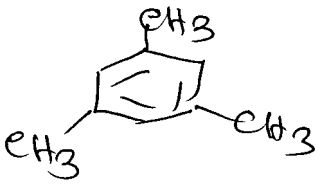
IR : $\gamma_{max}^{CHCl_3}$ 3067, 2907, 1608, 1473 cm^{-1}

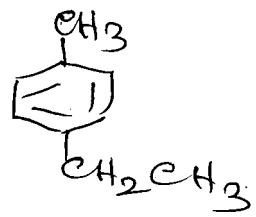
^1H NMR : δ_{CDCl_3} 2.26 (s, 31.6 squares)
6.79 (s, 10.4 squares)

Mass : m/z 120 (M^+)

(A) 

(B) 

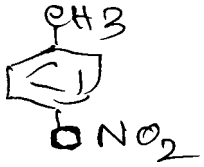
(C) 

(D) 

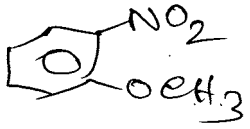
29. An organic compound with molecular formula $C_7H_7NO_3$ exhibited the following spectral data. What is the structure of the compound ?

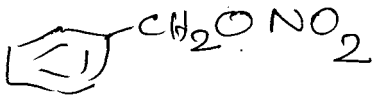
IR : γ_{max}^{KBr} 3040, 1610, 1510, 1350 cm^{-1}

^1H NMR : δ_{CDCl_3} 3.9 (s, 3H)
6.8 (d, 2H, 8Hz)
8.1 (d, 2H, 8Hz)

(A) 

(B) 

(C) 

(D) 

30. Which of the following is a stronger base and a better nucleophile ?

(A) $\ominus$NH (B) $HO_{\ominus}$

(C) $\ominus CH_3$ (D) $F_{\ominus}$

31. Which of the following compounds has the lowest pka ?

(A) p-methyl phenol

(B) phenol

(C) p-chlorophenol

(D) p-nitrophenol

32. What will be the pH of a solution formed by mixing 40 ml of 0.1 M HCl with 10 ml of 0.45 M NaOH ?

(A) 12 (B) 10

(C) 8 (D) 6

33. According to Pearson, a hard base is one whose donor atom has

(A) Low electronegativity, low polarizability and which is difficult to oxidize

(B) High electronegativity, high polarizability and easy to oxidise

(C) High electronegativity, low polarizability and which is difficult to oxidise

(D) Low electronegativity, high polarizability and difficult to oxidise

34. If the reduction potentials of Ag^+/Ag and Fe^{3+}/Fe^{2+} are 0.799 and 0.771V respectively. What is the equilibrium constant of the reaction ?

$Ag + Fe^{3+} \rightleftharpoons Fe^{2+} + Ag^+$

(A) +0.028 (B) −0.4732

(C) −0.3363 (D) +0.3363

35. The ionic strength of 0.01M K_2SO_4 is

(A) 0.01 M (B) 0.02 M

(C) 0.03 M (D) 0.04 M

36. During the charging of a lead storage battery, the reaction occurring at the cathode is represented by

(A) $2H^+ + 2e^- \rightarrow H_2$

(B) $Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$

(C) $Pb \rightarrow Pb^{2+} + 2e^-$

(D) $Pb^{2+} + 2e^- \rightarrow Pb$

37. Saturated solution of KNO_3 is used to make salt bridge because

(A) Velocity of K^+ is greater than that of NO_3^-

(B) Velocity of NO_3^- is greater than that of K^+

(C) Velocity of both K^+ and NO_3^- are nearly the same

(D) KNO_3 is highly soluble in water

38. Based on the conventional transition state theory the rate constant (k_r) of a bimolecular reaction is given by

(A) $\left(\frac{k_B T}{h}\right) K^{\neq}$ (B) $\left(\frac{h}{k_B T}\right) K^{\neq}$

(C) $Ae^{-E_a/RT}$ (D) $\frac{k_B T}{h}$

39. The order of the reaction in which half life of it does not depend on the concentration/s of the reactant is

(A) 0 (B) 1

(C) 2 (D) 3

40. The following experimental techniques are not adequate for studying the fast reactions.

(A) Stopped flow technique

(B) Flash photolysis

(C) Conventional methods

(D) Relaxation methods

41. A substance which destroys the activity of a catalyst is called

(A) Promoter

(B) Inhibitor

(C) Negative catalyst

(D) Catalyst poison

42. The average bond energies of S_8, H_2 and H_2S are 264, 436 and 338 $kJmol^{-1}$ respectively. The enthalpy of the following reaction is

$S_8 + 8H_2 \rightleftharpoons 8H_2S$

(A) 1038 k $Jmol^{-1}$

(B) 368 k $Jmol^{-1}$

(C) 1048 k $Jmol^{-1}$

(D) Zero

43. Match the following spectroscopic techniques with the regions in the electromagnetic spectrum

a) Vibrational Spectroscopy	1) Ultraviolet-Visible
b) Electronic Spectroscopy	2) Gamma rays
c) Mossbauer Spectroscopy	3) Radio frequency
d) NMR Spectroscopy	4) Infrared

	a	b	c	d
(A)	4	1	2	3
(B)	3	4	1	2
(C)	2	3	4	1
(D)	1	2	3	4

44. Among the following diatomic molecules which one shows EPR signal ?

(A) Li_2 (B) B_2
(C) C_2 (D) N_2

45. Among the singlet (S), doublet (D) and triplet (T) electronic states, phosphorescence involves transition between

(A) S and S (B) D and D
(C) S and T (D) T and T

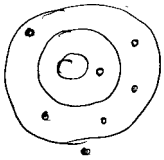
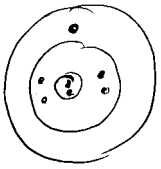
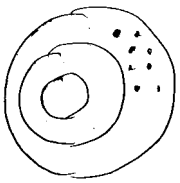
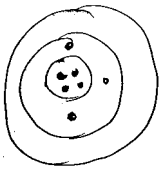
46. The number of normal modes of vibrations of the molecules CO_2, H_2O and acetylene are

(A) 3, 3, 12 (B) 4, 3, 7
(C) 9, 9, 12 (D) 4, 4, 7

47. Of the three types of systematic errors encountered in chemical analysis which is most difficult to identify the correct.

(A) Instrument error
(B) Method errors
(C) Personal errors
(D) All are equally difficult to identify and correct

48. Match the following :

a)		1) Low accuracy, high precision
b)		2) High accuracy, low precision
c)		3) Low accuracy, low precision
d)		4) High accuracy, high precision

Codes:

	a	b	c	d
(A)	3	1	2	4
(B)	3	2	4	1
(C)	3	4	1	2
(D)	3	2	1	4

49. Which type of error effect the results of a series of determinations to the same degree ?

(A) Indeterminate (B) Accidental
(C) Determinate (D) Erratic

50. The analyses of a sample of iron ore gave the following percentage values for the iron content : 7.08, 7.21, 7.12, 7.09, 7.16, 7.14, 7.07, 7.14, 7.18 and 7.11. What will be the mean and standard deviation for the value respectively ?

(A) 7.13, 0.0020 (B) 7.13, 0.0182
(C) 7.13, $\pm$ 0.045 (D) 7.13, $\pm$ 0.45

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Space for Rough Work