UNIT - 5
SPECTROSCOPIC TECHNIQUES

Q. 1 Lambert's law states that the rate of decrease in intensity of monochromatic light passing through transparent medium with thickness of medium is proportional to ----------
-
a. Wavelength of incident light.
b. Intensity of incident light.
c. Wavelength of transmitted light.
d. Intensity of visible light
Ans:b

Q. 2 Beer's law states that the intensity of monochromatic light passing through transparent medium decreases as ----------of the absorbing substance increases arithmetically
a. Volume
b. Concentration
c. Cost
d. Standard oxidation potential
Ans:b

Q. 3 Any isolated covalently bonded functional group that shows a characteristic absorption in uv-visible region is known as ----------
a. Auxochrome
b. Chromophore
c. Phosphoresce
d. Chromatophore
Ans:b

Q. 4 Any group which does not itself act as a functional group but whose presence brings about a shift in absorption band towards longer wavelength is known as ----------
a. Auxochrome
b. Chromophore
c. Phosphoresce
d. Chromatophore
Ans:a

Q. 5 The energy required for the transition is highest in case of ---------- transition.
a. π-σ*
b. σ-σ*
c. σ-n
d. n-σ
Ans:b

Q. 6 Substitution of group if shifts absorption to the longer wavelength the shift is known as ------.
a. chromophoric shift
b. bathochromic shift
c. blue shift
d. yellow shift
Ans:b

Q. 7 Absorption shifted to shorter wavelength due to substitution of group is known as ---------
a. chromophoric shift
b. bathochromic shift
c. blue shift
d. yellow shift
Ans:c

Q. 8 A module which provides a beam of light of given single wavelength is known as ----------
a. window
b. monochromator
c. selector
d. spectrometer
Ans:b

Q. 9 Operating range of uv-spectrophotometer is -----.
a. 400nm-800nm
b. 200nm-400nm
c. 200nm-800nm
d. 500nm-1500nm
Ans: b

Q. 10 Operating range of uv- visible spectrophotometer is -
a. 400nm-800nm
b. 200nm-400nm
c. 200nm-800nm
d. 500nm-1500nm
Ans: a

Q. 11 Detector used in uv- visible spectrophotometer is
a. Photomultiplier tube
b. Electric buzzer
c. Null point detector
d. None of the above
Ans: a

Q. 12 Benzene absorbs at 255nm while aniline absorbs at 280nm because ----------
a. Bezene is auxochrome
b. -NH2 is auxochrome
c. -NH2 is chromophpre
d. None of the above
Ans:b

Q. 13 ---------- is known as colour enhancing group.
a. Auxochrome
b. Chromophore
c. Chromatophor
d. None of the above
Ans:a

Q. 14 Source used in uv-visible spectrophotometer is --.
a. Incandescent lamp
b. Hydrogen lamp
c. Deuterium lamp
d. Any of the above
Ans: d

Q. 15 Cuvettes used in uv-visible spectrophotometer are made up of ----------.
a. Glass
b. Quartz
c. Metal
d. None of the above
Ans: b

Q. 16 The parts of spectrophotometer is used to obtain a light rays with single wavelength is known as ----------.
a. Monochromator
b. Source of light
c. Slit
d. Detector
Ans: a

Q. 17 Transition which requires highest energy in uv-visible spectrophotometer is ---------- transition.
a. π-σ*
b. σ-σ*
c. σ-n
d. n-σ
Ans: b

Q. 18 Transition which requires lowest energy in uv-visible spectrophotometer is ---------- transition.
a. π-σ*
b. σ-σ*
c. σ-n
d. n- π *
Ans: d

Q. 19 Transition which requires radiation of shortest wavelength in uv-visible spectrophotometer is ----
a. π-σ* transition.
b. σ-σ* transition.
c. σ-n transition.
d. n- π * transition.
Ans:b

Q. 20 Transition which requires radiation of longest wavelength in uv-visible spectrophotometer is ----
a. π-σ* transition.
b. σ-σ* transition.
c. σ-n transition.
d. n- π * transition.
Ans: d

Q. 21 Electron transition is allowed transition or forbidden depends upon----------
a. The geometry of the molecular orbital in ground state
b. The geometry of the molecular orbital in excited state
c. The orientation of the electric dipole of the incident light responsible for including the transition
d. On appropriate symmetry relationship between the above three factors
Ans:d

Q. 22 UV – Visible spectrophotometer has application in ----------
a. Detection of function group
b. Determination of conjugation
c. Identification of unknown compound
d. All above
Ans:d

Q. 23 The magnitude of molar absorption coefficient in dependant of the wavelength of incident beam of radiation and----------
a. Physical state of absorbing substance
b. Chemical nature of absorbing substance
c. Thermal energy of substance
d. Electrical conductivity of absorbing substance

Ans:b

Q. 24 The relative energy changes involved in the transition has order----------
a. n- π * < σ-σ* < π- π *
b. n- π * > σ-σ* > π- π *
c. n- π * < π- π * < σ-σ*
d. n- π * > π- π *> σ-σ*
Ans:c

Q. 25 In Photomultiplier tube sensitivity of cell----------.
a. Is considerably decreased
b. Is kept constant
c. Is considerably increased
d. None of the above
Ans:c

Q. 26 The essential component of monochromator are entrance exit slit and----------.
a. Dispersing element like prism
b. Photovoltaic cell
c. Galvanometer
d. None of the above
Ans:a

Q. 27 If It is intensity of transmitted light I0 is intensity of incident light, K is the constant for wavelength, l is thickness and c is concentration It = I0 . e^{-kl} is----------.
a. Beer's law
b. Lambert's law
c. Kohlrausch's law
d. None of the above
Ans:b

Q. 28 Photomultiplier tube converts----------
a. Electrons into photons
b. Electrons into electric current
c. Photons into electric current
d. All above
Ans:c

Q. 29 The term log It/ I0 is ----------.
a. Transmittance
b. Resistance
c. Conductance
d. absorbance

Ans:a

Q. 30 Unsaturated compounds containing hetroatoms such as O, N and S shows ------- transition.

a. π-σ*

b. n-π *

c. σ-σ*

d. σ-n

Ans:b

Q. 31 Visible spectrophotometer has operational range…….

a. 400nm-800nm

b. 200nm-400nm

c. 200nm-800nm

d. 500nm-1500nm

Ans:a

Q. 32 The solution of substance that appears colored to human eyes absorbs in the range…….

a. 400nm-800nm

b. 200nm-400nm

c. 200nm-800nm

d. 500nm-1500nm

Ans:a

Q. 33 The solution of substance that absorbs in UV region appears ……. to human eyes.

a. Colored

b. Transparent

c. Turbid

d. None of the above

Ans:b

Q. 34 In UV visible spectrophotometer measurement of absorbance is preferred over % transmittance because----

a. UV visible spectrophotometer is equipped to measure absorbance

b. Absorbance is α C while % transmittance is not

c. % transmittance can't be measured with 100 % accuracy

d. % transmittance is dependant on the power of incident radiations

Ans:b

Q. 35 According to Beer's Lamberts law A= εcl

Where ε is

a. Absorbance

b. Molar absorptivity

c. Path length
d. Transmittance
Ans:b

36. UV-visible spectroscopy measures ----------.

a. Molecular Rotation
b. Electronic Excitation
c. Nuclear excitation
d. Molecular vibrations

Ans – b

37. UV region extends from ---------- --.

a. 100-400 nm
b. 200-600 nm
c. 800-1000 nm
d. 400-700 nm

Ans-a

38. Visible region extends from ---------- --.

a. 100-400 nm
b. 200-600 nm
c. 800-1000 nm
d. 400-800 nm

Ans- d

39. According to the statement of Lambert's law, the rate of decrease in intensity of light with thickness of the medium is proporational to the----------.

a. Concentration of the medium
b. Temperature of the system
c. Intensity of light
d. Pressure of the medium

Ans - c

40. According to the statement of Beer's law, the rate of decrease in intensity of light with thickness of the medium is directly proporational to the---------- --.

a. Concentration of the medium
b. Temperature of the system
c. Intensity of light
d. Pressure of the medium

Ans – a

41. The unshared electrons present in the compound are known as---------- --.

a. л electron

b. б electrons
c. unsaturated electrons
d. n electrons

Ans- d

42. **Identify the correct order of energies required for the electronic transitions. a.** б→ б* > n→ б*> л→ л* > n→ л*

b. n→ б* > б→ б*> л→ л* > n→ л*

c. б→ б* > n→ б*> n→ л* > л→ л*

d. б→ б* > n→ л*> л→ л* > n→ б*

Ans – a

43. Which of the following transition required less amount of energy?

a. б→ б*
b. n→ б*
c. л→ л*
d. n→ л*

Ans. d

44. Which of the following transition required large amount of energy?

a. б→ б*
b. n→ б*
c. л→ л*
d. n→ л*

Ans. a

45. Saturated hydrocarbons shows ---------- transition.

a. б→ б*
b. n→ б*
c. л→ л*
d. n→ л*

Ans. a

46. Unsaturated hydrocarbon shows ---------- transition.

a. б→ б*
b. n→ б*
c. л→ л*
d. n→ л*

Ans. c

47. Compound containing nonbonding or unshared electrons present on hetero atoms such as O, N, S shows ----------.

a. б→ б*

b. n→ б*
c. л→ л*
d. n→ л*
Ans. b

48. Compound containing double bonds involving hetero atoms bearing unshared electron pairs of electrons shows---------- --.

a. б→ б*
b. n→ б*
c. л→ л*
d. n→ л*
Ans. d

49. Covalently unsaturated group responsible for electronic transitions is called as---------.

a. Auxochrome
b. Active molecule
c. Chromophore
d. Hyperchrome
Ans. c

50. Auxochrome is ----------.

a. Saturated functional group attached to the chromophore
b. Unsaturated functional group attached to the Chromophore
c. Unsaturated group responsible for electronic transition
d. Saturated group responsible for electronic transition
Ans- a

51. The shift of absorption to longer wavelength is ---------- --.

a. Hypsochromic shift
b. Hyperchromic shift
c. Bathochromic shift
d. Hypochromic shift
Ans – c

52. Hypsochromic shift is ----------.

a. Shift of absorption to the longer wavelength
b. Shift of absorption to the shorter wavelength
c. Increase in intensity of absorption
d. Decrease in intensity of absorption
Ans.-b

53. Increase in the intensity of absorption is called as----------.

a. Hypsochromic shift
b. Hyperchromic shift
c. Bathochromic shift

d. Hypochromic shift

Ans – b

54. Hypochromic effect is when---------- --.

a. Intensity of absorption increases
b. Intensity of absorption decreases
c. Shift of absorption to the longer wavelength
d. Shift of absorption to the shorter wavelength

Ans. b

55. In block diagram of UV-Visible spectroscopy, correct sequence will be.....

a. Source → Monochromator → Sample holder → Photodetector → Amplifier → Recorder
b. Source → Sample holder → Monochromator → Photodetector → Amplifier → Recorder
c. Source → Photodetector → Sample holder → Monochromator → Amplifier → Recorder
d. Source → Monochromator → Photodetector → Sample holder → Amplifier → Recorder

Ans. a

(Part B- Infra Red Spectroscopy)

56. IR spectroscopy measures --------- --.

a. Molecular Rotation
b. Electronic Excitation
c. Nuclear excitation
d. Molecular vibrations

Ans: d

57. IR region is ----------.

a. 0.78 to 200 µ
b. 200 to 300 µ
c. 1.5 -100 µ
d.1-2 µ

Ans: a

58. Stretching vibrations in molecules involves ---------- --.

a. Movement of the atoms w.r.t. particular atom in same direction
b. Movement of the atoms w.r.t. particular atom in opposite direction
c. Movement of the atoms w.r.t. particular atom in parallel direction
d. Movement of the atoms w.r.t. particular atom in perpendicular direction

Ans: a

59. Match the following

i) Scissoring	a) movement of atoms in same direction in same plane
ii) Rocking	b) movement of two atoms in opposite direction in same plane
iii) Wagging	c) movement of one atom up and other atom down the plane
iv) Twisting	d) movement of atoms up the plane or below the plane

a. i=d, ii=c, iii=b, iv=a
b. i=b, ii=a, iii=d, iv=c
c. i= c, ii=d, iii= b, iv=a
d. i=d, ii=a, iii=d, iv=b
Ans. =b

60. Bending vibrations are characterised by---------- --.
a. Change in bond angle between two covalent bonds
b. Change in bond length between two covalent bonds
c. Change in geometry of molecule
d. Change in internuclear distance
Ans: a

61. Fundamental modes of vibrations in benzene are---------- --.
a. 9
b. 6
c. 3
d. 30
Ans =d

62. Fundamental modes of vibrations in CO_2 are ---------- --.
a. 9
b. 6
c. 4
d. 30
Ans = c

63. Fundamental modes of vibrations in water are ---------- --.
a. 3
b. 9
c. 4
d. 18
Ans = a

64. Fundamental modes of vibrations in C_2H_6 are---------- --.
a. 6
b. 9
c. 4
d. 18
Ans= d

65. Molecule absorbs IR radiation only when----------.

a. Frequency of vibration of bond and frequency of IR radiation match
b. Frequency of rotation of bond and frequency of IR radiation match
c. Frequency of excitation of bond and frequency of IR radiation match
d. Frequency of transition of bond and frequency of IR radiation match
Ans: a

66. Molecule absorb IR radiation in following condition?
i) Frequency of vibration of bond and frequency of IR radiation match
ii) When absorption causes change in electric dipole
a. Only i
b. Only ii
c. Both i and ii
d. None of above
Ans: c

67. Out of following which is not used as an IR source?
a. Nernst filament
b. Globar
c. Mercury arc
d. Quartz hydrogen lamp
Ans: d

68. Monochromator i.e. prism in IR spectroscopy is made up of .....
a. NaCl, KOH
b. NaCl, KBr
c. NaOH, KBr
d. NaOH, KOH
Ans: b

69. Sampling of substances in IR spectroscopy can be done as following; match it
a. Solid run in solution i) amorphous sample deposit on NaCl or KBr cell
b. Solid film technique ii) solid dissolve in aq. Solvent and drop it on alkali halide, evaporate
c. Pressed pallet technique iii)sample mixed in Nujol and make paste
d. Mull technique iv) sample grind with KBr and pressed to pallet
a. a=iii, b=iv, c=i, d=ii
b. a=ii, b=i, c=iv, d=iii
c. a=iv, b=iii, c=i, d=ii
d. a=ii, b=i, c=iii, d=iv
Ans: b

70. Out of following which is not used as detector in IR spectroscopy?
a. Thermocouple
b. Bolometer
c. Golay detector
d. Globar
Ans; =d

71. IR Spectrum is graph between---------- --.

a. Wavelength vs absorbance

b. Wavelength vs transmittance

c. Wavelength vs % transmittance

d. Wave number vs absorbance

Ans: c

72. Finger print region is --------- --.

a. 4000-1500 cm-1

b. 1500-909 cm-1

c. 909-667 cm-1

d. 667-50 cm-1

Ans: b

73. Match the following.

a. Alkanes	i) 1725 cm-1
b. Alcohols	ii) 2800-3000 cm-1
c. Ketones	iii) 3000-3100 cm-1
d. Aromatic rings	iv)3200-3600 cm-1

a. a=ii, b=iv, c=i, d=iii

b. a=iii, b=i, c= iv, d=ii

c. a=ii, b=iv, c=iii, d=i

d. a=iv, b=iii, c=ii, d=i

Ans=a

74. Match the following

a. Cyclopropanone	i)1710 cm-1
b. Cyclobutanone	ii) 1740 cm-1
c. Cyclopentanone	iii) 1775 cm-1
d. Cyclohexanone	iv) 1818 cm-1

a. a=ii, b=iii, c=iv, d=i

b. a=iii, b=iv, c=i, d=ii

c. a=iv, b=iii, c=ii, d=i

d. a=iv, b=i, c=ii, d=i

Ans: = c

75. Out of following is not detector in IR spectroscopy.

a. Globar

b. Bolometer

c. Golay

d. thermocouple

Ans. = a

76. Aromatic region in IR spectroscopy is in between.....

A.1500-909 cm-1

b. 909-667 cm-1

c. 667-50 cm-1
d. 4000-1500 cm-1
Ans= b

77. In block diagram of IR spectroscopy, correct sequence will be.....
a. Source--sample--monochromator--detector—amplifier—recorder
b. Source--sample--monochromator--amplifier-- detector --recorder
c. Source--monochromator----Sample—detector—amplifier--recorder
d. Source--sample--monochromator--detector—amplifier—reference—recorder
Ans= a

78. Molecules like H2, Cl2, O2 are IR inactive because.....
a. They are diatomic
b. They are linear
c. They does not have electrical dipole
d. All of above
Ans=C

79. Vibrational transitions require.....energy than electronic transitions.
a. More
b. less
c. same
d. none of above
Ans= b

80. Calculate possible number of fundamental vibration in $CHCl_3$?
a. 19
b. 15.
c. 36
d. 9
Ans= d

81. Streching frequency of cyclic ketone in IR.....with increase in ring size.
a. Increases
b. decreases
c. remain same
d. no effect
Ans= b

82. Which one of following is out of plane vibration?
a. Scissoring
b. Rocking
c. symmetric stretching
d. Wagging
Ans=d

83. Keto form of acetyl acetone show characteristic absorption stretching frequency for

carbonyl group while Enol form of same will give absorption for.....

a. –OH & -C=C stretch
b. -C=O & -C=C stretch
c. -C=O & -OH strech
d. None of above

Ans= a

84. Out of following which is not a bending vibration?

a. Rocking vibration
b. wagging vibration
c. twisting vibration
d. symmetric stretching

Ans= d

85. Which of following is correct about application of IR spectroscopy?

i) Identifying atmospheric pollution
ii) Measuring ethanol in breath
iii) Determination of molecular weight

a. Only i
b. Only ii
c. Only i & ii
d. All i, ii, iii

Ans= C

86. In IR exact position of absorption depends upon.....

a. Force constant
b. Masses of atoms
c. Environment of bond
d. All of above

Ans=d

87. For calculating fundamental modes of vibration in non-linear polyatomic molecule (3N-6) formula is used where N is.....

a. Number of electron in bond
b. Number of atoms in molecule
c. Number of degree of freedom
d. None of above

Ans= b

88. For calculating fundamental modes of vibration in non-linear polyatomic molecule (3N-6) formula is used where "3"in 3N indicates for.....

a. Sum of rotational, vibrational and translational degree of freedom
b. Sum of rotational and translational degree of freedom
c. Sum of vibrational and rotational degree of freedom
d. Sum of vibrational and translational degree of freedom

Ans= a

89. KBr is used in IR spectroscopy because.....

a. It has dipole moment
b. It is diatomic salt
c. It is transparent to IR
d. All of above

Ans= c

90. CCl_4 does not give prominent bands in IR because....

a. It has dipole moment zero
b. It is solvent
c. It is polyatomic molecule
d. All of above

Ans= a

91. IR spectroscopy measures
    a. Molecular Rotation
    b. Electronic Excitation
    c. Nuclear excitation
    d. Molecular vibrations

    Correct ans: d

92. IR region is
    a. 0.78 to 200 µ
    b. 200 to 300 µ
    c. 1.5 -100 µ
    d. 1-2 µ

Correct ans: a.

93. Stretching vibrations in molecules involves
    a. Movement of the atoms w.r.t. particular atom in same direction
    b. Movement of the atoms w.r.t. particular atom in opposite direction
    c. Movement of the atoms w.r.t. particular atom in parallel direction
    d. Movement of the atoms w.r.t. particular atom in perpendicular direction Correct ans: a.

94. Match the following

i)	Scissoring	a) movement of atoms in same direction in same plane
ii)	Rocking	b) movement of two atoms in opposite direction in same plane
iii)	Wagging	c) movement of one atom up and other atom down the plane
iv)	Twisting	d) movement of atoms up the plane or below the plane

    a. i=d, ii=c, iii=b, iv=a
    b. i=b, ii=a, iii=d, iv=c
    c. i= c, ii=d, iii= b, iv=a
    d. i=d, ii=a, iii=d, iv=b

Correct ans. =b

95. Bending vibrations are characterised by
    a. Change in bond angle between two covalent bonds
    b. Change in bond length between two covalent bonds
    c. Change in geometry of molecule
    d. Change in internuclear distance Correct ans: a

96. Fundamental modes of vibrations in benzene are a. 9 b. 6 c. 3 d. 30

Correct and=d

97. Fundamental modes of vibrations in CO_2 are a. 9 b. 6 c. 4 d. 30

Correct ans = c

98. Fundamental modes of vibrations in water are a. 3 b. 9 c. 4 d. 18

Correct ans = a

99. Fundamental modes of vibrations in C_2H_6 are a. 6 b. 9 c. 4 d. 18

    Correct ans= d

100. Molecule absorbs IR radiation only when
    a. Frequency of vibration of bond and frequency of IR radiation match
    b. Frequency of rotation of bond and frequency of IR radiation match
    c. Frequency of excitation of bond and frequency of IR radiation match
    d. Frequency of transition of bond and frequency of IR radiation match
    Correct ans: a

101. Molecule absorb IR radiation in following condition?
    i) Frequency of vibration of bond and frequency of IR radiation match
    ii) When absorption causes change in electric dipole
    a. Only i
    b. Only ii
    c. Both i and ii
    d. None of above
    Correct ans: c

102. Out of following which is not used as an IR source?
    a. Nernst filament
    b. Globar
    c. Mercury arc
    d. Quartz hydrogen lamp Correct ans: d

103. Monochromator i.e. prism in IR spectroscopy is made up of .....
    a. NaCl, KOH
    b. NaCl, KBr

c. NaOH, KBr
d. NaOH, KOH
Correct ans: b

104. Sampling of substances in IR spectroscopy can be done as following; match it

a. Solid run in solution — i) amorphous sample deposit on NaCl or KBr cell
b. Solid film technique — ii) solid dissolve in aq. Solvent and drop it on alkali halide, evaporate
c. Pressed pallet technique — iii)sample mixed in Nujol and make paste
d. Mull technique — iv) sample grind with KBr and pressed to pallet

i. a=iii, b=iv, c=i, d=ii
ii. a=ii, b=i, c=iv, d=iii
iii. a=iv, b=iii, c=i, d=ii
iv. a=ii, b=i, c=iii, d=iv

correct ans: b

105. Out of following which is not used as detector in IR spectroscopy

a. Thermocouple
b. Bolometer
c. Golay detector
d. Globar

Correct ans; =d

106. IR Spectrum is graph between

a. Wavelength vs absorbance
b. Wavelength vs transmittance
c. Wavelength vs % transmittance
d. Wave number vs absorbance Correct ans: c

107. Finger print region is a. 4000-1500 cm-1
b. 1500-909 cm-1
c. 909-667 cm-1
d. 667-50 cm-1

Correct ans: b

108. Match the following

a. Alkanes — i) 1725 cm-1
b. Alcohols — ii) 2800-3000 cm-1
c. Ketones — iii) 3000-3100 cm-1
d. Aromatic rings — iv)3200-3600 cm-1

i. a=ii, b=iv, c=i, d=iii
ii. a=iii, b=i, c= iv, d=ii
iii. a=ii, b=iv, c=iii, d=i

iv. a=iv, b=iii,
c=ii, d=i
correct
ans=a

109. Match the following
   a. Cyclopropanone i)1710 cm^{-1}
   b. Cyclobutanone ii) 1740 cm^{-1}
   c. Cyclopentanone iii) 1775 cm^{-1}
   d. Cyclohexanone iv) 1818 cm^{-1}
      i. a=ii, b=iii, c=iv, d=i
      ii. a=iii, b=iv, c=i, d=ii
      iii. a=iv, b=iii, c=ii, d=i
      iv. a=iv, b=i,
      c=ii, d=i
      Correct
      ans: = c

110. Out of following is not detector in IR spectroscopy.
   a. Golbar b. Bolometer c. Golay d. thermocouple Correct Ans.= a

111. Aromatic region in IR spectroscopy is in between.....
a.1500-909 cm^{-1} b. 909-667 cm^{-1} c. 667-50 cm^{-1} d. 4000-1500 cm^{-1}
Correct Ans= b

112. In block diagram of IR spectroscopy, correct sequence will be.....
   a. Source--sample--monochromator--detector—amplifier—recorder
   b. Source--sample--monochromator--amplifier-- detector --recorder
   c. Source--monochromator----Sample—detector—amplifier--recorder
   d. Source--sample--monochromator--detector—amplifier—reference—recorder
   Correct Ans= a

113. Molecules like H_2, Cl_2, O_2 are IR inactive because.....
   a. They are diatomic
   b. They are linear
   c. They does not have electrical dipole
   d. All of above
   Correct
   Ans=C

114. ..... Vibrational transitions require energy than electronic transitions.
   a. More b. less c. same d. none of above Correct Ans= b

115. Calculate possible number of fundamental vibration in $CHCl_3$? a. 19
b. 15. c. 36 d. 9
Correct Ans= d

116. ..... Streching frequency of cyclic ketone in IR with increase in ring size.

a. Increases b. decreases c. remain same d. no effect Correct Ans= b

117. Which one of following is out of plane vibration?
    a. Scissoring b. Rocking c. symmetric stretching d. Wagging Correct Ans=d

118. **Keto** form of acetyl acetone show characteristic absorption stretching frequency for carbonyl group while **Enol** form of same will give absorption for.....
    a. –OH & -C=C stretch
    b. -C=O & -C=C stretch
    c. -C=O & -OH strech
    d. None of above
    e. Correct Ans= a

119. Out of following which is not a bending vibration?
    a. Rocking vibration b. wagging vibration c. twisting vibration d. symmetric stretching

Correct ans= d

120. Which of following is correct about application of IR spectroscopy
    i) Identifying atmospheric pollution
    ii) Measuring ethanol in breath
    iii) Determination of molecular weight
        a. Only i
        b. Only ii
        c. Only i & ii
        d. All i, ii, iii Correct Ans= C

121. In IR , exact position of absorption depends upon.....
    a. Force constant
    b. Masses of atoms
    c. Environment of bond
    d. All of above Correct Ans=d

122. For calculating fundamental modes of vibration in non linear polyatomic molecule (3N-6) formula is used where N is.....
    a. Number of electron in bond
    b. Number of atoms in molecule
    c. Number of degree of freedom
    d. None of above Correct Ans= b

123. For calculating fundamental modes of vibration in non linear polyatomic molecule (3N-6)

formula is used where “3”in 3N indicates for.....

a. Sum of rotatonal, vibrational and translational degree of freedom
b. Sum of rotational and translational degree of freedom
c. Sum of vibrational and roatational degree of freedom
d. Sum of vibrational and translational degree of freedom

Correct Ans= a

124. KBr is used in IR spectroscopy because.....

a. It has dipole moment
b. It is diatomic salt
c. It is transparent to IR
d. All of above

Correct Ans= c

125. CCl4 does not give prominent bands in IR because....

a. It has dipole moment zero
b. It is solvent
c. It is polyatomic molecule
d. All of above

Correct Ans= a