Test Paper : **II**

Test Subject : **CHEMICAL SCIENCES**

Test Subject Code : **K-2717**

Test Booklet Serial No. : _____

OMR Sheet No. : _____

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

(Figures as per admission card)

Name & Signature of Invigilator/s

Signature : _____

Name : _____

Paper : II

Subject : CHEMICAL SCIENCES

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) ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಗೆ ಪ್ರವೇಶಾವಕಾಶ ಪಡೆಯಲು, ಈ ಹೊದಿಕೆ ಪುಟದ ಅಂಚಿನ ಮೇಲಿರುವ ಪೇಪರ್ ಸೀಲನ್ನು ಹರಿಯಿರಿ. ಸ್ಟಿಕ್ಕರ್ ಸೀಲ್ ಇಲ್ಲದ ಅಥವಾ 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 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 ಕೊಂಡೊಯ್ಯಕೂಡದು.
10. ಪರೀಕ್ಷೆಯ ನಂತರ, ಪರೀಕ್ಷಾ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಮತ್ತು ನಕಲು OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.
11. **ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರವೇ ಉಪಯೋಗಿಸಿರಿ.**
12. **ಕ್ಯಾಲ್ಕುಲೇಟರ್, ವಿದ್ಯುನ್ಮಾನ ಉಪಕರಣ ಅಥವಾ ಲಾಗ್ ಟೇಬಲ್ ಇತ್ಯಾದಿಯ ಉಪಯೋಗವನ್ನು ನಿಷೇಧಿಸಲಾಗಿದೆ.**
13. **ಸರಿ ಅಲ್ಲದ ಉತ್ತರಗಳಿಗೆ ಋಣ ಅಂಕ ಇರುವುದಿಲ್ಲ.**
14. **ಕನ್ನಡ ಮತ್ತು ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ಯಾವುದೇ ರೀತಿಯ ವ್ಯತ್ಯಾಸಗಳು ಕಂಡುಬಂದಲ್ಲಿ, ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳಲ್ಲಿರುವುದೇ ಅಂತಿಮವೆಂದು ಪರಿಗಣಿಸಬೇಕು.**

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 the cover page. Do not accept a booklet without sticker seal or 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 circle 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 circles in the OMR 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 after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator, Electronic gadgets or log table etc., is prohibited.**
13. **There is no negative marks for incorrect answers.**
14. **In case of any discrepancy found in the Kannada translation of a question booklet the question in English version shall be taken as final.**

CHEMICAL SCIENCES
Paper – II

Note : This paper contains **fifty (50)** objective type questions. **Each** question carries **two (2)** marks. **All** questions are **compulsory**.

1. The atom with the highest ionization potential is
(A) Boron (B) Carbon
(C) Nitrogen (D) Oxygen

2. The oxidation number of sulphur in S_8, S_2F_2 and H_2S respectively are
(A) 0, + 1 and – 2
(B) + 2, + 1 and – 2
(C) 0, + 1 and + 2
(D) – 2, + 1 and – 2

3. The HOMO of Nitrogen molecule is
(A) π-bonding molecular orbital
(B) σ-bonding molecular orbital
(C) π^*-antibonding molecular orbital
(D) σ^*-antibonding molecular orbital

4. The conjugate base of H_3O^+ is
(A) H^+ (B) H_2O
(C) OH^- (D) H_2O_2

5. H_2S gas is passed through an acidic solution containing Pb^{2+}, Zn^{2+}, Cu^{2+} and Ni^{+2} ions. The precipitate will consists of
(A) ZnS and PbS
(B) PbS and NiS
(C) NiS and CuS
(D) CuS and PbS

6. The ground term symbol of Ni^{+2} ion has following L and S values
(A) L = 3, S = 1 (B) L = 1, S = 2
(C) L = 0, S = 1 (D) L = 2, S = 3

7. Hydroformylation reactions are catalyzed by
(A) $TiCl_4$ and $AlEt_3$
(B) $CaCl_2$ and NaOEt
(C) $Ni(CO)_4$
(D) $HCo(CO)_4$

8. The close structure of $[B_6H_6]^{2-}$ anion is anticipated by
(A) Huckel rule (B) Wade's rule
(C) EAN rule (D) Octet rule

9. Which one of the following techniques does not come under the head thermoanalytical methods ?
(A) Differential thermal analysis
(B) Thermomechanical analysis
(C) Differential scanning calorimetry
(D) Differential pulse voltammetry

10. Which of the following metalloproteins does not have iron in the active site ?
(A) Haemoglobin
(B) Haemoerythrin
(C) Hemocyanin
(D) Cytochrome – C

11. Among the following molecules CH_4, CO_2, C_6H_6 and H_2, the ones that will absorb infrared radiation are
(A) CH_4, CO_2 and C_6H_6
(B) CH_4, C_6H_6 and H_2
(C) CO_2, C_6H_6 and H_2
(D) CH_4, CO_2 and H_2

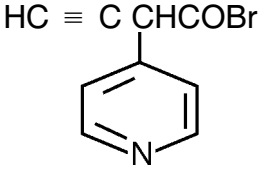
12. Which pair of ionic solids has the same Madelung constant ?
(A) NaCl and CsCl
(B) NaCl and CaF_2
(C) ZnS and MgO
(D) NaCl and MgO

13. The compound having a diamagnetic ground state is
(A) Fe_3O_4
(B) $K_4[Fe(CN)_6]$
(C) $Hg[Co(NCS)_4]$
(D) $[Mn(H_2O)_6]Cl_2$

14. Which of the following pairs of 4f elements can exhibit + 4 oxidation state ?
(A) La and Lu (B) Ce and Pr
(C) Eu and Yb (D) Sm and Tm

15. The nucleus resulting from $^{238}_{92}U$ after successive emission of two alpha particles and four beta particles is
(A) $^{230}_{90}Th$ (B) $^{230}_{94}Pu$
(C) $^{230}_{88}Ra$ (D) $^{230}_{92}U$

16. The IUPAC name of the following compound is



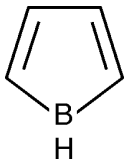
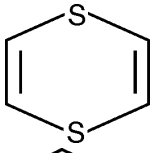
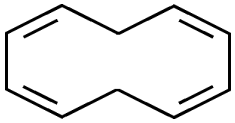
(A) 2 – (4 – Pyridyl) but – 3ynoyl bromide
(B) 1 – (4 – Pyridyl) but – 1 – yn – 4 – oyl bromide
(C) 2 – (4 – Pyridyl) but – 2 – oyl bromide
(D) 3 – (4 – Pyridyl) but – 3 – oyl bromide

17. Reaction of phenylglyoxalic acid with optically active (s) (+) – N-benzyl – 3 – (hydroxymethyl) – 4 – methyl – 1, 4 – dihydropyridine gives
(A) (±) – Mandelic acid
(B) R – (–) – Mandelic acid
(C) S – (+) – Mandelic acid
(D) Phenylacetic acid

18. The species formed when DMT protecting group is cleaved using dichloroacetic acid is
(A) Carbene
(B) Carbanion
(C) Free radical
(D) Carbocation

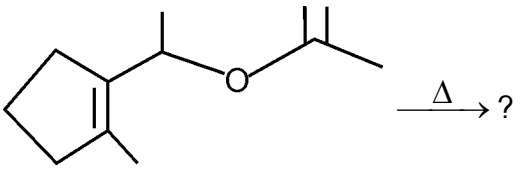
19. Which of the following statement(s) is/are correct ?
i) $R\overset{\ominus}{O}$ is a stronger nucleophile than $\overset{\ominus}{O}H$
ii) $RC\overset{\ominus}{O}_2$ is a stronger nucleophile than $\overset{\ominus}{O}H$
iii) $RC\overset{\ominus}{O}_2$ is a stronger nucleophile than ROH
iv) $R\overset{\ominus}{O}$ is a weaker nucleophile than $\overset{\ominus}{O}H$
(A) iv is correct
(B) ii and iv are correct
(C) i, ii and iii are correct
(D) i and iii are correct

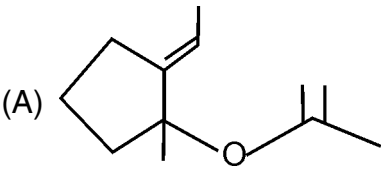
20. Match the following :

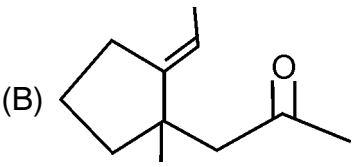
List – I	List – II
i) 	a) Aromatic
ii) 	b) Non-aromatic
iii) 	c) Anti-aromatic

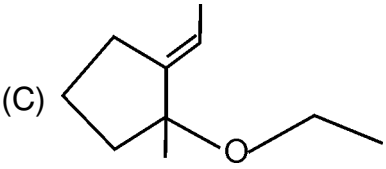
(A) i – c, ii – a, iii – b
(B) i – b, ii – a, iii – c
(C) i – a, ii – b, iii – c
(D) i – a, ii – c, iii – b

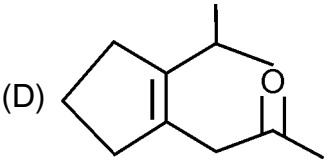
21. The product formed in the following thermal reaction is



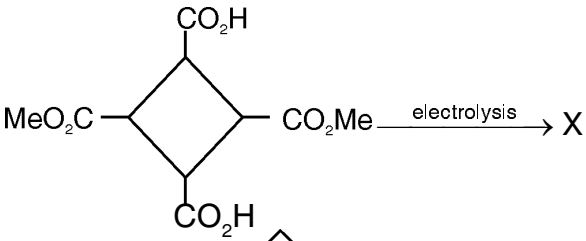
(A) 

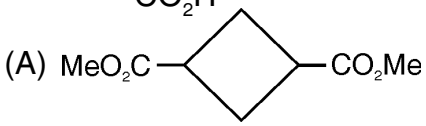
(B) 

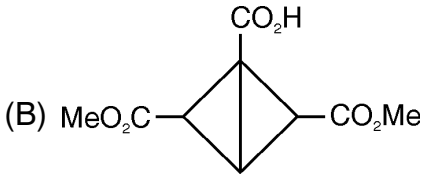
(C) 

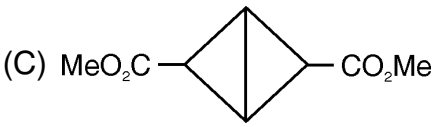
(D) 

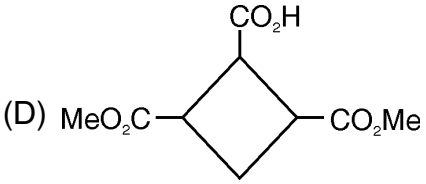
22. In the reaction X is



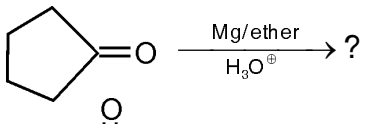
(A) 

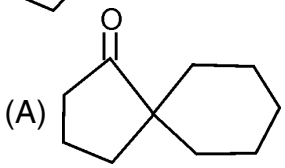
(B) 

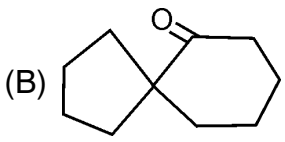
(C) 

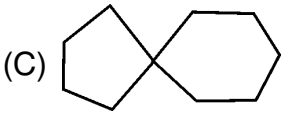
(D) 

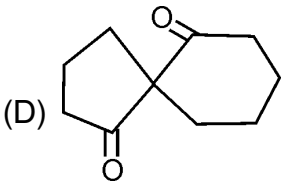
23. The product of the following reaction is



(A) 

(B) 

(C) 

(D) 

24. Secondary alcohols can be oxidized into ketones using Sarett reagent. The Sarett reagent is

(A) Chromic anhydride in acetic acid

(B) Chromic anhydride in sulfuric acid

(C) Chromic anhydride in pyridine

(D) Chromic anhydride in pyridine-water

25. Hydration of 3–phenyl–1–propyne in presence of sulfuric acid and mercuric sulphate as catalysts gives

(A) 1–phenyl–2–propanol

(B) 3–phenylpropanol

(C) 3–phenylpropanal

(D) phenylacetone

26. The most shielded carbon(s) of 1–chloro–4–fluorobenzene is/are

(A) C_2 and C_6 (B) C_3 and C_5

(C) C_1 (D) C_4

27. The relative intensities of the halogen isotope peaks in the molecular ions of $CHCl_2Br$ is

(A) 9 : 7 : 15 : 1 (B) 9 : 15 : 7 : 1

(C) 3 : 7 : 5 : 1 (D) 3 : 5 : 7 : 1

28. Match the following :

i) Bischler	a) Quinoline
ii) Bischler-Napieralski	b) Imidazoles
iii) Bredereck	c) Isoquinoline
iv) Doebner-Von Miller	d) Indole

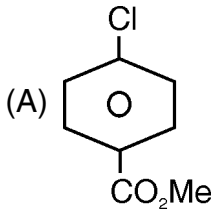
(A) i – d, ii – a, iii – c, iv – b

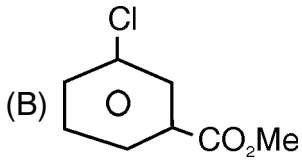
(B) i – c, ii – d, iii – a, iv – b

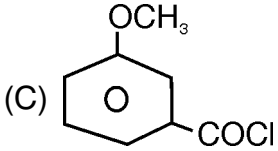
(C) i – d, ii – c, iii – b, iv – a

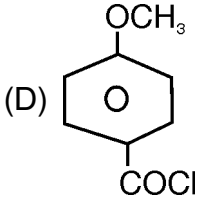
(D) i – c, ii – d, iii – b, iv – a

29. A compound of molecular formula $C_8H_7ClO_2$ had peaks for its benzene ring carbons at δ 114.3, 125.3, 134.0 and 165.5. The structure of the compound is

(A) 

(B) 

(C) 

(D) 

30. In the reaction X is

$$Boc-Lys(Z)-Glu(O^tBu)-OBzl \xrightarrow{TFA} X$$

(A) $H_3\overset{+}{N}-Lys\,(Z)-Glu-OBzl$

(B) $H_3\overset{+}{N}-Lys\,(Z)-Glu-OH$

(C) $Boc-Lys\,(Z)-Glu(O^tBu)-OH$

(D) $Boc-Lys\,(Z)-Glu-OH$

31. Match the following :

List – I (Color)	List – II
i) Green	a) 420
ii) Red	b) 620
iii) Orange	c) 530
iv) Violet	d) 700

(A) i – d, ii – c, iii – b, iv – a
(B) i – c, ii – d, iii – b, iv – a
(C) i – a, ii – b, iii – c, iv – d
(D) i – c, ii – a, iii – b, iv – d

32. The identity E is equal to

(A) C_3^+ (B) $C_3^- C_3^+$
(C) $C_3^+ C_3^+$ (D) $\delta_v C_3$

33. This molecule is an example of D_{6h} point group

(A) H_2O
(B) NH_3
(C) HOOC – CH (OH) – CH (OH) COOH
(D) C_6H_6

34. Which of the following molecules can show a pure rotational microwave spectrum ?

CO_2, OCS, N_2, C_6H_6, H_2O, $CH_2 = CH_2$

(A) CO_2 and $CH_2 = CH_2$
(B) N_2 and CO_2
(C) OCS and H_2O
(D) C_6H_6 and $CH_2 = CH_2$

35. Match the following :

i) Molecular partition function	a) $K_c = \frac{K_1}{K_{-1}}$
ii) Arrhenius equation	b) $q = \sum g_i e^{-\beta E_i}$
iii) Boltzmann constant	c) $K = Ae^{-E_a/RT}$
iv) Principle of detailed balance	d) $\frac{R}{N}$

(A) i – b, ii – c, iii – d, iv – a
(B) i – c, ii – b, iii – d, iv – a
(C) i – a, ii – b, iii – c, iv – d
(D) i – d, ii – c, iii – b, iv – a

36. Chromophore activity of C = C double bond is due to the transition

(A) $n \rightarrow \sigma^*$ (B) $\pi \rightarrow \pi^*$
(C) $n \rightarrow \pi^*$ (D) $\sigma \rightarrow \sigma^*$

37. Radiation used for XRD

(A) $M_0\ K\alpha_1$ (B) $M_0\ K\alpha_2$
(C) Nd : YAG (D) Cu $K\alpha$

38. The following data is given (p-probability)

x	p(x)
1	0.20
3	0.25
4	0.55

The average value of x is equal to

(A) $\langle x \rangle = 3.15$
(B) $\langle x \rangle = 0.12$
(C) $\langle x \rangle = 0.24$
(D) $\langle x \rangle = 0.31$

39. Ionic strength of a solution that is 0.10 mol Kg^{-1} in KCl (aq.) and 0.20 mol Kg^{-1} in $CuSO_4$ (aq.) is
(A) 0.009 (B) 0.90
(C) 0.19 (D) 0.99

40. The catalysts used for hydrogenation and dehydrogenation among Ni, Fe, SiO_2 and MgO
(A) Ni and Fe (B) SiO_2 and MgO
(C) Fe and SiO_2 (D) Ni and MgO

41. The number of lines in the e.s.r. spectrum of $[CH_2Cl]^{\bullet}$ is
(A) 8 (B) 4
(C) 12 (D) 9

42. These elements exhibit ferro-or anti-ferromagnetism
Cr, Mn, Mg, Co
(A) Cr, Mn and Co
(B) Mg and Co
(C) Cr and Mg
(D) Mn and Mg

43. Which of the following are linear operators ?

$\frac{d}{dx}, \frac{d^2}{dx^2}, \sqrt{\ }, x^2$

(A) $\frac{d}{dx}, \frac{d^2}{dx^2}$ and x^2

(B) $\sqrt{\ }$

(C) $\sqrt{\ }$ and x^2

(D) $\frac{d}{dx}$ and $\sqrt{\ }$

44. Number of vibrational degrees of freedom for the methane molecule
(A) 9 (B) 10
(C) 8 (D) 5

45. The ratio of the translational partition function of D_2 and H_2 at the same temperature and volume is
(A) 1 (B) 2.83
(C) 2 (D) 0.5

46. Which of the following is the strongest bonding between drug and receptor ?
(A) Ionic bonding
(B) Covalent bonding
(C) Hydrogen bonding
(D) Vander Waal's interactions

47. Gold at the nanoscale is _____ in color.
(A) Red (B) Yellow
(C) Green (D) Violet

48. Match the following :

i) Paul Ehrlich	a) Morphine
ii) Edward Jenner	b) Receptor
iii) Christian Gram	c) Smallpox vaccine
iv) Surturnery	d) Staining procedure

(A) i – b, ii – c, iii – d, iv – a
(B) i – c, ii – d, iii – a, iv – b
(C) i – d, ii – c, iii – b, iv – a
(D) i – b, ii – a, iii – d, iv – c

49. 'Minamata disease' is caused from which one of the followings ?
(A) Tetramethyl lead
(B) Methyl thallium
(C) Methyl mercury
(D) Methyl cobalamin

50. The reaction $CCl_2F_2 + h\nu \rightarrow Cl^{\bullet} + \dot{C}ClF_2$ occurs in the stratosphere which requires a radiation of wavelength (λ) of
(A) 400 nm (B) 900 nm
(C) 100 nm (D) 200 nm

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Space for Rough Work