CHE 514 / CHE 515 / CHE 516
M.Sc. III[rd] SEMESTER EXAMINATION, 2022-23
CHEMISTRY

(Group-1 : CHE 514 – Quantum Chemistry-II)
(Group-2 : CHE 515 – Chemical Applications of Symmetry and Group Theory)
(Group-3 : CHE 516 – Stereochemistry)

(4+0)

(CBCS MODE)

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Time : 1 Hour
समय : 1 घण्टा

Max. Marks : 60
अधिकतम अंक : 60

नोट : पुस्तिका में 40 प्रश्न दिये गये हैं, सभी प्रश्न करने होंगे। प्रत्येक प्रश्न 1.5 अंक का होगा।

Important Instructions :

1. The candidate will write his/her Roll Number only at the places provided for, i.e. on the cover page and on the OMR answer sheet at the end and nowhere else.
2. Immediately on receipt of the question booklet, the candidate should check up the booklet and ensure that it contains all the pages and that no question is missing. If the candidate finds any discrepancy in the question booklet, he/she should report the invigilator within 10 minutes of the issue of this booklet and a fresh question booklet without any discrepancy be obtained.

महत्वपूर्ण निर्देश :

1. अभ्यर्थी अपने अनुक्रमांक केवल उन्हीं स्थानों पर लिखेंगे जो इसके लिए दिये गये हैं, अर्थात् प्रश्न पुस्तिका के मुख्य पृष्ठ तथा साथ दिये गये ओ०एम०आर० उत्तर पत्र पर, तथा अन्यत्र कहीं नहीं लिखेंगे।
2. प्रश्न पुस्तिका मिलते ही अभ्यर्थी को जाँच करके सुनिश्चित कर लेना चाहिए कि इस पुस्तिका में पूरे पृष्ठ हैं और कोई प्रश्न छूटा तो नहीं है। यदि कोई विसंगति है तो प्रश्न पुस्तिका मिलने के 10 मिनट के भीतर ही कक्ष परिप्रेक्षक को सूचित करना चाहिए और बिना त्रुटि की दूसरी प्रश्न पुस्तिका प्राप्त कर लेना चाहिए।

(GROUP-1 : CHE 514 – Quantum Chemistry-II)

1. NH_3 molecule has symmetry :

   (A) C_{2v}

   (B) C_{3v}

   (C) D_{3h}

   (D) D_{2h}

2. Molecular Mechanics (MM) is used for determination of geometries and energy of :

   (A) Micro particles

   (B) Ionic molecules

   (C) Large molecules

   (D) Small molecules

3. The resonance energy for cyclo propenyl carbanion is :

   (A) 3β

   (B) 2β

   (C) β

   (D) 0

4. Linear combination of basis functions yield :

   (A) Atomic orbital

   (B) Molecular orbital

   (C) Shape of molecules

   (D) Shape of atoms

5. In DFT, the electron density function is a function of :

   (A) $4n$ variables

   (B) $3n$ variables (Position only)

   (C) Spin coordinates only

   (D) Functional

6. CNDO stands for :

(A) Composite Neglect of Different Overlap

(B) Composite Neglect of Differential Overlap

(C) Complete Neglect of Different Overlap

(D) Complete Neglect of Differential Overlap

7. The perturbation in a system can be given by the equation :

(A) $\hat{H} = \widehat{H^0} + \lambda\widehat{H^1}$

(B) $\widehat{H^1} = \hat{H} + \widehat{H^0}$

(C) $\widehat{H^0} = \hat{H} + \lambda\widehat{H^1}$

(D) $\lambda\widehat{H^1} = \hat{H} + \widehat{H^0}$

8. The density functional theory (DFT) was proposed by :

(A) Kohn and Sham

(B) Slater and Boys

(C) Hohenberg and Kohn

(D) Hohenberg and Boys

9. In the construction of force field, the angle bending energy will be equal to :

(A) $K_{bend}(a + a_{eq})^2$

(B) $K_{bend}(a + a_{eq})$

(C) $K_{bend}(a - a_{eq})$

(D) $K_{bend}(a - a_{eq})^2$

10. Total π electron energy of ethylene is :

(A) $\propto -2\beta$

(B) $\propto +2\beta$

(C) $2\beta - \propto$

(D) $2(\propto +\beta)$

11. The basis set 3–21G is a type of :

(A) Minimal basis set

(B) Polarized and diffuse basis set

(C) Split valence and double zeta basis set

(D) Pople basis set

12. The correlation energy for molecule or atom can be determined by the expression :

(A) $E_{corr.} = E_{exact} - E_{HF}$

(B) $E_{corr.} = E_{exact} + E_{HF}$

(C) $E_{corr.} = E_{HF} - E_{exact}$

(D) None of the above

13. The declocalization energy for cyclo propenyl radical is :

(A) 3β

(B) β

(C) $2\beta - 2 \propto$

(D) $2\beta + 2\alpha$

14. In constituting the force-field, the torsional energy can be calculated using the equation :

(A) $E_{torsional} = K_{bend}(a - a_{eq})^2$

(B) $E_{torsional} = K_0 + \sum_{r=1}^{n} Kr\,[1 + \cos(r\theta)]$

(C) $E_{torsional} = K\left[\left(\frac{\sigma}{r}\right)^{12} - \left(\frac{\sigma}{r}\right)^{6}\right]$

(D) $E_{torsional} = K_0 - \sum_{r=1}^{n} K\,[1 - \cos\theta]$

15. Which of the following is true statement ?

(A) In the LSDA, electrons with opposite spin paired with each other have same spatial Kohn-Sham orbital.

(B) In the LDA, electrons with opposite spin paired with each other have same Kohn-Sham orbital.

(C) For open shell molecules near dissociation, LDA gives better results than LSDA.

(D) For open shell molecules near dissociation, LDA and LSDA gives the same results.

16. Delocalization energy for cyclo propenyl carbocation is :

(A) β

(B) 2β

(C) 3β

(D) 0

17. Which of the following computational methods used wave function ?

(A) Molecular Mechanics (MM)

(B) DFT

(C) Ab-initio methods

(D) Molecular dynamics

18. In molecular mechanics, the non-bonding energy term constituting the force field is equal to :

(A) $K_{nb}\left[\left(\frac{\sigma}{r}\right)^6 - \left(\frac{\sigma}{r}\right)^3\right]$

(B) $K_{nb}(2)^{-1/6}\, r_{min}$

(C) $K_{nb} + [1 + \cos(r\theta)]$

(D) $K_{nb}\left[\left(\frac{\sigma}{r}\right)^{12} - \left(\frac{\sigma}{r}\right)^6\right]$

19. MNDO stands for :

(A) Modified Neglect of Different Overlap

(B) Modified Neglect of Diatomic Overlap

(C) Modified Neglect of Differential Overlap

(D) None of the above

20. The Schrodinger equation for perturbed system can be written as :

(A) $\widehat{H^0}\Psi_n^0 = E_n^0\Psi_n^0$

(B) $\left(\widehat{H^0} + \lambda\widehat{H^1}\right)\Psi_n = E_n\Psi_n$

(C) $\left(\widehat{H^0} - \lambda\widehat{H^1}\right)\Psi_n = E_n\Psi_n$

(D) $\left(\lambda\widehat{H^1} - \widehat{H}\right)\Psi_n = E_n\Psi_n$

21. The basis set can be represented by the equation :

(A) $\Psi_i = \sum c_i \phi_i$

(B) $\Psi_i = \int c_i \phi_i$

(C) $\Psi_i = \sum c_i \phi_i^{\,2}$

(D) $\Psi_i = \int c_i \phi_i^{\,2}$

22. In CH_2 molecule, How many basis functions are farmed for 3-21G basis set ?

(A) 9

(B) 11

(C) 12

(D) 13

23. Naphthalene belongs to the point group :

(A) C_{2v}

(B) D_{2h}

(C) C_{3v}

(D) D_{3h}

24. Huckel secular determination in terms of x, when $x = \frac{\alpha - E}{\beta}$ will be :

(A) $\begin{bmatrix} 1 & x \\ 1 & x \end{bmatrix} = 0$

(B) $\begin{bmatrix} x & 1 \\ 1 & x \end{bmatrix} = 0$

(C) $\begin{bmatrix} x & 1 \\ x & 1 \end{bmatrix} = 0$

(D) $\begin{bmatrix} x & x \\ 1 & 1 \end{bmatrix} = 0$

25. The slater type orbital (STO) can be expressed best by the equation :

(A) $N_{x^a} y^b z^c \exp^- \int r$

(B) $N_{x^a} y^b z^c \exp^- \int r^2$

(C) $N_{x^a} y^b z^c \int -r^2$

(D) $N_{x^a} y^b z^c \int -r$

26. DFT methods used to determine the electronic structure primarily :

(A) In the Ground state

(B) In the Excited state

(C) For one electron system only

(D) For very large molecules

27. In MM, the stretching energy constituting force field is equal to :

(A) $K_{st.}(l + l_{eq})^2$

(B) $K_{st.}(l + leq^2)$

(C) $K_{st.}(l - l_{eq})^2$

(D) $K_{st.}(l^2 + l_{eq})$

28. In Hohenberg-Kohn theorem the exchange correlation energy $F[P_0]$ is equal to :

(A) $\overline{T}[P_0] - [P_0]\overline{V}_{ee}$

(B) $\overline{T}[P_0] + \overline{V}_{ee}[P_0]$

(C) $\overline{T} + \overline{V}_{Ne} + \overline{V}_{ee}$

(D) $\overline{V}_{ee}[P_0]$

29. π-bond energy in butadiene will be :

(A) 0.4472β

(B) $44.72\ \beta$

(C) $4.472\ \beta$

(D) $447.2\ \beta$

30. Which of the following terms refers to the computational method obeying the laws of classical physics ?

(A) Density Functional Theory

(B) Ab-Initio Method

(C) Molecular Mechanics

(D) Quantum Mechanics

31. Exchange correlation energy under LDA approximation can be written as :

(A) $E_{XC}^{LDA}[p] = \int \varepsilon_{xc}\,(p)dr$

(B) $E_{XC}^{LDA}[p] = \int p(r)\ \varepsilon_{xc}\,(p)dr$

(C) $E_{XC}^{LDA}[p] = \int pr.dr$

(D) $E_{XC}^{LDA}[p] = \int \varepsilon_x\,(p) + \varepsilon_c(p)$

32. STO-3G is a :

(A) Split valence basis set

(B) Minimal basis set

(C) Gaussia type orbital

(D) All of the above

33. The Gaussian type orbital (GTO) can be expressed by the equation :

(A) $N_{x^a y^b z^c} \int -r^2$

(B) $N_{x^a y^b z^c} \int -r$

(C) $N_{x^a y^b z^c} \exp^{-} \int r^2$

(D) $N_{x^a y^b z^c} \exp^{-} \int r$

34. The total π electron energy in benzene is :

(A) $E_\pi = 6 \propto +8\beta$

(B) $E_\pi = 6 \propto -8\beta$

(C) $E_\pi = 8\beta - 6 \propto$

(D) $E_\pi = 3 \propto +4\beta$

35. The correct full form of INDO is :

(A) Intermediate Neglect of Differential Overlap

(B) Internal Neglect of Differential Overlap

(C) Intermediate Neglect of Different Overlap

(D) Internal Neglect of Different Overlap

36. Which of the following is correct regarding coulomb integrals (Hrr) ?

(A) $H_{11} = H_{22} = - - - = \propto$

(B) $H_{11} = H_{22} = - - - = 2\beta$

(C) $H_{11} = H_{22} = - - - = 3 \propto$

(D) $H_{11} = H_{22} = - - - = \beta$

37. Density functional theory methods used :

(A) Schrodinge wave equation

(B) Quantum mechanical equations

(C) Electron probability density

(D) Molecular density

38. The second Hohenberg-Kohn theorem can be stated as :

(A) $E_V[P_{tr}] \geqslant E_0[P_0]$

(B) $E_V[P_{tr}] \leqslant E_0[P_0]$

(C) $E_V[P_{tr}] = -E_0[P_0]$

(D) $E_V[P_{tr}] < E_0[P_0]$

39. Which of the following is correct regarding exchange entegrals (Hrs) where the atoms r and s are not directly banded ?

(A) $H_{rs} = 1$

(B) $H_{rs} = -1$

(C) $H_{rs} = 0$

(D) $H_{rs} = \beta$

40. The schrodinger wave equation with respect to symmetry oprations is :

(A) Variant

(B) Invariant

(C) Non-variant

(D) All of the above

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(GROUP-2 : CHE 515 – Chemical Applications of Symmetry and Group Theory)

1. Which of the following is the group generating elemnt for C_{3v} point group ?

   (A) C_3^1

   (B) σ_v

   (C) C_3^1 and σ_v

   (D) None of the above

2. Rearrangement theorem is related with :

   (A) Symmetry element

   (B) Symmetry operation

   (C) Inversion

   (D) GMT

3. A D_n group results from :

   (A) $C_n\ 1\ \sigma_n$

   (B) $C_n\ 1\ nC_2$

   (C) $C_n\ 1\ \sigma_v$

   (D) None of the above

4. CO_2 possesses i at :

   (A) C-atom

   (B) O-atom

   (C) Middle of $C = 0$ bond

   (D) None of the above

5. $C_{2(z)}.\sigma_{xz}$ equals :

   (A) E

   (B) σ_{yz}

   (C) i

   (D) σ_{xy}

6. Point group of a circle is :

(A) $D_{\infty h}$

(B) $C_{\infty v}$

(C) K_n

(D) None of the above

7. Which of the following will show S_4-axis ?

(A) CH_4

(B) PCl_3

(C) PCl_5

(D) All of the above

8. The sign of which coordinate will not change after $Cn_{(z)}$ operation :

(A) $z-$ coordinate

(B) $x-$ coordinate

(C) $y-$ coordinate

(D) All will change

9. The number of symmetry operations generated by S_3-axis is :

(A) 4

(B) 3

(C) 5

(D) 6

10. D_2 point group is isomorphic to :

(A) C_2

(B) S_2

(C) C_{2h}

(D) None of the above

11. The point group assigned to NH_2Cl is :

(A) C_s

(B) C_{2v}

(C) C_{3v}

(D) C_i

12. For determining classes we need :

(A) Axis

(B) Plane

(C) Matrix

(D) Similarity transformation

13. Rotation of C_n for n times gives :

(A) Identity

(B) Inversion

(C) Improper rotation

(D) Reflection

14. The point group assigned to $ML_3L_3{}^1(fac)$ is :

(A) C_{3v}

(B) O_h

(C) T_d

(D) Cubic

15. Ethane molecule in eclipsed form has :

(A) C_6

(B) σ

(C) C_6 and σ both

(D) None of these

16. All the three dimensional representations are labelled as :

(A) T

(B) F

(C) T or F

(D) G or H

17. The $\lceil\overline{\sigma}(R)$ for tetrahedral (Td) point group is :

(A) $A_1 + T_2$

(B) $A_1 + A_2 + E$

(C) $A_1 + A_2 + T_2$

(D) $T_1 + T_2$

18. Squares and binary products of the coordinates are indicted by the area :

(A) Area IV

(B) Area III

(C) Area II

(D) Area I

19. Which of the following does not contain a l_3 axis ?

(A) $POCl_3$

(B) $[NH_4]^+$

(C) $[H_3O]^+$

(D) ClF_3

20. $cis - N_2F_2$ contain :

(A) a C_2 axis

(B) a σ_n plane

(C) an inversion centre, i

(D) an S_2 axis

21. The species belonging to the same point group :

(A) X_eF_2 and OF_2

(B) H_2O and CO_2

(C) H_2S and OF_2

(D) $[NO_2]^+$ and $[NO_2]^-$

22. C_3 and C_2 both are present in :

(A) SO_3

(B) NH_3

(C) PCl_3

(D) $[H_3O]^+$

23. An inversion centre (i) is present is :

(A) $[PF_6]^-$

(B) SiH_4

(C) BF_3

(D) PF_5

24. CO_2 has :

(A) 3 vibrational modes

(B) 4 vibrational modes, 2 of which are degenarate

(C) Stretching modes only

(D) An IR active symmetric stretch

25. The number of degrees of vibrational freedom possessed by CH_4 is :

(A) 10

(B) 6

(C) 4

(D) 9

26. The symmetric stretching mode of the SiF_4 molecule is :

(A) IR active

(B) IR inactive

(C) Generates a change in molecular dipole moment

(D) Gives rise to a strong absorption in the IR spectrum

27. Which pairing of molecule and point group is correct ?

(A) BCl_3, C_{3v}

(B) $SiCl_4, D_{4h}$

(C) H_2S, C_{2v}

(D) SF_4, C_{4v}

28. Eclipsed form of ferrocene belongs to :

(A) T_d

(B) C_{5v}

(C) D_{5h}

(D) D_{5d}

29. The point group of trans - AB_4C_2 is :

(A) C_{4v}

(B) D_{4h}

(C) O_h

(D) T_d

30. Centre of inversion is absent is :

(A) D_{2h}

(B) D_{4h}

(C) D_{6h}

(D) T_d

31. S_4 axis is present in :

(A) SO_4^{2-}

(B) BF_3

(C) C_2H_2

(D) CO_2

32. The symmetric stretching mode for PCl_3 is of A_1 symmetry. In the C_{3v} character table, there are Z (and $x^2 + y^2, z^2$) entries in A_1, row. It means, the mode is :

(A) IR active and Raman active

(B) IR active and Raman inactive

(C) IR inactive and Raman active

(D) IR inactive and Raman inactive

33. The order of T point group is :

(A) 4

(B) 15

(C) 12

(D) 16

34. Which of the following is an operation ?

(A) Matrix

(B) Axis

(C) Determinant

(D) Rotation

35. Number of C_3 present in tetrachedral molecule is :

(A) 4

(B) 3

(C) 6

(D) 2

36. The number of planes present in I_n point group is :

(A) 6

(B) 8

(C) 15

(D) None of the above

37. In T_{2g} , g represents :

(A) E

(B) σ

(C) i

(D) All of the above

38. All the planes in C_{3v} are :

(A) Same class

(B) Different class

(C) Both (A) and (B)

(D) None of the above

39. Which is the correct formula for subgroup ?

(A) $^{h}/_{g} = k$

(B) $^{g}/_{h} = k$

(C) $^{h}/_{g} = 0$

(D) $^{g}/_{h} = 0$

40. $S_n^n = E$, when :

(A) n = even

(B) n = odd

(C) n = double

(D) Both (A) and (B)

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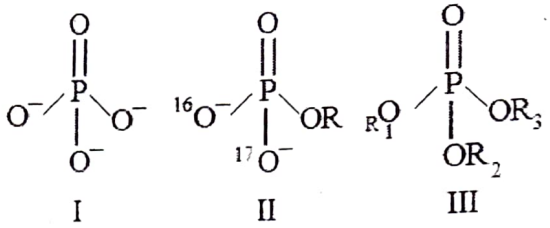
(GROUP-3 : CHE 516 – Stereochemistry)

1. Which one of the following is achiral phosphate center ?



I II III

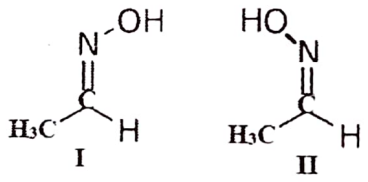
(A) I and II

(B) II and III

(C) I only

(D) II only

2. Which one of the following is syn aldoxime ?



I II

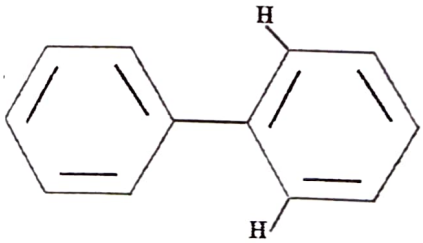
(A) I

(B) II

(C) I and II both

(D) Neither I nor II

3. The two hydrogen shown in the following compound are :



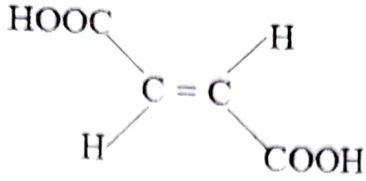
(A) Heterotopic

(B) Homotopic

(C) Enantiotopic

(D) Diastereotopic

4. Which one is correct Re/Si designation in the given molecule ?



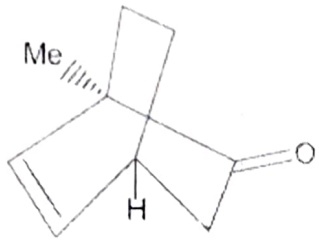
(A) Si-Si

(B) Re-Re

(C) Si-Re

(D) Re-Si

5. What is configuration at the two steocenters in the given compound are :



(A) 1 S, 4 S

(B) 1 R, 4 S

(C) 1 R , 4 R

(D) 1 S, 4 R

6. Which of the following is an example of regioselective reactions?

(A) Addition of HBr to propylene

(B) Debromination of meso dibromobutane

(C) 2- bromo octane with sodium hydroxide

(D) Debromination of 2, 3-dibromobutane

7. How many 1H-NMR signals are obtained from homotopic hydrogens.

(A) One

(B) Two

(C) Three

(D) Four

8. Which correctly describes the chair conformations of trans-1, 3-diethylayclohexane.

(A) The two Chair conformations are equal in energy

(B) The lower energy chair conformation contains two axial ethyl groups

(C) The higher energy chair conformation contains two equatorial ethyl groups.

(D) The higher energy chair conformation contains two axial ethyl group.

9. Relationship of hydrogen atom in methane molecule is.

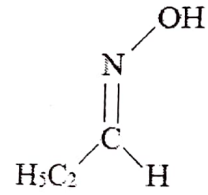
(A) Enantiotopic

(B) Diastereotopic

(C) Homotopic

(D) Unpredictable

10. What is the correct name of the following compound.



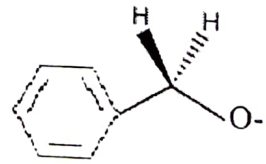
(A) (1E)- N- hydroxyethane

(B) (1Z)-N- hydroxypropane

(C) (1E)-N- hydroxy propanimine

(D) (1Z)-N- hydroxy propanimine

11. What is the relationship between the hydrogens in the following molecule?



(A) Diastereotopic

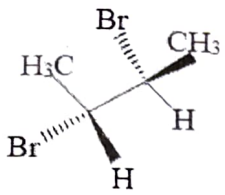
(B) Enantiotopic

(C) Homootopic

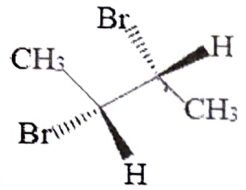
(D) None of the above

12. Identify two emantiomers among the following compounds :

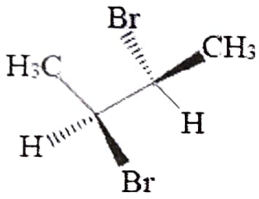
I



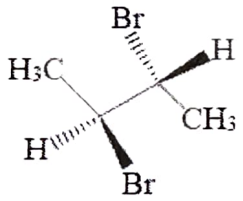
II



III



IV



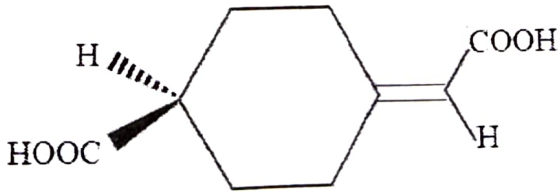
(A) II and III

(B) I and II

(C) I and III

(D) III and IV

13. The following molecule has



(A) Plane of symmetry

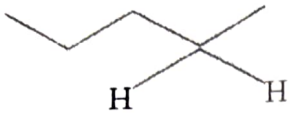
(B) R Configuration

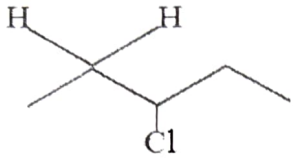
(C) S Configuration

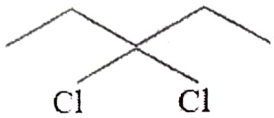
(D) Centre of symmetry

14. Which one of the following has enantiotopic hydrogen ?

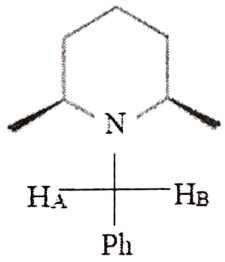
(A) 

(B) 

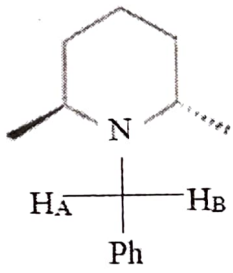
(C) 

(D) 

15. H_A and H_B in the following compounds are :



I



II

(A) Enantiotopic in I and diastereotopic in II.

(B) Diastereotopic in I and enantiotopic in II

(C) Enantiotopic in both

(D) Diastereotopic in both

16. Calculate the optical purity of a compound with following data.

Optical rotation=-8.8°

Specific rotation=-2.2°

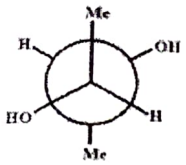
(A) 10%

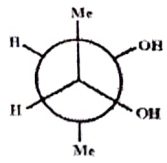
(B) 90%

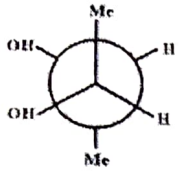
(C) 40%

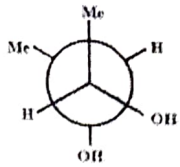
(D) 60%

17. Among the following the Newmann projections of meso-2, 3- butanediol are-

I 

II 

III 

IV 

(A) I and II

(B) II and III

(C) I only

(D) IV only

18. Which element of symmetry is present between enantiotopic ligands.

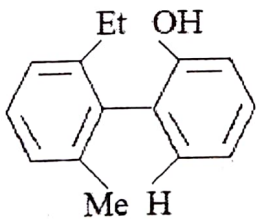
(A) Plane of symmetry

(B) Axis of symmetry

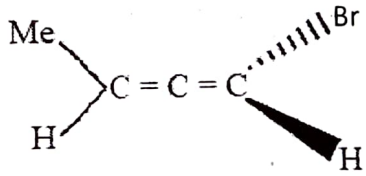
(C) Inversion only

(D) None of the above

19. The absolute configuration for given compounds are-



I



II

(A) I-R, II- S

(B) I-S, II-R

(C) I-R, II-R

(D) I-S, II-S

20. Which of the following compounds exhibit geometrical isomerism?

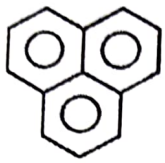
(A) 1 - Hexene

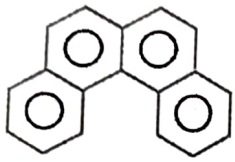
(B) 2 - Methyl-2- Pentene

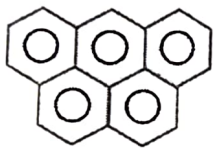
(C) 2 - Hexene

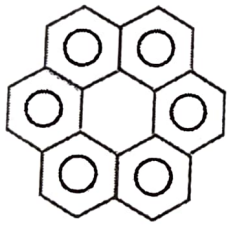
(D) 3 – methyl-1- Pentene

21. A chiral molecule among the following is-

(A) 

(B) 

(C) 

(D) 

22. Identify the nature of hydrogen in the givens molecule :

(A) Diastereotopic

(B) Enantiotopic

(C) Homotopic

(D) None of the above

20. Which of the following compounds exhibit geometrical isomerism?

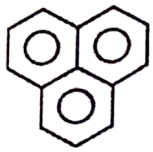
(A) 1 - Hexene

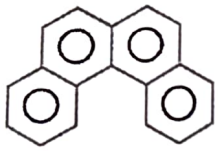
(B) 2 - Methyl-2- Pentene

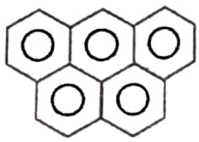
(C) 2 - Hexene

(D) 3 – methyl-1- Pentene

21. A chiral molecule among the following is-

(A) 

(B) 

(C) 

(D) 

22. Identify the nature of hydrogen in the givens molecule :

(A) Diastereotopic

(B) Enantiotopic

(C) Homotopic

(D) None of the above

23. The reaction that yields predominantly one enantiomer of a possible pain is called-

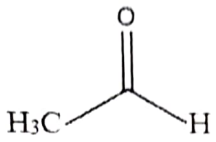
(A) Chemoselective

(B) Regioselective

(C) Sterospecific

(D) Steroselective

24. The face in the given molecule is :



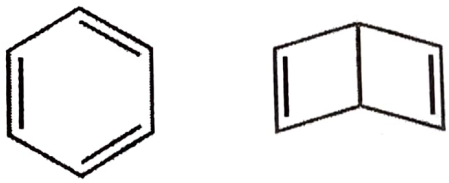
(A) Homotopic face

(B) Diastereotopic face

(C) Identical face

(D) Enantiotopic face

25. Bemzene and Dewar benzene are :



(A) Tautomers

(B) Canonical forms

(C) Structural isomers

(D) Conformational isomers

26. In sharplus asymmetric epoxidation, the oxidant used is-

(A) DHQ

(B) Ti (o-iPr)$_4$

(C) ButO-OH

(D) NaOH

27. The energy difference between the axial and equatorial conformers of methylayclohexane is-

(A) 1.5 Kcal/mol

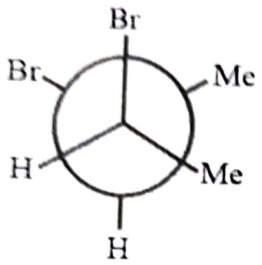
(B) 0.9 Kcal/mol

(C) 1.8 Kcal/mol

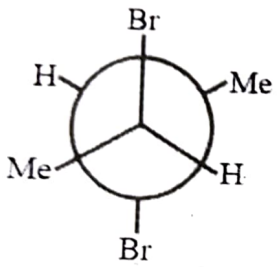
(D) <0.2 Kcal/mol

28. Which one is the most stable conformation of meso-2,3-dibromobutane is-

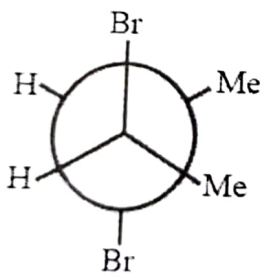
(A)



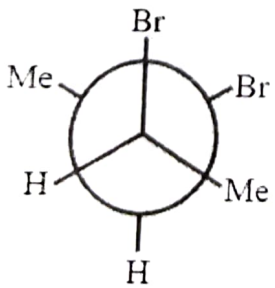
(B)



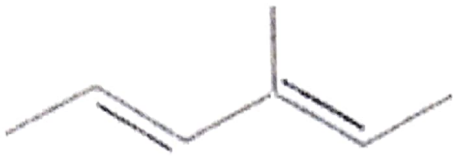
(C)



(D)



29. What is the correct nomeclature for the following compound ?



(A) (2E, 4E)-3- methylhexa-2,4-diene

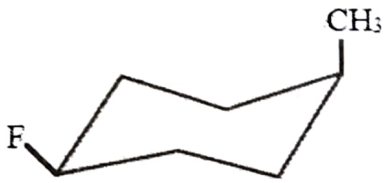
(B) (2E, 4Z)-3- methylhexa-2,4-diene

(C) (2Z, 4Z)-3- methylhexa-2,4-diene

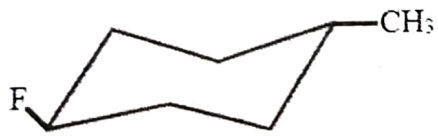
(D) (2Z, 4E)-3- methylhexa-2,4-diene

30. What is most stable conformation of trans-I- fluoro-4- methylcyclohexane ?

(A)



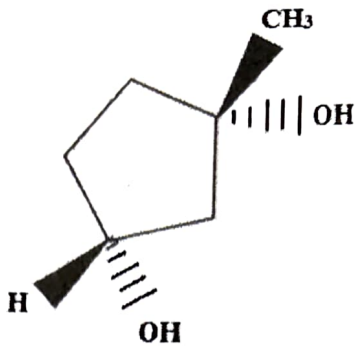
(B)



(C)

(D)

31. What is correct IUPAC name of the following substance ?



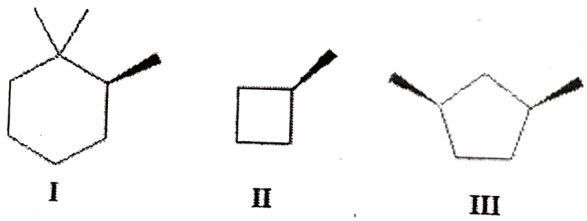
(A) (1S, 3S)-1- methylcyclopentane-1,3-diol

(B) (1S, 3R)-1- methylcyclopentane-1,3-diol

(C) (1R, 3R)-1- methylcyclopentane-1,3-diol

(D) (1R, 3S)-1- methylcyclopentane-1,3-diol

32. Which of the following compounds is/are chiral?



(A) Only II

(B) Only I

(C) I and II both

(D) All are chiral

33. Cram's rule is useful to predict predominaul product-

(A) Geometrical isomer

(B) Regio-isomer

(C) Diastereoisomer

(D) Homoner

34. The reaction in which stereo chemically different molecules react differently is called-

(A) Chemoselective

(B) Regioselective

(C) Stereospecific

(D) Stereoselective

35. Which of the following is accurate definition of asymmetric reaction ?

(A) A reaction which creats a new chiral centre with selective for one enantiomer/diastereomer over another.

(B) A reaction that involves a chiral reagent.

(C) A reaction that creates a new chiral centre in the product.

(D) All are correct

36. What is meant by a reaction going in 94% enantiomeric excess ?

(A) The product contains 94% of one enantiomer and 6% of the other enautiomer.

(B) The product contains 97% of one enantiomer and 3% of the other enautiomer.

(C) The product contains an enantiomer which is 94% pure.

(D) None of the above

37. Which of the following is correct increasing energy order for cyclohexane conformations ?

(A) Half Chair < Boat < Twist < Chair

(B) Chair < Twist < Half-Chair < Boat

(C) Chair < Twist < Boat < Half-Boat

(D) None of the above

38. Which one of the following conformation of cyclohexane is chiral ?

(A) Chain

(B) Rigid

(C) Boat

(D) Twisted Boat

39. Rate of Pyramidal inversion is reduced in which phosphine ?

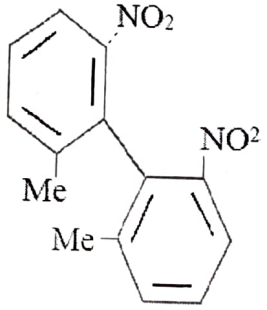
(A) Achiral Phosphines

(B) Chiral Phosphines

(C) Both

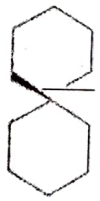
(D) Neither Chiral nor Achiral Phosphines

40. Match the following :

I- 

(i) Chiral Centre

(ii) Chiral Axis

II- 

(iii) Chiral Plane

(A) I-(ii), II-(iii)

(B) I-(i), II-(ii)

(C) I-(iii), II-(i)

(D) None of the above is true

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