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PG-EE-June, 2023

SUBJECT: Chemistry

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| 10 | | | | ^ |

| | | Sr. No |
|------------------------------|-----------------|--------------------------------|
| Time: 11/4 Hours | Max. Marks: 100 | Total Questions : 100 |
| Roll No. (in figures) | (in words) | |
| Name | Date of Birth | |
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| | (1) 3S_1 (2) 3P_2 | (3) ${}^{3}S_{0}$ (4) ${}^{1}S_{0}$ |
|-------|--|---|
| 2. | Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_5$ | O_6 and $H_4P_2O_7$ are respectively: |
| | (1) +3, +5 and +4 | (2) +5, +3 and +4 |
| | (3) +5, +4 and +3 | (4) +3, +4 and +5 |
| 3. | The basicity of the hydroxides of the following | lowing alkali metals is of the order: |
| | (1) Li > Na > Rb > Cs | (2) Na > Li > Rb > Cs |
| | (3) Cs > Rb > Na > Li | (4) Rb > Cs > Na > Li |
| 4. | The geometry around the central atom i | n ClF_4^+ : |
| | (1) square planar | (2) square pyramidal |
| | (3) octahedral | (4) trigonal bipyramidal |
| 5. | The number of anti-bonding electron respectively: | in NO and CO according to MO theory are |
| | (1) 1, 0 (2) 2, 2 | (3) 3, 2 (4) 2, 3 |
| 6. | Semiconductors have conduction | on band and valence band. |
| | (1) a lightly filled; a moderately filled | conversely the world set one or shart / Lt |
| | (2) an almost filled; a moderately filled | |
| | (3) an almost empty; an almost filled | |
| | (4) an almost filled; an almost empty | |
| 7. | Which of the following is called 'Pearl a | sh'? |
| | (1) Na ₂ CO ₃ (2) NaHCO ₃ | (3) K_2CO_3 (4) $CaCO_3$ |
| PG-EI | E-June, 2023/(Chemistry)/(SET-X)/(A) | (A))((A [18] (vitament 3))(T0) and P. T. O |
| | | |

1. The atomic term symbol for the Helium atom in its ground state is:

| | (1) s-block (2) p-block | (3) d-block | (4) f-block |
|-------|---|-----------------------------|-----------------------------|
| 9. | C ₆₀ has: | pla might ar | 2. On Dation stylich of |
| | (1) 14 pentagons and 18 hexagons | | |
| | (2) 12 pentagons and 20 hexagons | | Francis (6) |
| | (3) 10 pentagons and 20 hexagons | | |
| | (4) 12 pentagons and 18 hexagons | | town Walter |
| 10. | The order of acidity in boron trihalides | is: | |
| | $(1) BF_3 > BCl_3 > BBr_3$ | | noni stanospati A |
| | $(2) BBr_3 > BCl_3 > BF_3$ | | |
| | $(3) BF_3 > BBr_3 > BCl_3$ | | |
| | $(4) BBr_3 > BF_3 > BCl_3$ | | |
| 11. | How many S-S bonds are there in tetra | thionate ion? | |
| | (1) 2 (2) 3 | (3) 4 | (4) 5 |
| 12. | P ₄ O ₁₀ has bridging O atoms | S | |
| | (1) 4 (2) 5 | (3) 6 | (4) 2 |
| 13. | Which among the following electronic maximum electron affinity? | configurations repre | esent the elements with the |
| | (1) $1s^2 2s^2 2p^6$ | (2) $1s^2 2s^2 2p^5$ | ngers tecknile na (E) |
| | $(3) 1s^2 2s^2 2p^6 3s^1$ | $(4) 1s^2 2s^2 2p^6 3s^2 3$ | |
| 14. | The active site of enzyme nitrogenase of | contains: | |
| | (1) Mo (2) Mn | (3) Fe | (4) Cu |
| PG-EE | -June, 2023/(Chemistry)/(SET-X)/(A) | LYMSKT-XIAA) | |

8. To which block of the periodic table the element with atomic number 56 belongs:

15. The IUPAC nomenclature of $K_3[Co(NO_2)_6]$ is:

| | (1) Potassium hexanitrocobaltate (III) | | |
|-------|--|---------|---|
| | (2) Potassium (I) hexanitrocobaltate (III) | | |
| | (3) Potassium hexanitrocobalt (0) | | |
| | (4) Potassium (I) hexanitrocobaltate (II) | | responded in the first second and rest of the second |
| 16. | Coordination number and geometry of [| Ce(1 | $(NO_3)_6]^{2-}$: |
| | (1) 6, octahedral | (2) | 12, octahedral |
| | (3) 8, octahedral | (4) | 12, icosahedral |
| 17. | The spin only magnetic moment (in B. respectively are: | M.) |) value of $[FeF_6]^{3-}$ and $[Co(CN)_5(H_2O)]^{3-}$ |
| | (1) 0 and 1.73 | (2) | 5.92 and 1.73 |
| | (3) 4.47 and 1.73 | (4) |) 5.92 and 3.87 |
| 18. | The number of microstates in term ${}^{1}G$ is | ; : | |
| | (1) 9 (2) 6 | (3) |) 7 (4) 15 |
| 19. | The total number of isomers of [Co(en) ₂ C | $[l_2]$ |], (en = ethylenediamine) is: |
| | (1) 4 (2) 3 | (3) |) 6 (4) 5 |
| 20. | The nephelauxetic parameter (β) is higher | est f | for: We will be a second to the two transfers |
| | (1) Br ⁻ (2) Cl ⁻ | (3) |) CN^- (4) F^- |
| 21. | The complex with maximum CFSE is: | | |
| | (1) $[CoCl_4]^{2-}$ | | $[Co(H_2O)_6]^{3+}$ |
| | (3) $[CoF_3(H_2O)_3]$ | (4) | $[CoF_6]^{3+}$ |
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| 22. | When is the Intramolecular hydrogen bond formed |
|------|--|
| | (1) When a hydrogen atom is in between the two highly electropositive atoms |
| | (2) When a oxygen atom is in between the two highly electronegative atoms |
| | (3) When a hydrogen atom is in between the two highly electronegative atoms |
| | (4) When a oxygen atom is in between the two highly electropositive atoms |
| 23. | The number of metal-metal bonds in $Ir_4(CO)_{12}$ is: |
| | (1) 4 (2) 6 (3) 10 (4) 12 |
| 24. | Identify the strongest Bronsted acid: |
| | (1) H ₂ SO ₄ (2) CH ₃ COOH |
| | (3) HNO ₃ (4) H ₃ PO ₄ |
| 25. | Which of the following represents a set of hard acid and soft base respectively? |
| | (1) Fe^{3+} and F (2) Fe^{3+} and S^{2-} |
| | (3) Ag^{+} and S^{2-} (4) Ag^{+} and F^{-} |
| 26. | The substance present in a lesser amount in solution is: |
| | (1) solute (2) solvent |
| | (3) aqueous solvent (4) None |
| 27. | Which one of the following conductometric titration will show a linear increase of the conductance with volume of titrant added upto the break point and almost constart conductance afterwards? |
| | (1) A strong acid with a strong base |
| | (2) A strong acid with a weak base |
| | (3) A weak acid with a strong base |
| | (4) A weak acid with a weak base |
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| 28. | The oxidation state of iron in met-hemo | oglobin is: |
|-----|--|--|
| | (1) Three . (2) Two | (3) Four (4) Zero |
| 29. | $BaTi[Si_3O_9]$ is a class of: | |
| | (1) ortho silicate | (2) cyclic silicate |
| | (3) chain silicate | (4) sheet silicate |
| 30. | | mium is $4s^13d^5$. The element tungsten (W) atomic number = 74. The configuration of its |
| | (1) $5s^14d^1$ | (2) $6s^15d^5$ |
| | (3) $6s^25d^4$ | (4) $6s^05d^6$ |
| 31. | Which one of the following is most eas | ily reduced ? |
| | (1) V(CO) ₆ | (2) Cr(CO) ₆ |
| | (3) Fe(CO) ₅ | (4) Ni(CO) ₄ |
| 32. | Which of the following pair of 4f elements | ents can exhibit +4 oxidation state? |
| | (1) La and Lu | (2) Ce and Pr |
| | (3) Eu and Yb | (4) Sm and Tm |
| 33. | A 1s orbital refers to: | 37, 50 mi et 0.1 Met 41 is gelebel in 49 mi et 0.1 (1). |
| , | (1) A circular track in an atom in which | ch an electron travels |
| | (2) A one electron wave function | an and a some series (1) |
| | (3) An observable property of the syst | tem the exposition of the second series |
| | (4) A Hermitian operator | and the latter states of the state of the st |

| 34. | For the reaction $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$; $\Delta H = -13.7$ kcals. The heat change when 100 ml of 0.1 M is mixed with 100 ml of 0.2 M H_2SO_4 is: |
|-----|--|
| | 100 1111 01 0.1 141 15 111110 |

(1) -0.137 kcals

(2) -0.274 kcals

(3) - 1.37 kcals

(4) - 0.548 kcals

- **35.** When red light is absorbed in a malachite green solution, which of the following is *correct*?
 - (1) wave length of light decreases
 - (2) number of photons is a light beam decreases
 - (3) a part of red light changes to green radiation
 - (4) None of these
- **36.** Equivalent conductance of $AgNO_3$ solution at infinite dilution is 130 ohm⁻¹cm²equiv⁻¹. The transport number of Ag^+ ion in v-dilution is 0.4. The equivalent conductance of NO_3^- ion is:
 - (1) 69 ohm⁻¹ cm² equiv⁻¹
 - (2) $52 \text{ ohm}^{-1} \text{cm}^2 \text{equiv}^{-1}$
 - (3) 78 ohm⁻¹ cm² equiv⁻¹
 - (4) 39 ohm⁻¹ cm² equiv⁻¹
 - 37. 50 ml of 0.1 NaOH is added to 49 ml of 0.1 M HCl. The pH of the resulting solution is:
 - (1) 9
- (2) 12
- (3) 10
- (4) 11

- 38. A solid acts as an adsorbend because it has:
 - (1) unsaturated valencies
 - (2) small pores in it
 - (3) high lattice energy
 - (4) a definite shape

39. According to Langmuir adsorption isotherm, the amount of gas adsorbed at very high pressure:

- (1) goes on increasing with pressure
- (2) goes on decreasing with pressure
- (3) increases first and decreases later with pressure
- (4) reaches a constant limiting value

40. Which of the following is an irreversible cell?

(1)
$$Zn \mid Zn^{2+} \mid AgCl \mid Ag$$

(3)
$$Zn | Zn^{2+} | | Cd^{2+} | Cd$$

(4)
$$Cd \mid Cd^{2+} \mid |KCl, Hg_2Cl_2|Hg$$

41. $\psi_{21(-1)}$ represents:

(1) 2s orbital

(2) 2px orbital

(3) 2py orbital

(4) 2pz orbital

42. An operator \hat{A} is said to be Hermitian, if:

$$(1) \quad \int \psi_1^* \psi_2 \hat{A} d\tau = \int \psi_2 \psi_1^* \hat{A} d\tau$$

(2)
$$\int \psi_2^* \psi_1 \hat{A} d\tau = \int \psi_1 \psi_2^* \hat{A} d\tau$$

(3)
$$\int \psi_1^* (\hat{A} \psi_2) d\tau = \int (\hat{A} \psi_1)^* \psi_2 d\tau$$

(4) None of these

43. The selection rules for rotational transitions are:

(1)
$$\Delta J = 0$$
, $\Delta K = 0$

(2)
$$\Delta J = 0, \pm 1$$

(3)
$$\Delta J = 0$$
, $\Delta K = 1$

(4)
$$\Delta J = 0, \pm 1; \Delta K = 0$$

| 44. | Thermal conductivity of a gas is: | | | |
|-----|---|---------|------------------|--|
| | (1) Independent of pressure | (2) V | /iscosity | |
| | (3) Temperature | (4) N | None of these | art, all makes (2) speed on decinal |
| 45. | Number of components, number of phacritical point is: | ises an | nd the degree of | freedom in a liquid at its |
| | (1) 1, 2, 1 (2) 0, 1, 2 | (3) 1 | 1, 2, 0 | (4) 1, 0, 2 |
| 46. | The value of θ for the first order reflecti | ion fro | m (100) face is: | |
| | (1) 5.2° (2) 5.9° | (3) 8 | 8.4° | (4) 8.9° |
| 47. | Total number of vibrations in allyl bror | | | (4) 21 |
| | (1) 14 (2) 16 | (3) | | (4) 21 |
| 48. | Which of the following shift leads to th | ne decr | eased intensity | of absorption? |
| | (1) Hypochromic | (2) | Hypsochromic | |
| | (3) Hyperchromic | (4) | Bathochromic | |
| 49. | Spin inversion of electrons takes place | in the | processes: | se at the most test in the 1995 |
| | (1) Absorption | (2) | Internal conver | rsion |
| | (3) Florescence | (4) | Phosphorescer | nce |
| 50. | Which of the following is a limitation | of Lan | nbert-Beer's law | / ? |
| | (1) Scattering of light due to particles | | | |
| | (2) Florescence of sample | | | Politica de la company de la c |
| | (3) Non-monochromatic radiation | | | |
| | (4) All of these | | | |
| | | | | |

- **51.** Parachor is related to the density of a liquid by relation :
 - (1) $[P] = \frac{Mr}{d}$

(2) $[P] = \frac{M^{\frac{1}{4}}r}{d}$

(3) $[P] = \frac{Mr^{\frac{1}{4}}}{d}$

- (4) $[P] = \frac{Md^{\frac{1}{4}}}{r}$
- 52. For a particular vibrational mode to appear in the Raman spectrum, what must change?
 - (1) Molecular polarizability
 - (2) Molecular shape
 - (3) Frequency of radiation
 - (4) Intensity of radiation
- For an isentropic change of state:
 - (1) dE = 0

- (2) dS = 0 (3) dS = 1 (4) dH = 0
- **54.** Operators \hat{A} and \hat{B} are said to commutative, if:
 - (1) $\hat{A} \hat{B} = 0$

(2) $\hat{B} \hat{A} = 0$

(3) $\hat{A} \hat{B} = \hat{B} \hat{A}$

- (4) $\hat{A} \hat{B} \neq \hat{B} \hat{A}$
- In relation S = klnW, the entropies are additive while thermodynamic properties are multiplicative. What will happen to S and lnW when the energy of the system is increased?
 - (1) S increases and lnW decreases
 - (2) S and W will increase
 - (3) S and W will decreases
 - (4) S decreases and lnW increases

- In the lead acid base battery during charging the Cathode reaction is:
 - (1) Reduction of Pb^{2+} to Pb
 - (2) Formation of PbSO₄
 - (3) Formation of PbO₂
 - (4) Oxidation of Pb to Pb^{2+}
- For one of gaseous mixture, entropy of mixing is expressed as:
 - (1) $\Delta S_{mix} = -R \sum \ln x_i$
 - (2) $\Delta S_{mix} = R \sum \ln x_i$
 - (3) $\Delta S_{mix} = R \sum x_i \ln x_i$
 - (4) $\Delta S_{mix} = -R \sum x_i \ln x_i$
- Which one of the following is correct Maxwell's relation?
 - (1) $\left(\frac{\partial T}{\partial P}\right)_{S} = \left(\frac{\partial V}{\partial S}\right)_{P}$
 - (2) $\left(\frac{\partial T}{\partial P}\right)_V = \left(\frac{\partial V}{\partial S}\right)_T$
 - (3) $\left(\frac{\partial T}{\partial V}\right)_{S} = \left(\frac{\partial P}{\partial S}\right)_{V}$
 - (4) $\left(\frac{\partial S}{\partial V}\right)_T = -\left(\frac{\partial P}{\partial T}\right)_V$
- According to first thermodynamic equation of state, for an ideal gas $\left(\frac{\partial U}{\partial V}\right)_T$ is:
 - (1) Infinite
- (2) $\frac{P}{T}$ (3) zero (4) $\frac{T}{V}$

- **60.** Which of the following partially miscible liquids have both upper and lower critical solution temperature?
 - (1) Water and aniline
 - (2) Water and β-picoline
 - (3) Water and diethyl amine
 - (4) Methanol and cyclohexane
- **61.** Which of the following statement is *correct*, if:

$$K_{sp(AgCl)} > K_{sp(AgBr)} > K_{sp(AgI)}$$

- (1) AgI is more soluble than AgCl and AgBr
- (2) AgCl is more soluble than AgBr and AgI
- (3) AgBr is more soluble than AgCl and AgI
- (4) None of these
- **62.** Dry ice is used in fire extinguishers. It is stored in the cylinder in solid form. When sprayed on fire, dry ice quickly changes into CO_2 . The change of state is known as:
 - (1) Distillation

(2) Evaporation

(3) Condensation

- (4) Sublimation
- **63.** The Joule-Thomson expansion of an ideal gas is:
 - (1) an isenthalpic process
 - (2) an isentropic process
 - (3) an isothermal process
 - (4) adiabatic process

(1) Peptization

(2) Dialysis

(3) Coagulation

(4) Flocculation

The elastic scattering of photons is called as: 65.

- (1) Atmospheric scattering
- (2) Conserved scattering
- (3) Rayleigh scattering
- (4) Raman scattering

The solubility of a solute is three times as high in the ether as in water. What amount of the solute will be extracted from 100 ml of the aqueous solution by 100 ml of ether 66. in one step?

(1) 80%

(2) 75%

(3) 70%

(4) 60%

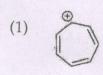
Choose the *correct* order of bond strength for X-F bond (X = B, C, N & O)?

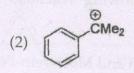
- (1) $BF_3 > CF_4 > OF_2 > NF_3$
- (2) $CF_4 > BF_3 > NF_3 > OF_2$
- (3) $BF_3 > CF_4 > NF_3 > OF_2$
- (4) $OF_2 > NF_3 > CF_4 > BF_3$

Which of the following conformation is correct?

 $(2) \qquad \begin{array}{c} CI \\ S \\ \end{array}$ $(4) \qquad \begin{array}{c} S \\ CI \\ \end{array}$

69. Which of the following is a non-classical carbocation?







70. Choose the *correct* reaction product from the following transformation :

- **71.** Which of the following is *not* a suitable reagent for nitration of aromatic compounds?
 - (1) H_2SO_4 (conc.) and HNO_3 (conc.)
 - (2) HNO₃ (conc.) and acetic anhydride
 - (3) Nitric acid (fuming) and H_2SO_4 (conc.)
 - (4) Potassium nitrate (alcoholic)
- **72.** Which of the following compound exist in meso form?
 - (1) Tartaric acid

(2) Naphthyl acetic acid

(3) Glyceraldehyde

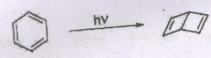
(4) Glucose

- **73.** Which of the following reactions can be used for conversion of PhCOPh into $PhCH_2Ph$?
 - (1) Hydroboration and Meerwein-Pondroff-Verley reduction
 - (2) Wolf-Kishner reduction and Birch reduction
 - (3) Hydroboration and Birch reduction
 - (4) Clemmensen reduction and Wolf-Kishner reduction
 - 74. Which compound will liberate CO₂ from NaHCO₃?
 - (1) CH₃CONH₂

(2) CH₃NH₂

(3) (CH₃)₄N⁺OH⁻

- (4) CH₃NH₃⁺Cl⁻
- 75. The following reaction is an example of:



- (1) Cycloaddition reaction
- (2) Ene reaction
- (3) Sigmatropic rearrangement
- (4) Electrocyclic reaction
- 76. Enolate on reaction with the carbonyl carbon of an ester resulted into:
 - (1) β-Ketoaldehyde
 - (2) Carboxylic acid
 - (3) An aldol
 - (4) α , β -Unsaturated aldehyde

77. In the following reaction:

(A) NaOCH₃ Me H
$$H_2SO_4$$
 (B)

The product A and B are, respectively:

78. Which of the following carboxylic acid is more acidic?

- (1) *p*-nitrobenzoic acid
- (2) p-aminobenzoic acid
- (3) p-methoxybenzoic acid
- (4) p-fluorobenzoic acid

79. Nitration reaction of nitrobenzene resulted into:

(1) *m*-dinitrobenzene

(2) *p*-dinitrobenzene

- (3) o- dinitrobenzene
- (4) benzene

80. Which of the following is more basic?

(1) Pyrrole

(2) Furan

(3) Piperidine

(4) Pyridine

- **81.** Which of the following halides would be most reactive in an SN_2 Reaction?
 - (1) PhCH₂CH(Br)CH₃
 - (2) PhCH₂CH₂CH₂Br
 - (3) $PhCH(CH_3)CH_2Br$
 - (4) $PhC(CH_3)_2Br$
- 82. The base assisted formation of glycolic acid from glyoxal is named as:
 - (1) Aldol condensation
 - (2) Rosenmund reduction
 - (3) Cannizaro reaction
 - (4) Knoevenagel condensation
- **83.** Which of the following is anionic detergent?
 - (1) Sodium dodecylbenzene sulfonate
 - (2) Cetyltromethyl ammonium bromide
 - (3) Caustic soda
 - (4) polyethylene glycol stearate
- **84.** The formation of toluene from p-toluidine requires:
 - (1) Acidification followed by hydrogenation
 - (2) Acidification followed by reaction with $NaBH_4$
 - (3) Diazotization followed by hydrogenation
 - (4) Diazotization followed by treatment with H_3PO_2

| 85 | . Markovnikof's addition of HCl to | propene involves the : |
|-----|---|--|
| | (1) Initial attack of a chloride ior | (i) Crelogeapains and acceptance (ii) |
| | (2) Formation of isopropyl cation | orans con a secondario de la constanta de la c |
| | (3) Isomerization of 1-chloroprop | |
| | (4) Formation of propyl cation | |
| 86. | Which of the following compound condensation followed by dehydr | ounds will give methyl vinyl ketone by Aldol ration? |
| | (1) HCHO and CH ₃ CHO | nus see all preup survivors durangles est to transfer (*166) |
| | (2) HCHO and CH ₃ COCH ₃ | (c) |
| | (3) 2 moles of CH ₃ CHO | |
| , | (4) 2 moles of CH_3COCH_3 | The Blue staff on all years of a country as |
| 87. | Which of the following will not give | ve positive Molisch test ? |
| | (1) d-glucose | (2) <i>d</i> -glyceraldehyde |
| | (3) d-mannose | (4) d-galactose |
| 88. | Which of the following polymer do | |
| | (1) Melamine | (2) Bakelite |
| | (3) Polyethylene | (4) Vulcanised rubber |
| | | Barbara de la companya del companya del companya de la companya de |

95. The IR strecthing frequecy for C=O in case of acetaldehye appears between:

(1) 3400-3300 cm⁻¹

(2) 1300-1000 cm⁻¹

(3) 1750-1700 cm⁻¹

(4) 2100-2300 cm⁻¹

96. The IR –OH stretching frequency in which of the molecule is *not* concentration dependent:

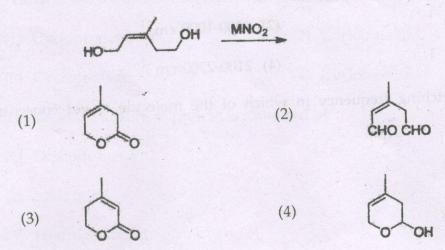
- (1) p-Nitrophenol
- (2) p- Nitroaniline
- (3) o-Nitrophenol
- (4) m-Nitrophenol

97. Which of the following compound gives 2 signal in its nmr spectrum?

- (1) Terephthaldehyde
- (2) 4-hydroxytoluene
- (3) 4-nitrobenzaldehyde
- (4) 1,3-dimethylbenzene

98. Which of the following will have higher λ_{max} ?

The major product formed in the following reaction is:



- **100.** The number of peaks observed in the 1H NMR of CHD_2OD are :
 - (1) Septet
- (2) Triplet (3) Pentet
- (4) Doublet

Total No. of Printed Pages: 21

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PG-EE-June, 2023

SUBJECT: Chemistry

SET-X

10838

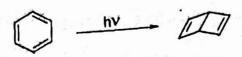
| | | Sr. No |
|------------------------------|-----------------|--------------------------------|
| Time: 11/4 Hours | Max. Marks: 100 | Total Questions: 100 |
| Roll No. (in figures) | (in words) | |
| Name | Date of Birth | |
| Father's Name | Mother's Name | |
| Date of Examination | | |
| (Signature of the Candidate) | | (Signature of the Invigilator) |

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- 1. All questions are compulsory.
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- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
- 5. The candidate *must not* do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers *must not* be ticked in the question booklet.
- 6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

- 1. Which of the following is *not* a suitable reagent for nitration of aromatic compounds?
 - (1) H_2SO_4 (conc.) and HNO_3 (conc.)
 - (2) HNO₃ (conc.) and acetic anhydride
 - (3) Nitric acid (fuming) and H_2SO_4 (conc.)
 - (4) Potassium nitrate (alcoholic)
- 2. Which of the following compound exist in meso form?
 - (1) Tartaric acid
 - (2) Naphthyl acetic acid
 - (3) Glyceraldehyde
 - (4) Glucose
- **3.** Which of the following reactions can be used for conversion of PhCOPh into $PhCH_2Ph$?
 - (1) Hydroboration and Meerwein-Pondroff-Verley reduction
 - (2) Wolf-Kishner reduction and Birch reduction
 - (3) Hydroboration and Birch reduction
 - (4) Clemmensen reduction and Wolf-Kishner reduction
- **4.** Which compound will liberate CO_2 from $NaHCO_3$?
 - (1) CH_3CONH_2
 - (2) CH_3NH_2
 - (3) $(CH_3)_4 N^+ OH^-$
 - (4) CH₃NH₃⁺Cl⁻

5. The following reaction is an example of :



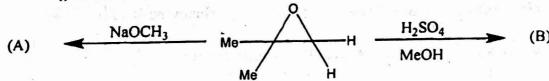
- (1) Cycloaddition reaction
- (2) Ene reaction
- (3) Sigmatropic rearrangement
- (4) Electrocyclic reaction
- 6. Enolate on reaction with the carbonyl carbon of an ester resulted into:
 - (1) β-Ketoaldehyde

(2) Carboxylic acid

(3) An aldol

(4) α , β -Unsaturated aldehyde

7. In the following reaction:



The product A and B are, respectively:

(3)
$$Me \rightarrow OH \qquad Me \rightarrow OH \qquad$$

- 8. Which of the following carboxylic acid is more acidic?
 - (1) p-nitrobenzoic acid
 - (2) p-aminobenzoic acid
 - (3) p-methoxybenzoic acid
 - (4) p-fluorobenzoic acid
- 9. Nitration reaction of nitrobenzene resulted into:
 - (1) m-dinitrobenzene

(2) p-dinitrobenzene

(3) o- dinitrobenzene

- (4) benzene
- 10. Which of the following is more basic?
 - (1) Pyrrole

(2) Furan

(3) Piperidine

- (4) Pyridine
- 11. Parachor is related to the density of a liquid by relation:

(1)
$$[P] = \frac{Mr}{d}$$

(2)
$$[P] = \frac{M^{\frac{1}{4}}r}{d}$$

(3)
$$[P] = \frac{Mr^{\frac{1}{4}}}{d}$$

(4)
$$[P] = \frac{Md^{\frac{1}{4}}}{r}$$

- 12. For a particular vibrational mode to appear in the Raman spectrum, what must change?
 - (1) Molecular polarizability
 - (2) Molecular shape
 - (3) Frequency of radiation
 - (4) Intensity of radiation

- 13. For an isentropic change of state:
 - (1) dE = 0
- (2) dS = 0
- (3) dS = 1
- -(4) dH = 0

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- **14.** Operators \hat{A} and \hat{B} are said to commutative, if:
 - $(1) \hat{A} \hat{B} = 0$

 $(2) \quad \hat{B} \ \hat{A} = 0$

(3) $\hat{A} \hat{B} = \hat{B} \hat{A}$

- (4) $\hat{A} \hat{B} \neq \hat{B} \hat{A}$
- **15.** In relation S = klnW, the entropies are additive while thermodynamic properties are multiplicative. What will happen to S and lnW when the energy of the system is increased?
 - (1) S increases and lnW decreases
 - (2) S and W will increase
 - (3) S and W will decreases
 - (4) S decreases and lnW increases
- **16.** In the lead acid base battery during charging the Cathode reaction is:
 - (1) Reduction of Pb^{2+} to Pb
 - (2) Formation of PbSO₄
 - (3) Formation of PbO₂
 - (4) Oxidation of Pb to Pb^{2+}
- 17. For one of gaseous mixture, entropy of mixing is expressed as:
 - (1) $\Delta S_{mix} = -R \sum \ln x_i$
 - (2) $\Delta S_{mix} = R \sum \ln x_i$
 - (3) $\Delta S_{mix} = R \sum x_i \ln x_i$
 - (4) $\Delta S_{mix} = -R \sum x_i \ln x_i$

- **18.** Which one of the following is *correct* Maxwell's relation?
 - (1) $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$
 - (2) $\left(\frac{\partial T}{\partial P}\right)_V = \left(\frac{\partial V}{\partial S}\right)_T$
 - (3) $\left(\frac{\partial T}{\partial V}\right)_S = \left(\frac{\partial P}{\partial S}\right)_V$
 - (4) $\left(\frac{\partial S}{\partial V}\right)_T = -\left(\frac{\partial P}{\partial T}\right)_V$
- **19.** According to first thermodynamic equation of state, for an ideal gas $\left(\frac{\partial U}{\partial V}\right)_T$ is:
 - (1) Infinite
- (2) $\frac{P}{T}$
- (3) zero
- (4) $\frac{T}{V}$
- **20.** Which of the following partially miscible liquids have both upper and lower critical solution temperature?
 - (1) Water and aniline
 - (2) Water and β -picoline
 - (3) Water and diethyl amine
 - (4) Methanol and cyclohexane
- 21. Which one of the following is most easily reduced?
 - (1) $V(CO)_6$

(2) Cr(CO)₆

- (3) $Fe(CO)_5$
- (4) Ni(CO)₄

| 27. | 50 ml of 0.1 NaOH is added to 49 ml of 0.1 M HCl. The pH of the resulting solution is : |
|-----|--|
| | (1) 9 (2) 12 (3) 10 (4) 11 |
| 28. | A solid acts as an adsorbend because it has: |
| | (1) unsaturated valencies |
| | (2) small pores in it |
| | (3) high lattice energy |
| | (4) a definite shape |
| 29. | According to Langmuir adsorption isotherm, the amount of gas adsorbed at very high pressure: |
| | (1) goes on increasing with pressure |
| | (2) goes on decreasing with pressure |
| | (3) increases first and decreases later with pressure |
| | (4) reaches a constant limiting value |
| 30. | Which of the following is an irreversible cell? |
| | (1) $Zn \mid Zn^{2+} \mid AgCl \mid Ag$ |
| | (2) $Zn \mid H_2SO_4 \mid Ag$ |
| | (3) $Zn Zn^{2+} Cd^{2+} Cd$ |
| | (4) $Cd \mid Cd^{2+} \mid \mid KCl, Hg_2Cl_2 \mid Hg$ |
| 31. | How many S-S bonds are there in tetrathionate ion? |
| | (1) 2 (2) 3 (3) 4 (4) 5 |
| 32. | P ₄ O ₁₀ has bridging O atoms. |
| | (1) 4 (2) 5 (3) 6 (4) 2 |

| | 33. | maximum electron affinity? | angurations represent the elements with the |
|---|------------|--|--|
| | | (1) $1s^2 2s^2 2p^6$ | 2) $1s^2 2s^2 2p^5$ |
| | | $(3) 1s^2 2s^2 2p^6 3s^1 $ | 2) $1s^2 2s^2 2p^5$ 4) $1s^2 2s^2 2p^6 3s^2 3p^5$ |
| | 34. | The active site of enzyme nitrogenase con | tains : |
| | | (1) Mo (2) Mn (3) | 3) Fe (4) Cu |
| | 35. | The IUPAC nomenclature of $K_3[Co(NO_2)]$ | 6] is: |
| | | (1) Potassium hexanitrocobaltate (III) | |
| | - W | (2) Potassium (I) hexanitrocobaltate (III) | |
| | | (3) Potassium hexanitrocobalt (0) | en jere aller men er som |
| | | (4) Potassium (I) hexanitrocobaltate (II) | |
| | 36. | Coordination number and geometry of [C | $(NO_3)_6]^{2-}$: |
| | | (1) 6, octahedral | 2) 12, octahedral |
| | | (3) 8, octahedral (4) | 4) 12, icosahedral |
| | 37. | The spin only magnetic moment (in B.M respectively are: | 1.) value of $[FeF_6]^{3-}$ and $[Co(CN)_5(H_2O)]^3$ |
| | | (1) 0 and 1.73 | 2) 5.92 and 1.73 |
| | | (3) 4.47 and 1.73 | 4) 5.92 and 3.87 |
| | 38. | The number of microstates in term ${}^{1}G$ is | and his part of the distance of the second |
| | | (1) 9 (2) 6 (| 3) 7 (4) 15 |
| | 39. | The total number of isomers of $[Co(en)_2Co(e$ | l_2], (en = ethylenediamine) is: |
| | | (1) 4 (2) 3 | 3) 6 (4) 5 |
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| 40. | The nephelauxetic | parameter (β) is high | hest for: |
|------|------------------------------|--------------------------------|---|
| | $(1) Br^-$ | (2) CI | (3) CN^{-} (4) Γ^{-} |
| 41. | Which of the follow | ving carbohydrate gi | rives only glucose on hydrolysis : |
| | (1) Galactose | | (2) Sucrose |
| | (3) Maltose | | (4) Lactose |
| 42. | The Blue shift in U | V is also called as: | |
| | (1) Hypochromic | | (2) Hyperchromic |
| | (3) Bathochromic | | (4) Hypsochromic |
| 43. | Which of the follow | wing substituent wil | ll enhance the basicity of phenol? |
| | (1) -Me | | (2) $-NO_2$ |
| | (3) –CN | and the second | $(2) -NO_2$ $(4) -COOCH_3$ |
| 44. | Which of the follo | wing give electrophi | ilic substitution at 3rd position? |
| | (1) Pyrrole | | (2) Indole |
| × | (3) Furan | F | (4) Thiophene |
| 45. | The IR strecthing | frequecy for C=O in | case of acetaldehye appears between: |
| ž | (1) 3400-3300 cm | | (2) 1300-1000 cm ⁻¹ |
| | (3) 1750-1700 cm | -1 | (4) 2100-2300 cm ⁻¹ |
| 46. | The IR -OH street dependent: | etching frequency in | in which of the molecule is not concentration |
| | (1) p-Nitropheno | l (1), (1, A, 3, 4, 3), (1, 2) | (2) <i>p</i> - Nitroaniline |
| | (3) o-Nitropheno | 1 | (4) m-Nitrophenol |
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- 47. Which of the following compound gives 2 signal in its nmr spectrum?
 - (1) Terephthaldehyde
 - (2) 4-hydroxytoluene
 - (3) 4-nitrobenzaldehyde
 - (4) 1,3-dimethylbenzene
- **48.** Which of the following will have higher λ_{max} ?

49. The major product formed in the following reaction is:

(2)

(4)

- **50.** The number of peaks observed in the ${}^{1}H$ NMR of $CHD_{2}OD$ are:
 - (1) Septet

(2) Triplet

(3) Pentet

(4) Doublet

51. Which of the following statement is *correct*, if:

$$K_{sp(AgCl)} > K_{sp(AgBr)} > K_{sp(AgI)}$$

- (1) Agl is more soluble than AgCl and AgBr
- (2) AgCl is more soluble than AgBr and AgI
- (3) AgBr is more soluble than AgCl and AgI
- (4) None of these

52. Dry ice is used in fire extinguishers. It is stored in the cylinder in solid form. When sprayed on fire, dry ice quickly changes into CO_2 . The change of state is known as:

- (1) Distillation
- (2) Evaporation
- (3) Condensation
- (4) Sublimation

53. The Joule-Thomson expansion of an ideal gas is:

- (1) an isenthalpic process
- (2) an isentropic process
- (3) an isothermal process
- (4) adiabatic process

54. The colloidal solutions are purified by:

(1) Peptization

(2) Dialysis

(3) Coagulation

(4) Flocculation

- **55.** The elastic scattering of photons is called as:
 - (1) Atmospheric scattering
 - (2) Conserved scattering
 - (3) Rayleigh scattering
 - (4) Raman scattering
- **56.** The solubility of a solute is three times as high in the ether as in water. What amount of the solute will be extracted from 100 ml of the aqueous solution by 100 ml of ether in one step?
 - (1) 80%

(2) 75%

(3) 70%

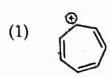
- (4) 60%
- **57.** Choose the *correct* order of bond strength for X-F bond (X = B, C, N & O)?
 - (1) $BF_3 > CF_4 > OF_2 > NF_3$
- (2) $CF_4 > BF_3 > NF_3 > OF_2$
- (3) $BF_3 > CF_4 > NF_3 > OF_2$
- (4) $OF_2 > NF_3 > CF_4 > BF_3$
- **58.** Which of the following conformation is *correct*?
 - (1) SCI SCI

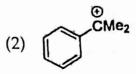
 $(2) \qquad S \qquad C_1 \qquad S \qquad C_2 \qquad C_3 \qquad C_4 \qquad C_5 \qquad C_5 \qquad C_6 \qquad C_$

(3) S S

(4) S CI CI

59. Which of the following is a non-classical carbocation?





(3)



60. Choose the *correct* reaction product from the following transformation:

- **61.** Which of the following halides would be most reactive in an SN_2 Reaction?
 - (1) $PhCH_2CH(Br)CH_3$
 - (2) PhCH2CH2CH2Br
 - (3) $PhCH(CH_3)CH_2Br$
 - (4) $PhC(CH_3)_2Br$

- 62. The base assisted formation of glycolic acid from glyoxal is named as:
 - (1) Aldol condensation
 - (2) Rosenmund reduction
 - (3) Cannizaro reaction
 - (4) Knoevenagel condensation
- **63.** Which of the following is anionic detergent?
 - (1) Sodium dodecylbenzene sulfonate
 - (2) Cetyltromethyl ammonium bromide
 - (3) Caustic soda
 - (4) polyethylene glycol stearate
- **64.** The formation of toluene from p-toluidine requires:
 - (1) Acidification followed by hydrogenation
 - (2) Acidification followed by reaction with NaBH4
 - (3) Diazotization followed by hydrogenation
 - (4) Diazotization followed by treatment with H_3PO_2
- **65.** Markovnikof's addition of HCl to propene involves the :
 - (1) Initial attack of a chloride ion
 - (2) Formation of isopropyl cation
 - (3). Isomerization of 1-chloropropane
 - (4) Formation of propyl cation

| 66. | Which of the following compounds condensation followed by dehydration? | will give methyl vinyl | ketone by Aldol |
|------|--|------------------------------|------------------|
| | (1) HCHO and CH ₃ CHO | | 140 |
| | (2) HCHO and CH ₃ COCH ₃ | | i seemi oo sii |
| | (3) 2 moles of CH ₃ CHO | | ** |
| | (4) 2 moles of CH ₃ COCH ₃ | | |
| 67. | Which of the following will not give pos | sitive Molisch test? | |
| | 8 - 1 | | |
| | (1) <i>d</i> -glucose | (2) <i>d</i> -glyceraldehyde | |
| | (3) <i>d</i> -mannose | (4) d-galactose | egyer en e |
| 68. | Which of the following polymer doesn't | involve cross linking? | |
| | (1) Melamine | (2) Bakelite | |
| ¥,0 | (3) Polyethylene | (4) Vulcanised rubber | vicesces" (%) |
| 69. | Which of the following ring have maxis | mum ring strain? | ato in traver of |
| | (1) Cyclopropane | (2) Cyclobutane | |
| | (3) Cyclopentane | (4) Cyclohexane | |
| 70. | The helical structure of protein is stabil | lised by: | |
| | (1) Dipeptic bond | (2) Ionic bond | |
| 9 * | (3) Hydrogen bond | (4) Peptide bond | |
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| 71. | $\Psi_{21(-1)}$ represents: | g An go. to | |
|------------|---|---------------------------------------|------------------------------|
| | (1) 2s orbital | (2) 2px orbital | |
| | (3) 2py orbital | (4) 2pz orbital | |
| 72. | An operator \hat{A} is said to be Hermitian, if | : . mark | 1 m # . |
| | $(1) \int \psi_1^* \psi_2 \hat{A} d\tau = \int \psi_2 \psi_1^* \hat{A} d\tau$ | | ranga dipini art |
| | (2) $\int \psi_2^* \psi_1 \hat{A} d\tau = \int \psi_1 \psi_2^* \hat{A} d\tau$ | | . a 26 P S |
| | (3) $\int \psi_1^* (\hat{A}\psi_2) d\tau = \int (\hat{A}\psi_1)^* \psi_2 d\tau$ | | 19. |
| | (4) None of these | | · · |
| 73. | The selection rules for rotational transiti | ons are : | |
| | (1) $\Delta J = 0$, $\Delta K = 0$ | (2) $\Delta J = 0, \pm 1$ | Continues III |
| | (3) $\Delta J = 0$, $\Delta K = 1$ | (4) $\Delta J = 0, \pm 1; \Delta K =$ | 0 |
| 74. | Thermal conductivity of a gas is: | | |
| | (1) Independent of pressure | (2) Viscosity | |
| | (3) Temperature | (4) None of these | G. 78 B. 17 1 |
| 75. | Number of components, number of phacritical point is: | ses and the degree o | f freedom in a liquid at its |
| | (1) 1, 2, 1 (2) 0, 1, 2 | (3) 1, 2, 0 | (4) 1, 0, 2 |
| 76. | The value of θ for the first order reflecti | on from (100) face is | instruction of the structure |
| | (1) 5.2° (2) 5.9° | (3) 8.4° | (4) 8.9° |
| 77. | Total number of vibrations in allyl bron | nide are: | |
| | (1) 14 (2) 16 | (3) 18 | (4) 21 |
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| | 78. | Which of the following shift leads to the decreased intensity of absorption? | |
|---|-------|--|----|
| | | (1) Hypochromic (2) Hypsochromic | |
| | | (3) Hyperchromic (4) Bathochromic | |
| | 79. | Spin inversion of electrons takes place in the processes: | |
| | | (1) Absorption (2) Internal conversion | |
| | | (3) Florescence (4) Phosphorescence | |
| | 80. | Which of the following is a limitation of Lambert-Beer's law? | |
| | | (1) Scattering of light due to particles | |
| | jar N | (2) Florescence of sample | |
| | | (3) Non-monochromatic radiation(4) All of these | |
| | 81. | The complex with maximum CFSE is: | • |
| | | (1) $[CoCl_4]^{2-}$ (2) $[Co(H_2O)_6]^{3+}$ | |
| | | (3) $[CoF_3(H_2O)_3]$ (4) $[CoF_6]^{3+}$ | |
| | 82. | When is the Intramolecular hydrogen bond formed? | |
| | | (1) When a hydrogen atom is in between the two highly electropositive atoms | |
| | | (2) When a oxygen atom is in between the two highly electronegative atoms | |
| | | (3) When a hydrogen atom is in between the two highly electronegative atoms | |
| | | (4) When a oxygen atom is in between the two highly electropositive atoms | |
| | 83. | The number of metal-metal bonds in $Ir_4(CO)_{12}$ is: | |
| | | (1) 4 (2) 6 (3) 10 (4) 12 | |
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| 4. | Ider | ntify the strongest Bronsted acid: | | |
|------------|------|---|----------------|--|
| | (1) | H_2SO_4 | (2) | CH ₃ COOH |
| | (3) | HNO ₃ | (4) | H_3PO_4 |
| 15. | Wh | ich of the following represents a set | of h | ard acid and soft base respectively? |
| | | Fe^{3+} and F | | Fe^{3+} and S^{2-} |
| | (3) | Ag^+ and S^{2-} | (4) | Ag^+ and F^- |
| 36. | The | e substance present in a lesser amou | nt in | solution is: |
| | (1) | solute | (2) | solvent |
| | (3) | aqueous solvent | . (4) | None |
| 87. | CO | hich one of the following conductor nductance with volume of titrant ac nductance afterwards? | netrio Ided | titration will show a linear increase of the upto the break point and almost constant |
| | (1) | A strong acid with a strong base | | THE PARTY STATE OF THE PARTY OF |
| | (2) | A strong acid with a weak base | | |
| | (3 |) A weak acid with a strong base | | 5.0 c |
| | (4 |) A weak acid with a weak base | 43.3 | was in the property of the sales |
| 88 | . T | he oxidation state of iron in met-hem | oglo | obin is: |
| | (1 | 1) Three (2) Two | (3 | 3) Four (4) Zero |
| 89 |). E | BaTi[Si ₃ O ₉] is a class of : | din. | Tay side of the state of the st |
| | (| 1) ortho silicate | (| 2) cyclic silicate |
| | (| 3) chain silicate | (| 4) sheet silicate |
| PC. | EE-I | (une 2023/(Chemistry)/(SET-X)/(B) | | |

| • | | |
|-----|---|--|
| 90. | | mium is $4s^13d^5$. The element tungsten (Watomic number = 74. The configuration of its |
| | (1) $5s^14d^1$ | (2) $6s^15d^5$ |
| | (3) $6s^25d^4$ | (4) $6s^05d^6$ |
| 91. | The atomic term symbol for the Heliur | n atom in its ground state is: |
| | (1) 3S_1 (2) 3P_2 | $(3) \ ^{3}S_{0} \qquad (4) \ ^{1}S_{0}$ |
| 92. | Oxidation states of P in $H_4P_2O_5$, H_4P_2 | O_6 and $H_4P_2O_7$ are respectively: |
| | (1) +3, +5 and +4 | (2) +5, +3 and +4 |
| | (3) +5, +4 and +3 | (4) +3, +4 and +5 |
| 93. | The basicity of the hydroxides of the fo | llowing alkali metals is of the order: |
| | (1) Li > Na > Rb > Cs | (2) Na > Li > Rb > Cs |
| | (3) Cs > Rb > Na > Li | (4) Rb > Cs > Na > Li |
| 94. | The geometry around the central atom | in ClF_4^+ : |
| | (1) square planar | (2) square pyramidal |
| | (3) octahedral | (4) trigonal bipyramidal |
| 95. | The number of anti-bonding electron respectively: | in NO and CO according to MO theory are |
| | (1) 1, 0 (2) 2, 2 | (3) 3, 2 (4) 2, 3 |
| 96. | Semiconductors have conducti | on band and valence band. |
| | (1) a lightly filled; a moderately filled | |
| | (2) an almost filled; a moderately filled | |
| * | (3) an almost empty; an almost filled | |

(4) an almost filled; an almost empty

- **97.** Which of the following is called 'Pearl ash'?
 - (1) Na_2CO_3
- (2) NaHCO₃
- (3) K_2CO_3
- (4) CaCO₃
- **98.** To which block of the periodic table the element with atomic number 56 belongs:
 - (1) s-block
- (2) p-block
- (3) d-block
- (4) f-block

- **99.** C₆₀ has:
 - (1) 14 pentagons and 18 hexagons
 - (2) 12 pentagons and 20 hexagons
 - (3) 10 pentagons and 20 hexagons
 - (4) 12 pentagons and 18 hexagons
- **100.** The order of acidity in boron trihalides is:
 - (1) $BF_3 > BCl_3 > BBr_3$
 - (2) $BBr_3 > BCl_3 > BF_3$
 - (3) $BF_3 > BBr_3 > BCl_3$
 - (4) $BBr_3 > BF_3 > BCl_3$

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PG-EE-June, 2023

SET-X

SUBJECT: Chemistry

10839

| Time: 11/4 Hours | Max. Marks: 100 | Total Questions : 100 |
|------------------------------|-----------------|--------------------------------|
| Roll No. (in figures) | (in words) | |
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| Father's Name | Mother's Name | |
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PG-EE-June, 2023/(Chemistry)(SET-X)/(C)

EAL

| 1. | $ \psi_{21(-1)} $ represents: (1) 2s orbital (3) 2py orbital | | (2) | 2px orbital 2pz orbital | Winter of the following of the following in the following | |
|----|---|---------------------------------|--------|-----------------------------------|--|----------|
| 2. | An operator \hat{A} is said | d to be Hermitian, i | f: | | amente providu (A) | |
| | $(1) \int \psi_1^* \psi_2 \hat{A} d\tau = \int \psi_2^* d\tau$ | $_{2}\psi_{1}^{st}\hat{A}d	au$ | | | | |
| | $(2) \int \psi_2^* \psi_1 \hat{A} d\tau = \int \psi_2^* \psi_2 \hat{A} \psi_2 \hat{A} d\tau = \int \psi_2^* \psi_2 \hat{A} d\tau = \int \psi_2^* \psi_2 \hat{A} d\tau + \int \psi_2^* \psi_2 \hat{A} d\tau = \int \psi_2^* \psi_2 \hat{A} d\tau + \int \psi_2^* \psi_2 \hat{A} d\tau + \int \psi_2$ | $_{1}\psi_{2}^{*}\hat{A}d	au$ | | | | |
| | $(3) \int \psi_1^* (\hat{A}\psi_2) d\tau = \int 0$ | $(\hat{A}\psi_1)^*\psi_2 d\tau$ | | i kanala Teknila zi gaiw | | O D |
| | (4) None of these | | | | | |
| 3. | The selection rules for | or rotational transiti | ons | are: | | |
| | (1) $\Delta J = 0$, $\Delta K = 0$ | | (2) | $\Delta I = 0. +1$ | rdsonom-sol/1-tF1 | |
| | (3) $\Delta J = 0$, $\Delta K = 1$ | | (4) | $\Delta J = 0, \pm 1; \Delta K =$ | | |
| 4. | Thermal conductivity | y of a gas is: | | | | |
| | (1) Independent of p | pressure | (2) | Viscosity | | |
| | (3) Temperature | | (4) | None of these | | |
| 5. | Number of compone critical point is: | | | | | d at its |
| | (1) 1, 2, 1 | (2) 0, 1, 2 | | 1, 2, 0 | (4) 1, 0, 2 | |
| 6. | The value of θ for the | e first order reflection | on fro | om (100) face is | aber s certW (E) | |
| | (1) 5.2° | (2) 5.9° | (3) | 8.4° | (4) 8.9° | |
| 7. | Total number of vibr | ations in allyl brom | ide a | are: A saleson-lab | The number of as | |
| | (1) 14 | (2) 16 | (3) | 18 | (4) 21 | |

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P. T. O.

| 8. | Which of the following shift leads to the decreased intensity of absorption? | | |
|-----|--|-------------------|---|
| | (1) Hypochromic | (2) | Hypsochromic |
| | (3) Hyperchromic | (4) | Bathochromic |
| 9. | Spin inversion of electrons takes place in | n the | e processes : |
| | (1) Absorption | (2) | Internal conversion |
| | (3) Florescence | (4) | Phosphorescence |
| 10. | Which of the following is a limitation of | f Lai | mbert-Beer's law ? |
| | (1) Scattering of light due to particles | | (a) None of these |
| | (2) Florescence of sample | | en ûn retrain properties voorbeler bild. N |
| | (3) Non-monochromatic radiation | | |
| | (4) All of these | | |
| 11. | The complex with maximum CFSE is: | | |
| | (1) $[CoCl_4]^{2-}$ | (2) | $[Co(H_2O)_6]^{3+}$ |
| | (3) $[CoF_3(H_2O)_3]$ | (4) | $(CoF_6)^{3+}$ |
| 12. | When is the Intramolecular hydrogen b | onc | d formed ? |
| | (1) When a hydrogen atom is in between | en t | the two highly electropositive atoms |
| | (2) When a oxygen atom is in between | the | two highly electronegative atoms |
| | (3) When a hydrogen atom is in between | een t | the two highly electronegative atoms |
| | (4) When a oxygen atom is in between | the | e two highly electropositive atoms |
| 13. | The number of metal-metal bonds in In | r ₄ (C | O) ₁₂ is: |
| | (1) 4 (2) 6 | (3 | 3) 10 (4) 12 |
| G-E | E-June, 2023/(Chemistry)/(SET-X)/(C) | | |

| 14. | Identify the strongest Bronsted acid: | |
|-----|--|---|
| | (1) H ₂ SO ₄ | (2) CH ₃ COOH |
| | (3) HNO ₃ | (4) H_3PO_4 |
| 15. | Which of the following represents a set | of hard acid and soft base respectively? |
| | (1) Fe^{3+} and F | (2) Fe^{3+} and S^{2-} |
| | (3) Ag^{+} and S^{2-} | (4) Ag^+ and F^- |
| 16. | The substance present in a lesser amount | nt in solution is: |
| | (1) solute | (2) solvent |
| | (3) aqueous solvent | (4) None |
| 17. | | etric titration will show a linear increase of the ded upto the break point and almost constant |
| | (1) A strong acid with a strong base | |
| | (2) A strong acid with a weak base | |
| | (3) A weak acid with a strong base | |
| | (4) A weak acid with a weak base | |
| 18. | The oxidation state of iron in met-hemo | globin is: |
| | (1) Three (2) Two | (3) Four (4) Zero |
| 19. | $BaTi[Si_3O_9]$ is a class of: | of from any one to within 1 17 25 |
| | (1) ortho silicate | (2) cyclic silicate |
| | (3) chain silicate | (4) sheet silicate |
| -FF | June 2023/(Chemistry)/(SFT-Y)/(C) | The large land what were a soul P.T.O. |

| 20. | The electronic configuration of belongs to the same group an valence shell is: | of chromium is $4s^13d^5$. The element tungsten (W) and has atomic number = 74. The configuration of its |
|-----|--|---|
| | (1) $5s^14d^1$ | (2) $6s^15d^5$ |
| | (3) $6s^25d^4$ | (4) $6s^05d^6$ |
| 21. | | e Helium atom in its ground state is: |

(1) ${}^{3}S_{1}$ (2) ${}^{3}P_{2}$ (3) ${}^{3}S_{0}$ (4) ${}^{1}S_{0}$

22. Oxidation states of P in
$$H_4P_2O_5$$
, $H_4P_2O_6$ and $H_4P_2O_7$ are respectively: (1) +3, +5 and +4 (2) +5, +3 and +4

(3)
$$+5$$
, $+4$ and $+3$ (4) $+3$, $+4$ and $+5$

23. The basicity of the hydroxides of the following alkali metals is of the order:

24. The geometry around the central atom in ClF_4^+ :

(1) square planar

(2) square pyramidal

(3) octahedral

(4) trigonal bipyramidal

25. The number of anti-bonding electron in NO and CO according to MO theory are respectively:

- (1) 1, 0
- (2) 2, 2
- (3) 3, 2
- (4) 2, 3

| 26. | Semiconductors have conduction band and valence band. |
|------|---|
| | (1) a lightly filled; a moderately filled |
| | (2) an almost filled; a moderately filled |
| | (3) an almost empty; an almost filled |
| | (4) an almost filled; an almost empty |
| 27. | Which of the following is called 'Pearl ash'? |
| | (1) Na ₂ CO ₃ (2) NaHCO ₃ (3) K ₂ CO ₃ (4) CaCO ₃ |
| 28. | To which block of the periodic table the element with atomic number 56 belongs: |
| | (1) s-block (2) p-block (3) d-block (4) f-block |
| 29. | C ₆₀ has: |
| | (1) 14 pentagons and 18 hexagons |
| | (2) 12 pentagons and 20 hexagons |
| | (3) 10 pentagons and 20 hexagons |
| , | (4) 12 pentagons and 18 hexagons |
| 30. | The order of acidity in boron trihalides is: |
| | $(1) BF_3 > BCl_3 > BBr_3$ |
| | $(2) BBr_3 > BCl_3 > BF_3$ |
| | $(3) BF_3 > BBr_3 > BCl_3$ |
| | (4) $BBr_3 > BF_3 > BCl_3$ |
| 31. | Which of the following carbohydrate gives only glucose on hydrolysis: |
| | (1) Galactose (2) Sucrose |
| | (3) Maltose (4) Lactose |
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| | |
| | |

| 32. The Blue shift in UV is also called as | in anic |
|---|--|
| | (2) Hyperchromic |
| (1) Hypochromic | (4) Hypsochromic |
| (3) Bathochromic33. Which of the following substituent | will enhance the basicity of phenol? |
| 33. Which of the following substituent | |
| | $(2) -NO_2$ |
| (1) -Me | (4) -COOCH ₃ |
| (3) -CN | rophilic substitution at 3rd position? |
| Which of the following give elect | roprine saco |
| | (2) Indole |
| (1) Pyrrole | (4) Thiophene |
| (3) Furan | =O in case of acetaldehye appears between: |
| 35. The IR strecthing frequecy for C | =O in case of |
| (1) $3400-3300 \text{ cm}^{-1}$ | |
| (2) 1300-1000 cm ⁻¹ | |
| | |
| (3) 1750-1700 cm ⁻¹ | William to the state of the sta |
| (4) 2100-2300 cm ⁻¹ | quency in which of the molecule is not concentration |
| OII stretching free | quency in which of the most |
| 36. The IR -OH streets | |
| dependent: | |
| (1) p-Nitrophenol | |
| | |
| (2) p-Nitroaniline | to stom to the every deduct at which is |
| (3) o-Nitrophenol | |
| | |
| (4) m-Nitrophenol | |
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- 37. Which of the following compound gives 2 signal in its nmr spectrum?
 - (1) Terephthaldehyde
 - (2) 4-hydroxytoluene
 - (3) 4-nitrobenzaldehyde
 - (4) 1,3-dimethylbenzene
- **38.** Which of the following will have higher λ_{max} ?

(1)
$$CN$$
 (2) CN (3) CN (4) CN

39. The major product formed in the following reaction is:

- **40.** The number of peaks observed in the ${}^{1}H$ NMR of $\dot{C}HD_{2}OD$ are :
 - (1) Septet
- (2) Triplet
- (3) Pentet
- (4) Doublet

41. Which of the following statement is *correct*, if:

$$K_{sp(AgCl)} > K_{sp(AgBr)} > K_{sp(AgI)}$$

- (1) AgI is more soluble than AgCl and AgBr
- (2) AgCl is more soluble than AgBr and AgI
- (3) AgBr is more soluble than AgCl and AgI
- (4) None of these
- **42.** Dry ice is used in fire extinguishers. It is stored in the cylinder in solid form. When sprayed on fire, dry ice quickly changes into CO_2 . The change of state is known as:
 - (1) Distillation

(2) Evaporation

(3) Condensation

- (4) Sublimation
- 43. The Joule-Thomson expansion of an ideal gas is:
 - (1) an isenthalpic process
- (2) an isentropic process
- (3) an isothermal process
- (4) adiabatic process
- 44. The colloidal solutions are purified by:
 - (1) Peptization

(2) Dialysis

(3) Coagulation

- (4) Flocculation
- 45. The elastic scattering of photons is called as:
 - (1) Atmospheric scattering
 - (2) Conserved scattering
 - (3) Rayleigh scattering
 - (4) Raman scattering

- **46.** The solubility of a solute is three times as high in the ether as in water. What amount of the solute will be extracted from 100 ml of the aqueous solution by 100 ml of ether in one step?
 - (1) 80%

(2) 75%

(3) 70%

- (4) 60%
- **47.** Choose the *correct* order of bond strength for X-F bond (X = B, C, N & O)?
 - (1) $BF_3 > CF_4 > OF_2 > NF_3$
 - (2) $CF_4 > BF_3 > NF_3 > OF_2$
 - (3) $BF_3 > CF_4 > NF_3 > OF_2$
 - (4) $OF_2 > NF_3 > CF_4 > BF_3$
- **48.** Which of the following conformation is *correct*?
 - (1) S CI

(2) s CI S CI

(3) ST S

- (4) ST CI
- **49.** Which of the following is a non-classical carbocation?
 - (1)

(2) CMe₂

(3)

(4)

50. Choose the *correct* reaction product from the following transformation:

- 51. Which one of the following is most easily reduced?
 - (1) $V(CO)_6$

(2) Cr(CO)₆

(3) Fe(CO)₅

- (4) Ni(CO)₄
- **52.** Which of the following pair of 4f elements can exhibit +4 oxidation state?
 - (1) La and Lu

(2) Ce and Pr

(3) Eu and Yb

(4) Sm and Tm

- **53.** A 1s orbital refers to:
 - (1) A circular track in an atom in which an electron travels
 - (2) A one electron wave function
 - (3) An observable property of the system
 - (4) A Hermitian operator
- **54.** For the reaction $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$; $\Delta H = -13.7$ kcals. The heat change when 100 ml of 0.1 M is mixed with 100 ml of 0.2 M H_2SO_4 is:
 - (1) -0.137 kcals

(2) -0.274 kcals

(3) - 1.37 kcals

(4) - 0.548 kcals

| | 1 |
|-----|---|
| 55. | When red light is absorbed in a malachite green solution, which of the following is correct? |
| | (1) wave length of light decreases |
| | (2) number of photons is a light beam decreases |
| | (3) a part of red light changes to green radiation |
| , | (4) None of these |
| 56. | Equivalent conductance of $AgNO_3$ solution at infinite dilution is 130 ohm ⁻¹ cm ² equiv ⁻¹ . The transport number of Ag^+ ion in v-dilution is 0.4. The equivalent conductance of NO_3^- ion is: |
| | (1) $69 \mathrm{ohm}^{-1} \mathrm{cm}^2 \mathrm{equiv}^{-1}$ |
| | (2) $52 \text{ ohm}^{-1} \text{cm}^2 \text{equiv}^{-1}$ |
| | (3) 78 ohm ⁻¹ cm ² equiv ⁻¹ |
| | (4) $39 \text{ohm}^{-1} \text{cm}^2 \text{equiv}^{-1}$ |
| 57. | 50 ml of 0.1 NaOH is added to 49 ml of 0.1 M HCl. The pH of the resulting solution is: |
| | (1) 9 (2) 12 (3) 10 (4) 11 |
| 58. | A solid acts as an adsorbend because it has: |
| | (1) unsaturated valencies |
| | (2) small pores in it |
| | (3) high lattice energy |
| | (4) a definite shape |

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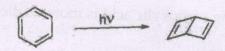
- **59.** According to Langmuir adsorption isotherm, the amount of gas adsorbed at very high pressure:
 - (1) goes on increasing with pressure
 - (2) goes on decreasing with pressure
 - (3) increases first and decreases later with pressure
 - (4) reaches a constant limiting value
 - **60.** Which of the following is an irreversible cell?
 - (1) $Zn \mid Zn^{2+} \mid AgCl \mid Ag$
 - (2) Zn | H₂SO₄ | Ag
 - (3) $Zn | Zn^{2+} | | Cd^{2+} | Cd$
 - (4) Cd | Cd²⁺ | | KCl, Hg₂Cl₂ | Hg
 - **61.** Which of the following is *not* a suitable reagent for nitration of aromatic compounds?
 - (1) H_2SO_4 (conc.) and HNO_3 (conc.)
 - (2) HNO₃ (conc.) and acetic anhydride
 - (3) Nitric acid (fuming) and H_2SO_4 (conc.)
 - (4) Potassium nitrate (alcoholic)
 - **62.** Which of the following compound exist in meso form?
 - (1) Tartaric acid
 - (2) Naphthyl acetic acid
 - (3) Glyceraldehyde
 - (4) Glucose

- **63.** Which of the following reactions can be used for conversion of PhCOPh into $PhCH_2Ph$?
 - (1) Hydroboration and Meerwein-Pondroff-Verley reduction
 - (2) Wolf-Kishner reduction and Birch reduction
 - (3) Hydroboration and Birch reduction
 - (4) Clemmensen reduction and Wolf-Kishner reduction
- **64.** Which compound will liberate CO_2 from $NaHCO_3$?
 - (1) CH₃CONH₂

(2) CH₃NH₂

(3) $(CH_3)_4 N^+ OH^-$

- (4) CH₃NH₃⁺Cl⁻
- **65.** The following reaction is an example of :



- (1) Cycloaddition reaction
- (2) Ene reaction
- (3) Sigmatropic rearrangement
- (4) Electrocyclic reaction
- **66.** Enolate on reaction with the carbonyl carbon of an ester resulted into:
 - (1) β-Ketoaldehyde
 - (2) Carboxylic acid
 - (3) An aldol
 - (4) α , β -Unsaturated aldehyde

67. In the following reaction:

(A) NaOCH₃ Me H
$$H_2SO_4$$
 (B)

The product A and B are, respectively:

68. Which of the following carboxylic acid is more acidic?

- (1) p-nitrobenzoic acid
- (2) p-aminobenzoic acid
- (3) p-methoxybenzoic acid
- (4) p-fluorobenzoic acid

69. Nitration reaction of nitrobenzene resulted into:

(1) m-dinitrobenzene

(2) p-dinitrobenzene

(3) o- dinitrobenzene

(4) benzene

70. Which of the following is more basic?

(1) Pyrrole

(2) Furan

(3) Piperidine

(4) Pyridine

- **71.** Which of the following halides would be most reactive in an SN_2 Reaction?
 - (1) PhCH₂CH(Br)CH₃
 - (2) PhCH2CH2CH2Br
 - (3) $PhCH(CH_3)CH_2Br$
 - (4) $PhC(CH_3)_2Br$
- 72. The base assisted formation of glycolic acid from glyoxal is named as:
 - (1) Aldol condensation
 - (2) Rosenmund reduction
 - (3) Cannizaro reaction
 - (4) Knoevenagel condensation
- 73. Which of the following is anionic detergent?
 - (1) Sodium dodecylbenzene sulfonate
 - (2) Cetyltromethyl ammonium bromide
 - (3) Caustic soda
 - (4) polyethylene glycol stearate
- **74.** The formation of toluene from p-toluidine requires:
 - (1) Acidification followed by hydrogenation
 - (2) Acidification followed by reaction with NaBH4
 - (3) Diazotization followed by hydrogenation
 - (4) Diazotization followed by treatment with H_3PO_2

| | | С |
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| 16 75. | Markovnikof's addition of HCl to propene involves the: | |
| • | (1) Initial attack of a chloride ion | |
| | (2) Formation of isopropyl cation | |
| | (3) Isomerization of 1-chloropropane | |
| | (4) Formation of propyl cation | 81 |
| 76 | 6. Which of the following compounds will give methyl vinyl ketone by condensation followed by dehydration? | Aldol |
| | (1) HCHO and CH ₃ CHO | |
| | (2) HCHO and CH ₃ COCH ₃ | |
| | (3) 2 moles of CH ₃ CHO | |
| | (4) 2 moles of CH ₃ COCH ₃ | |
| | 77. Which of the following will not give positive Molisch test? | |
| | (2) d-glyceraldehyde | |
| | (3) d-mannose (4) d-galactose | |
| | 78. Which of the following polymer doesn't involve cross linking? | |
| | (1) Melamine (2) Bakelite | |
| | (4) Vulcanised rubber | |

(3) Polyethylene

| 79 | . V | Which | n of the foll | owing ring | have max | imun | n i | ring strain? | | | | |
|-----|--------------|-------------------|--------------------------|------------------------|-----------------------|-------|-----|------------------------|----------------|----------|----------|--------|
| | (| 1) C | yclopropan | e la banda | | (2) |) (| Cyclobutane | | undaix | | |
| | (3 | 3) C | yclopentane | e habeiten | | (4) |) (| Cyclohexane | | | | |
| 80 | . T | The he | elical struct | ure of prote | ein is stabi | lised | b | y: | | | | |
| | (1 | 1) Di | ipeptic bone | d | | (2) |) I | Ionic bond | | | | |
| | (3 | 3) H | ydrogen bo | nd | | (4) | I | Peptide bond | | | | |
| 81. | Н | How n | many S-S bo | onds are the | ere in tetra | thion | nat | te ion ? | | | | |
| | | 1) 2 | | (2) 3 | | (3) | | | (4) | 5 | | |
| 82. | P_{α} | 24010 | has | bridgin | g O atoms | | | | | | | |
| | (1 |) 4 | P. Paragon | (2) 5 | | (3) | 6 | | (4) | 2 | | |
| 83. | W | hich axim | among the um electron | following of affinity? | electronic | confi | igı | arations repre | sent | the elen | nents wi | th the |
| | (1) |) 1s ² | $2s^22p^6$ | | | (2) | 1. | $s^2 2s^2 2p^5$ | | | | |
| | (3) |) 1s ² | $2s^22p^63s^1$ | | | (4) | 15 | $s^2 2s^2 2p^6 3s^2 3$ | p ⁵ | | | |
| 84. | Th | ne act | ive site of e | nzyme nitro | ogenase co | ntair | ns | | | | | |
| | |) Mo | | (2) Mn | | (3) | | | (4) | Си | | |
| 85. | Th | e IUI | PAC nomen | clature of I | K ₃ [Co(NO | 2)6] | is | : | | | | |
| | | | assium hexa | | | | | | | | | |
| | (2) | Pota | assium (I) h | exanitrocol | paltate (III) |) | | | | | | |
| | (3) | Pota | assium hexa | nitrocobalt | (0) | | | | | | | |
| | (4) | Pota | ıssium (I) h | exanitrocob | paltate (II) | | | | | | | |
| | | | | | | | | | | | | |

| 3 | | | | | | |
|-----|---|-----------------------------------|--------|------------------------------------|----------------|---------------------|
| 86. | Coordination number and geometry of $[Ce(NO_3)_6]^{2-}$: | | | | | |
| | (1) 6, octahedral | and the Fig. | (2) | 12, octahedral | | |
| | (3) 8, octahedral | | (4) | 12, icosahedral | | |
| 87. | The spin only mag respectively are: | metic moment (in B | .M.) | value of [FeF ₆] | 3- and [Co(CN) | $_{5}(H_{2}O)]^{3}$ |
| | (1) 0 and 1.73 | | (2) | 5.92 and 1.73 | | |
| | (3) 4.47 and 1.73 | | (4) | 5.92 and 3.87 | | |
| 88. | The number of mic | rostates in term ${}^{1}G$ i | is: | | OF CHE THEM ST | |
| | (1) 9 | (2) 6 | (3) | 7 | (4) 15 | R2: Po |
| 89. | The total number of | f isomers of [Co(en) ₂ | Cl_2 | , (en = ethylened | diamine) is: | |
| | (1) 4 | (2) 3 | (3) | 6 | (4) 5 | igi ca |
| 90. | The nephelauxetic | parameter (β) is high | nest f | or: | post/Alicensus | |
| | (1) Br ⁻ | (2) CI | (3) | CN | (4) F | |
| 91. | Parachor is related | to the density of a li | quid | by relation: | | |
| | $(1) [P] = \frac{Mr}{d}$ | | (2) | $[P] = \frac{M^{\frac{1}{4}}r}{d}$ | | |
| | $(3) [P] = \frac{Mr^{\frac{1}{4}}}{d}$ | | (4) | $[P] = \frac{Md^{\frac{1}{4}}}{r}$ | | |
| 92. | For a particular v | vibrational mode to | app | ear in the Ram | nan spectrum, | what mus |
| | (1) Molecular pola | arizability | (2) | Molecular shap | pe was said | |
| | (3) Frequency of 1 | radiation | (4) | Intensity of rac | diation | |

- **93.** For an isentropic change of state:
 - (1) dE = 0
- (2) dS = 0
- (3) dS = 1
- (4) dH = 0
- **94.** Operators \hat{A} and \hat{B} are said to commutative, if:
 - $(1) \hat{A} \hat{B} = 0$

 $(2) \hat{B} \hat{A} = 0$

(3) $\hat{A} \hat{B} = \hat{B} \hat{A}$

- (4) $\hat{A} \hat{B} \neq \hat{B} \hat{A}$
- **95.** In relation S = klnW, the entropies are additive while thermodynamic properties are multiplicative. What will happen to S and lnW when the energy of the system is increased?
 - (1) S increases and lnW decreases
 - (2) S and W will increase
 - (3) S and W will decreases
 - (4) S decreases and lnW increases
- 96. In the lead acid base battery during charging the Cathode reaction is:
 - (1) Reduction of Pb^{2+} to Pb
 - (2) Formation of PbSO₄
 - (3) Formation of PbO₂
 - (4) Oxidation of Pb to Pb^{2+}
- **97.** For one of gaseous mixture, entropy of mixing is expressed as:
 - (1) $\Delta S_{mix} = -R \sum \ln x_i$
 - (2) $\Delta S_{mix} = R \sum \ln x_i$
 - (3) $\Delta S_{mix} = R \sum x_i \ln x_i$
 - (4) $\Delta S_{mix} = -R \sum x_i \ln x_i$

- **98.** Which one of the following is *correct* Maxwell's relation?
 - (1) $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$
 - (2) $\left(\frac{\partial T}{\partial P}\right)_V = \left(\frac{\partial V}{\partial S}\right)_T$
 - (3) $\left(\frac{\partial T}{\partial V}\right)_S = \left(\frac{\partial P}{\partial S}\right)_V$
 - (4) $\left(\frac{\partial S}{\partial V}\right)_T = -\left(\frac{\partial P}{\partial T}\right)_V$
- **99.** According to first thermodynamic equation of state, for an ideal gas $\left(\frac{\partial U}{\partial V}\right)_T$ is:
 - (1) Infinite
- (2) $\frac{P}{T}$
- (3) zero
- (4) $\frac{T}{V}$
- **100.** Which of the following partially miscible liquids have both upper and lower critical solution temperature?
 - (1) Water and aniline
 - (2) Water and β-picoline
 - (3) Water and diethyl amine
 - (4) Methanol and cyclohexane

Total No. of Printed Pages: 21

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PG-EE-June, 2023 SUBJECT: Chemistry

SET-X

10840

| | | S | r. No |
|------------------------------|-----------------|-------|---------------------------------------|
| Time: 11/4 Hours | Max. Marks: 100 | | Total Questions: 100 |
| Roll No. (in figures) | (in words) | · | |
| Name | Date of Birth | , | |
| Father's Name | Mother's Name | | · · · · · · · · · · · · · · · · · · · |
| Date of Examination | 4 | | |
| | | | |
| (Signature of the Candidate) | | (Sign | nature of the Invigilator) |

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

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- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
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- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

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|----|-----|-------------|-------------------------------|----------------------------------|-------------------------------|------------------------------|----------------|-----------------|------------------|
| | | (1) 2 | | (2) 3 | (3) | 4 | (4) | 5 | |
| | 2. | P_4O_{10} | has | bridging O atoms | | | | | |
| | | (1) 4 | | (2) 5 | (3) | 6 | (4) | 2 | |
| | 3. | | h among the f mum electron | ollowing electronic of affinity? | conf | igurations repres | sent | the elements wi | th the |
| | | (1) 1 | $s^2 2s^2 2p^6$ | | (2) | $1s^2 2s^2 2p^5$ | | | |
| | | (3) 1 | $s^2 2s^2 2p^6 3s^1$ | an e ta la line : | (4) | $1s^2 2s^2 2p^6 3s^2 3$ | p ⁵ | . He ' ad ' | \$ ·* |
| | 4. | The a | ctive site of er | nzyme nitrogenase co | onta | ins: | | | |
| | | (1) N | 10 | (2) Mn | (3) | Fe | (4) | Cu | |
| | 5. | The I | UPAC nomen | clature of $K_3[Co(NC)]$ | ₂) ₆] | is: | | a i Tirka a sa | |
| | | (1) P | otassium hexa | anitrocobaltate (III) | | | sel" | SengZof, mil | |
| | | (2) P | otassium (I) h | exanitrocobaltate (II | I) | | | | |
| | | (3) P | otassium hexa | nitrocobalt (0) | | | | | EF |
| | | (4) P | otassium (I) h | exanitrocobaltate (II) |) | | | | |
| | 6. | Coord | dination numb | per and geometry of | [Ce(| $NO_3)_6]^{2-}$: | | | |
| | | (1) 6 | , octahedral | he Mir tale Resta | (2) | 12, octahedral | | New Y | |
| | | (3) 8 | , octahedral | | (4) | 12, icosahedral | | | • |
| | 7. | | spin only mag | gnetic moment (in B | | value of [FeF ₆] | | - | 2)] ³ |
| | | (1) 0 | and 1.73 | 4 1600 | (2) | 5.92 and 1.73 | | egen p | |
| | | (3) 4 | .47 and 1.73 | | (4) | 5.92 and 3.87 | | AT TYPE | |
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- **16.** The IR –OH stretching frequency in which of the molecule is *not* concentration dependent:
 - (1) p-Nitrophenol

(2) p- Nitroaniline

(3) o-Nitrophenol

- (4) m-Nitrophenol
- 17. Which of the following compound gives 2 signal in its nmr spectrum?
 - (1) Terephthaldehyde

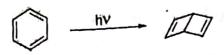
- (2) 4-hydroxytoluene
- (3) 4-nitrobenzaldehyde

- (4) 1,3-dimethylbenzene
- **18.** Which of the following will have higher λ_{max} ?

19. The major product formed in the following reaction is:

| 20. | The number of peaks observed in the ¹ H NMR of CHD ₂ OD are: |
|------|--|
| | (1) Septet (2) Triplet (3) Pentet (4) Doublet |
| 21. | Which of the following is not a suitable reagent for nitration of aromatic compounds? |
| | (1) H_2SO_4 (conc.) and HNO_3 (conc.) |
| | (2) HNO ₃ (conc.) and acetic anhydride |
| | (3) Nitric acid (fuming) and H_2SO_4 (conc.) |
| | (4) Potassium nitrate (alcoholic) |
| | enti, maria de la companya della companya della companya de la companya della com |
| 22. | Which of the following compound exist in meso form? |
| | (1) Tartaric acid (2) Naphthyl acetic acid |
| | (3) Glyceraldehyde (4) Glucose |
| 23. | Which of the following reactions can be used for conversion of $PhCOPh$ into $PhCH_2Ph$? |
| | (1) Hydroboration and Meerwein-Pondroff-Verley reduction |
| | (2) Wolf-Kishner reduction and Birch reduction |
| | (3) Hydroboration and Birch reduction |
| | (4) Clemmensen reduction and Wolf-Kishner reduction |
| 24. | Which compound will liberate CO_2 from $NaHCO_3$? |
| | (1) CH3CONH2 |
| | (3) $(CH_3)_4 N^+ OH^-$ (4) $CH_3 NH_3^+ Cl^-$ |
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25. The following reaction is an example of :



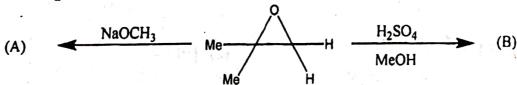
- (1) Cycloaddition reaction
- (2) Ene reaction
- (3) Sigmatropic rearrangement
- (4) Electrocyclic reaction
- 26. Enolate on reaction with the carbonyl carbon of an ester resulted into:
 - (1) β-Ketoaldehyde

(2) Carboxylic acid

(3) An aldol

(4) α , β -Unsaturated aldehyde

27. In the following reaction:



The product A and B are, respectively:

$$(3) \quad \stackrel{\text{Me}}{\underset{\text{MeO}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{OH}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{Me}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{Me}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{Me}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{Me}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{Me}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{Me}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{Me}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{MeO}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{HO}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{MeO}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{MeO}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{MeO}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{Me}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}} \stackrel{\text{H}}{\underset{\text{H}}{\longrightarrow}} \stackrel{\text{H}}{\underset{\text{H}}} \stackrel{\text{H$$

- 28. Which of the following carboxylic acid is more acidic?
 - (1) *p*-nitrobenzoic acid
 - (2) p-aminobenzoic acid
 - (3) p-methoxybenzoic acid
 - (4) p-fluorobenzoic acid
- **29.** Nitration reaction of nitrobenzene resulted into:
 - (1) *m*-dinitrobenzene

(2) *p*-dinitrobenzene

(3) o-dinitrobenzene

- (4) benzene
- **30.** Which of the following is more basic?
 - (1) Pyrrole

(2) Furan

(3) Piperidine

- (4) Pyridine
- **31.** Parachor is related to the density of a liquid by relation :

$$(1) \quad [P] = \frac{Mr}{d}$$

(2)
$$[P] = \frac{M^{\frac{1}{4}}r}{d}$$

(3)
$$[P] = \frac{Mr^{\frac{1}{4}}}{d}$$

(4)
$$[P] = \frac{Md^{\frac{1}{4}}}{r}$$

- **32.** For a particular vibrational mode to appear in the Raman spectrum, what must change?
 - (1) Molecular polarizability
 - (2) Molecular shape
 - (3) Frequency of radiation
 - (4) Intensity of radiation

33. For an isentropic change of state:

(1) dE = 0

(2) dS = 0

(3) dS = 1

(4) dI - I = 0

34. Operators \hat{A} and \hat{B} are said to commutative, if :

- $(1) \hat{A} \hat{B} = 0$
- $(2) \quad \hat{B} \ \hat{A} = 0$
- $(3) \hat{A} \hat{B} = \hat{B} \hat{A}$
- (4) $\hat{A} \hat{B} \neq \hat{B} \hat{A}$

35. In relation S = klnW, the entropies are additive while thermodynamic properties are multiplicative. What will happen to S and lnW when the energy of the system is increased?

- (1) S increases and lnW decreases
- (2) S and W will increase
- (3) S and W will decreases
- (4) S decreases and lnW increases

36. In the lead acid base battery during charging the Cathode reaction is:

- (1) Reduction of Pb^{2+} to Pb
- (2) Formation of PbSO₄
- (3) Formation of PbO₂
- (4) Oxidation of Pb to Pb^{2+}

37. For one of gaseous mixture, entropy of mixing is expressed as:

(1)
$$\Delta S_{mix} = -R \sum \ln x_i$$

(2)
$$\Delta S_{mix} = R \sum \ln x_i$$

(3)
$$\Delta S_{mix} = R \sum x_i \ln x_i$$

(4)
$$\Delta S_{mix} = -R \sum x_i \ln x_i$$

38. Which one of the following is *correct* Maxwell's relation?

(1)
$$\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$$

(2)
$$\left(\frac{\partial T}{\partial P}\right)_V = \left(\frac{\partial V}{\partial S}\right)_T$$

(3)
$$\left(\frac{\partial T}{\partial V}\right)_{S} = \left(\frac{\partial P}{\partial S}\right)_{V}$$

(4)
$$\left(\frac{\partial S}{\partial V}\right)_T = -\left(\frac{\partial P}{\partial T}\right)_V$$

39. According to first thermodynamic equation of state, for an ideal gas $\left(\frac{\partial U}{\partial V}\right)_T$ is:

- (1) Infinite
- (2) $\frac{P}{T}$
- (3) zero
- (4) $\frac{T}{V}$

40. Which of the following partially miscible liquids have both upper and lower critical solution temperature?

- (1) Water and aniline
- (2) Water and β -picoline
- (3) Water and diethyl amine
- (4) Methanol and cyclohexane

| _ | | | |
|-------|--|---|------|
| 41. | Which one of the following is most easily | reduced? | |
| | (1) $V(CO)_6$ | $(2) Cr(CO)_6$ | |
| | $(3) Fe(CO)_5 \qquad \qquad ($ | (4) Ni(CO) ₄ | |
| 42. | Which of the following pair of 4f element | ts can exhibit +4 oxidation state? | |
| | (1) La and Lu | (2) Ce and Pr | |
| | (3) Eu and Yb | (4) Sm and Tm | |
| 43. | A 1s orbital refers to : | | |
| | (1) A circular track in an atom in which | an electron travels | 1 |
| | (2) A one electron wave function | | |
| | (3) An observable property of the system | m | |
| | (4) A Hermitian operator | | |
| 44. | For the reaction $H^+(aq) + OH^-(aq) \rightarrow H_2$ 100 ml of 0.1 M is mixed with 100 ml of 0 | $_2O(l)$; $\Delta H = -13.7$ kcals. The heat change whose $0.2 \text{ M } H_2SO_4$ is: | hen |
| | (1) -0.137 kcals | (2) -0.274 kcals | |
| | (3) – 1.37 kcals | (4) – 0.548 kcals | |
| | | vering in Miner List in the previous a 機関がありて発見。 | |
| 45. | correct? | thite green solution, which of the followin | g is |
| | (1) wave length of light decreases | | |
| | (2) number of photons is a light beam d | decreases | |
| , | (3) a part of red light changes to green i | radiation | |
| | (4) None of these | | |
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46. Equivalent conductance of $AgNO_3$ solution at infinite dilution is 130 ohm⁻¹cm²equiv⁻¹. The transport number of Ag^+ ion in v-dilution is 0.4. The equivalent conductance of NO_3^- ion is:

- (1) $69 \, \text{ohm}^{-1} \text{cm}^2 \text{equiv}^{-1}$
- (2) $52 \text{ ohm}^{-1} \text{cm}^2 \text{ equiv}^{-1}$
- (3) $78 \, \text{ohm}^{-1} \text{cm}^2 \text{equiv}^{-1}$
- (4) $39 \text{ ohm}^{-1} \text{cm}^2 \text{equiv}^{-1}$

47. 50 ml of 0.1 *NaOH* is added to 49 ml of 0.1 M *HCl*. The pH of the resulting solution is:

- (1) 9
- (2) 12
- (3) 10
- (4) 11

48. A solid acts as an adsorbend because it has:

- (1) unsaturated valencies
- (2) small pores in it
- (3) high lattice energy
- (4) a definite shape

49. According to Langmuir adsorption isotherm, the amount of gas adsorbed at very high pressure:

- (1) goes on increasing with pressure
- (2) goes on decreasing with pressure
- (3) increases first and decreases later with pressure
- (4) reaches a constant limiting value

50. Which of the following is an irreversible cell?

- (1) $Zn \mid Zn^{2+} \mid AgCl \mid Ag$
- (2) $Zn \mid H_2SO_4 \mid Ag$
- (3) $Zn | Zn^{2+} | | Cd^{2+} | Cd$
- (4) Cd | Cd²⁺ | | KCl, Hg₂Cl₂ | Hg

| 51 . 7 | The | compl | ex v | with | maximum | CFSE | is | : |
|---------------|-----|-------|------|------|---------|-------------|----|---|
|---------------|-----|-------|------|------|---------|-------------|----|---|

(1) $[CoCl_4]^{2-}$

(2) $[Co(H_2O)_6]^{3+}$

(3) $[CoF_3(H_2O)_3]$

(4) $[CoF_6]^{3+}$

52. When is the Intramolecular hydrogen bond formed?

- (1) When a hydrogen atom is in between the two highly electropositive atoms
- (2) When a oxygen atom is in between the two highly electronegative atoms
- (3) When a hydrogen atom is in between the two highly electronegative atoms
- (4) When a oxygen atom is in between the two highly electropositive atoms

53. The number of metal-metal bonds in $Ir_4(CO)_{12}$ is:

- $(1)^{-4}$
- (2) 6
- (3) 10
- (4) 12

54. Identify the strongest Bronsted acid:

(1) H_2SO_4

(2) CH₃COOH

(3) HNO₃

(4) H_3PO_4

55. Which of the following represents a set of hard acid and soft base respectively?

(1) Fe^{3+} and F

(2) Fe^{3+} and S^{2-}

(3) Ag^{+} and S^{2-}

•(4) Ag^+ and F^-

56. The substance present in a lesser amount in solution is:

(1) solute

(2) solvent

(3) aqueous solvent

(4) None

D

| | | the improper of the |
|-----|--|--|
| 57. | Which one of the following of conductance with volume of conductance afterwards? | conductometric titration will show a linear increase of the titrant added upto the break point and almost constant |
| | | |
| | (1) A strong acid with a stro | ong base |
| | (2) A strong acid with a wea | ak base |
| | (3) A weak acid with a strong | ng base |
| | (4) A weak acid with a wea | k base |
| | | The second of the second secon |
| 58. | The oxidation state of iron i | n met-hemoglobin is: |
| | (1) Three (2) Tw | o (3) Four (4) Zero |
| 59. | $BaTi[Si_3O_9]$ is a class of: | and the second of the second |
| | (1) ortho silicate | (2) cyclic silicate |
| | (3) chain silicate | (4) sheet silicate |
| 60. | The electronic configuration belongs to the same grouvalence shell is: | on of chromium is $4s^13d^5$. The element tungsten (W) p and has atomic number = 74. The configuration of its |
| | (1) $5s^14d^1$ | (2) $6s^15d^5$ |
| | (3) $6s^25d^4$ | (4) $6s^0 5d^6$ |
| 61 | • $\psi_{21(-1)}$ represents: | partial constitution of the many states of the states of t |
| | (1) 2s orbital | (2) 2px orbital |
| | (3) 2py orbital | (4) 2pz orbital |

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62. An operator \hat{A} is said to be Hermitian, if :

(1)
$$\int \psi_1^* \psi_2 \hat{\Lambda} d\tau = \int \psi_2 \psi_1^* \hat{\Lambda} d\tau$$

(2)
$$\int \psi_2^* \psi_1 \hat{A} d\tau = \int \psi_1 \psi_2^* \hat{A} d\tau$$

(3)
$$\int \psi_1^* (\hat{A} \psi_2) d\tau = \int (\hat{A} \psi_1)^* \psi_2 d\tau$$

(4) None of these

63. The selection rules for rotational transitions are:

(1)
$$\Delta J = 0$$
, $\Delta K = 0$

(2)
$$\Delta J = 0, \pm 1$$

(3)
$$\Delta J = 0, \Delta K = 1$$

(4)
$$\Delta J = 0, \pm 1; \Delta K = 0$$

64. Thermal conductivity of a gas is:

(1) Independent of pressure

(2) Viscosity

(3) Temperature

(4) None of these

65. Number of components, number of phases and the degree of freedom in a liquid at its critical point is:

$$(1)$$
 1, 2, 1

$$(2)$$
 0, 1, 2

66. The value of θ for the first order reflection from (100) face is :

67. Total number of vibrations in allyl bromide are:

- (1) 14
- (2) 16
- (3) 18
- (4) 21

68. Which of the following shift leads to the decreased intensity of absorption?

(1) Hypochromic

(2) Hypsochromic

- (3) Hyperchromic
- (4) Bathochromic

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| 69. | Spin inversion of electrons takes place in | n the | processes: | | |
|-------------|--|--------|--|-----|-----|
| | (1) Absorption | (2) | Internal conversion | | |
| | (3) Florescence | (4) | Phosphorescence | | |
| 70. | Which of the following is a limitation of | f Lan | nbert-Beer's law? | | |
| | (1) Scattering of light due to particles | | ** | | |
| | (2) Florescence of sample | | | | |
| | (3) Non-monochromatic radiation | | | | |
| | (4) All of these | | | | • |
| 71. | Which of the following statement is cor | rect, | if: . | | |
| | $K_{sp(AgCl)} > K_{sp(AgBr)} > K_{sp(AgI)}$ | | | | |
| | (1) AgI is more soluble than AgCl and A | AgBı | | | J |
| | (2) AgCl is more soluble than AgBr and | d Ag | e page in the second se | | |
| | (3) AgBr is more soluble than AgCl and | d Ag | * * * | ,** | |
| | (4) None of these | | | | |
| 72 . | Dry ice is used in fire extinguishers. I sprayed on fire, dry ice quickly change | | · · · · · · · · · · · · · · · · · · · | | |
| | (1) Distillation | (2) | Evaporation | | 1.6 |
| | (3) Condensation | (4) | Sublimation | | |
| 73. | The Joule-Thomson expansion of an id | leal g | ras is : | | (77 |
| | (1) an isenthalpic process | (2 | an isentropic process | d. | |
| | (3) an isothermal process | (4 |) adiabatic process | | , |

PG-EE-June, 2023/(Chemistry)/(SET-X)/(D)

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The colloidal solutions are purified by:

(1) Peptization

(2) Dialysis

(3) Coagulation

(4) Flocculation

75. The elastic scattering of photons is called as:

- (1) Atmospheric scattering
- (2) Conserved scattering
- (3) Rayleigh scattering
- (4) Raman scattering

The solubility of a solute is three times as high in the ether as in water. What amount of the solute will be extracted from 100 ml of the aqueous solution by 100 ml of ether in one step?

(1) 80%

(3) 70%

(4) 60%

Choose the *correct* order of bond strength for X-F bond (X = B, C, N & O)?

- (1) $BF_3 > CF_4 > OF_2 > NF_3$ (2) $CF_4 > BF_3 > NF_3 > OF_2$
- (3) $BF_3 > CF_4 > NF_3 > OF_2$ (4) $OF_2 > NF_3 > CF_4 > BF_3$

78. Which of the following conformation is *correct*?

- 79. Which of the following is a non-classical carbocation?
 - (1)

(2) CMe₂

(3)

- (4)
- **80.** Choose the *correct* reaction product from the following transformation:

$$Me_3C \longrightarrow O \qquad LIAIH_4$$

$$(1) \qquad Me_3C \longrightarrow OH \qquad M$$

- **81.** The atomic term symbol for the Helium atom in its ground state is:
 - (1) 3S_1
- (2) ${}^{3}P_{2}$

92%

- (3) 3S_0
- $(4)^{1}S_{0}$

100%

0%

82. Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$ and $H_4P_2O_7$ are respectively:

8%

(1) +3, +5 and +4

(2) +5, +3 and +4

(3) +5, +4 and +3

- (4) +3, +4 and +5
- 83. The basicity of the hydroxides of the following alkali metals is of the order:
 - (1) Li > Na > Rb > Cs

(2) Na > Li > Rb > Cs

(3) Cs > Rb > Na > Li

(4) Rb > Cs > Na > Li

| 84. | The geometry arous | nd the central atom | in <i>Cl</i> | F_4^+ : | Alt . | 3.0 |
|--------------------|-------------------------------------|-------------------------------|--------------|---|-----------------------|------------|
| | (1) square planar | | (2) | square pyrami | dal | |
| | (3) octahedral | | (4) | trigonal bipyra | amidal | |
| 8 <mark>5</mark> . | The number of ant respectively: | i-bonding electron | in N | IO and CO acc | cording to MO | theory are |
| | (1) 1,0 | (2) 2, 2 | (3) | 3, 2 | (4) 2, 3 | |
| 86. | Semiconductors have | ve conduction | on ba | and and | valence band. | |
| | (1) a lightly filled; a | moderately filled | | * | | |
| | (2) an almost filled; | a moderately filled | | . د | | |
| | (3) an almost empty | y; an almost filled | | | 1 / 18/10/ 1 | |
| | (4) an almost filled; | an almost empty | | 8 4 | | |
| 87. | Which of the follow | ing is called 'Pearl a | sh'? | vita. | | 92 |
| | (1) Na ₂ CO ₃ | (2) <i>NaHCO</i> ₃ | (3) | K_2CO_3 | (4) CaCO ₃ | |
| 88. | To which block of the | ne periodic table the | elem | nent with atomi | c number 56 bel | |
| | (1) s-block | (2) p-block | (3) | d-block | (4) f-block | D |
| 89. | C ₆₀ has: | | | agrad See | oi turo 👝 | SF |
| | (1) 14 pentagons an | d 18 hexagons | 3 F | r. a. | cari e | |
| | (2) 12 pentagons an | d 20 hexagons | | | ایه اه دید | |
| | (3) 10 pentagons an | d 20 hexagons | | | ·= 1 | |
| | (4) 12 pentagons an | d 18 hexagons | è | | # 1 P . 14 | |
| PG-EE | -June, 2023/(Chemist | ry)/(SET-X)/(D) | | hiportani, kres | ment it it is a | P. T. O |

- 90. The order of acidity in boron trihalides is:
 - (1) $BF_3 > BCl_3 > BBr_3$
 - (2) $BBr_3 > BCl_3 > BF_3$
 - (3) $BF_3 > BBr_3 > BCl_3$
 - (4) $BBr_3 > BF_3 > BCl_3$
- **91.** Which of the following halides would be most reactive in an SN_2 Reaction?
 - (1) PhCH2CH(Br)CH3
 - (2) PhCH2CH2CH2Br
 - (3) $PhCH(CH_3)CH_2Br$
 - (4) $PhC(CH_3)_2Br$
- **92.** The base assisted formation of glycolic acid from glyoxal is named as:
 - (1) Aldol condensation
 - (2) Rosenmund reduction
 - (3) Cannizaro reaction
 - (4) Knoevenagel condensation
- **93.** Which of the following is anionic detergent?
 - (1) Sodium dodecylbenzene sulfonate
 - (2) Cetyltromethyl ammonium bromide
 - (3) Caustic soda
 - (4) polyethylene glycol stearate

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| 94. | The formation of toluene from p-toluidine requires: | |
|------------|---|----|
| | (1) Acidification followed by hydrogenation | |
| | (2) Acidification followed by reaction with NaBH ₄ | |
| | (3) Diazotization followed by hydrogenation | |
| | (4) Diazotization followed by treatment with H_3PO_2 | |
| 95. | Markovnikof's addition of HCl to propene involves the: | |
| | (1) Initial attack of a chloride ion | |
| | (2) Formation of isopropyl cátion | |
| | (3) Isomerization of 1-chloropropane | |
| , | (4) France 1: - () | |
| | (4) Formation of propyl cation | |
| 96. | Which of the following compounds will give methyl vinyl ketone by Aldo condensation followed by dehydration? | ol |
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| 96. 97. | Which of the following compounds will give methyl vinyl ketone by Aldo condensation followed by dehydration? (1) HCHO and CH ₃ CHO (2) HCHO and CH ₃ COCH ₃ (3) 2 moles of CH ₃ CHO | ol |
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D.

- (1) Dipeplie boli.
- (2) Ionic bond
- (3) Hydrogen bond
- (4) Peptide bond

| | | MISTRY 2 YEAR PG (| | r |
|----------|---|--------------------|---|-----|
| Q. NO. | A | В | С | D |
| 1 | 4 | 4 | 3 | 2 |
| 2 | 4 | 1 | 3 | 3 |
| 3 | 3 | 4 | 4 | 4 |
| 4 | 4 | 4 | 1 | 1 |
| 5 | 1 | 4 | 3 | 1 |
| 6 | 3 | 1 | 2 | 4 |
| 7 | 3 | 4 | 4 | 2 |
| 8 | 1 | 1 | 1 | 1 |
| 9 | 2 | 1 | 2 | 2 |
| 10 | 2 | 3 | 4 | 4 |
| 11 | 2 | 3 | 2 | 3 |
| 12 | 3 | 1 | 3 | 4 |
| 13 | 4 | 2 | 2 | 1 |
| 14 | 1 | 3 | 1 | 2 |
| 15 | 1 | 2 | 2 | 3 |
| 16 | 4 | 1 | 1 | 3 |
| 17 | 2 | 4 | 4 | 1 |
| 18 | 1 | 1 | 1 | 4 |
| 19 | 2 | 3 | 2 | 3 |
| 20 | 4 | 2 | 3 | 3 |
| 21 | 2 | 1 | 4 | 4 |
| 22 | 3 | 2 | 4 | 1 |
| 23 | 2 | 2 | 3 | 4 |
| 24 | 1 | 1 | 4 | 4 |
| 25 | 2 | 2 | 1 | 4 |
| 26 | 1 | 3 | 3 | 1 |
| 27 | 4 | 4 | 3 | 4 |
| 28 | 1 | 1 | 1 | 1 |
| 29 | 2 | 4 | 2 | 1 |
| 30 | 3 | 2 | 2 | 3 |
| 31 | 1 | 2 | 3 | 3 |
| | 2 | 3 | 4 | 1 |
| 32 | 2 | 4 | 1 | 2 |
| 33 34 | 1 | 1 | 2 | 3 |
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| 35 | 2 | 1 | | |
| 36 | 3 | 4 | 3 | 1 4 |
| 37 | 4 | 2 | | |
| 38 | 1 | 1 | 4 | 1 |
| 39 | 4 | 2 | 3 | 3 |
| 40 | 2 | 4 | 3 | 2 |
| 41 | 3 | 3 | 2 | 1 |
| 42 | 3 | 4 | 4 | 2 |
| 43 | 4 | 1 | 1 | 2 |
| 44 | 1 | 2 | 2 | 1 |
| 45 | 3 | 3 | 3 | 2 |
| 46 | 2 | 3 | 2 | 3 |
| 47 | 4 | 1 | 1 | 4 |
| 48 | 1 | 4 | 1 | 1 |
| 49 | 2 | 3 | 3 | 4 |



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| Q. NO. | Α | В | С | D |
|--------|----|---|---|---|
| 51 | 3 | 2 | 1 | 2 |
| | | | | |
| 52 | 1 | 4 | 2 | 3 |
| 53 | 2 | 1 | 2 | 2 |
| 54 | 3 | 2 | 1 | 1 |
| 55 | 2 | 3 | 2 | 2 |
| 56 | 1 | 2 | 3 | 1 |
| 57 | 4 | 1 | 4 | 4 |
| 58 | 1 | 1 | 1 | 1 |
| 59 | 3 | 3 | 4 | 2 |
| 60 | 2 | 3 | 2 | 3 |
| 61 | 2 | 2 | 4 | 3 |
| 62 | 4 | 3 | 1 | 3 |
| 63 | 1 | 1 | 4 | 4 |
| 64 | 2 | 4 | 4 | 1 |
| 65 | 3 | 4 | 4 | 3 |
| 66 | 2 | 2 | 1 | 2 |
| 67 | 1 | 2 | 4 | 4 |
| 68 | 1 | 3 | 1 | 1 |
| 69 | 3 | 1 | 1 | 2 |
| 70 | 3 | 3 | 3 | 4 |
| 71 | 4 | 3 | 2 | 2 |
| 72 | 1 | 3 | 3 | 4 |
| 73 | 4 | 4 | 1 | 1 |
| 74 | | | | 2 |
| | 4 | 1 | 4 | |
| 75 | 4 | 3 | 4 | 3 |
| 76 | 11 | 2 | 2 | 2 |
| 77 | 4 | 4 | 2 | 1 |
| 78 | 1 | 1 | 3 | 1 |
| 79 | 1 | 2 | 1 | 3 |
| 80 | 3 | 4 | 3 | 3 |
| 81 | 2 | 2 | 2 | 4 |
| 82 | 3 | 3 | 3 | 4 |
| 83 | 1 | 2 | 4 | 3 |
| 84 | 4 | 1 | 1 | 4 |
| 85 | 4 | 2 | 1 | 1 |
| 86 | 2 | 1 | 4 | 3 |
| 87 | 2 | 4 | 2 | 3 |
| 88 | 3 | 1 | 1 | 1 |
| 89 | 1 | 2 | 2 | 2 |
| 90 | 3 | 3 | 4 | 2 |
| 91 | 3 | 4 | 3 | 2 |
| 92 | 4 | 4 | 1 | 3 |
| 93 | 1 | 3 | 2 | 1 |
| 94 | 2 | 4 | 3 | 4 |
| 95 | 3 | 1 | 2 | 4 |
| 96 | 3 | 3 | 1 | 2 |
| 97 | 1 | 3 | 4 | 2 |
| 98 | 4 | 1 | 1 | 3 |
| 99 | 3 | 2 | 3 | 1 |
| 100 | 3 | 2 | 2 | 3 |

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