B.A. / B.Sc. SEMESTER 6 EXAMINATION, 2021
FAKIR CHAND COLLEGE CENTRE (551)

INSTRUCTIONS FOR CANDIDATES

READ ALL THE INSTRUCTIONS CAREFULLY BEFORE WRITING ANSWERS

1. Total **TIME OF EXAMINATION: 2 HOUR**
2. **Question Paper Comprises Of Four Separate Questions – CC13 (10 Marks), CC14 (10 Marks), DSE-A3 (10 Marks) And DSE-B3 (10 Marks). Candidates Must Have To Answer All The Four Question papers Separately And Have To Prepare Four pdf Files.**
3. **In The Answer Script Only Question Number & Correct Option To Be Mentioned. No Need Of Writing The Whole Answer.**
4. **ANYONE PREVIOUS SEMESTER ADMIT CARD As The Last Page Of Each pdf File**
5. **University Roll Number must be there in each pdf file name**
6. Use Only **WHITE PLAIN A4 PAPERS** For Writing Answers
7. Use **ONLY BLACK INK** For Writing Your Answers
8. Give **A TOP PAGE** With Clear Mention Of University **REGISTRATION NO. AND UNIVERSITY ROLL NO.** Of Anyone Previous Semester
9. Give **AT LEAST 1CM MARGINS** In All The Four Sides Of Each Page

2021
B.A./B.Sc. Semester 6 Examination
University of Calcutta
CHEMISTRY – HONOURS
INTERNAL EXAMINATION
Paper : CC13
F.M. – 10

FAKIR CHAND COLLEGE CENTRE (C551)

Choose the correct option in each case and report (no need to write the answer in sentence): **1x10**

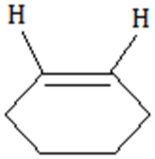
1. Identify the structure of the compound having empirical ratio Cr : NO : η^5-C_5H_5 = 1 : 2 : 1
   a) Monomeric b) Dimeric c) Trimeric d) None of these

2. Arrange the following compounds in order of stretching frequency of CO ($\bar{\upsilon}_{C\text{-}O}$ cm^{-1})
   $F_3Si – Co(CO)_4$ (I) $Cl_3Si – Co(CO)_4$ (II) $H_3Si – Co(CO)_4$ (III)
   a) I>II>III b) II>III>I c) III>I>II d) III>II>I

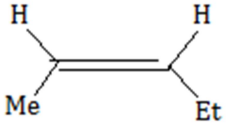
3. Which of the following statement is incorrect
   a) The Pt – Cl bond trans to C_2H_4 moiety is longer than the other two Pt – Cl bond.
   b) The electrophilic substitution reaction of Ferrocene is much faster than benzene.
   c) The H- atoms in C_2H_4 moiety are in the same plane containing two carbon atoms.
   d) Ferricinium ion is more stable than Ferrocene.

4. Among the following complex ions which one is maximum $\bar{\upsilon}_{M–C}$ stretching frequency?
   a) $Mn(CO)_6$ b) $Cr(CO)_6$ c) $W(CO)_6$ d) $Re(CO)_6$

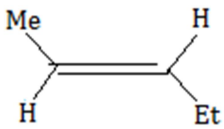
5. Arrange the rate of hydrogenation of alkene using Wilkinson catalyst of the following compounds



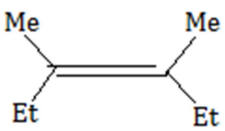
I



II



III



IV

   a) IV>III>II>I b) I>II>III>IV c) III>IV>II>I d) II>I>III>IV

6. Deoxy -hemocyanin is
   a) Diamagnetic with both Copper atoms in Cu(I) state
   b) Diamagnetic with both Copper atoms in Cu(II) state
   c) Paramagnetic with both Copper atoms in Cu(I) state
   d) Paramagnetic with one Copper atoms in Cu(I) state and the other Copper atom in Cu(II) state

7. The oxygenation of haemoglobin is autocatalytic due to
   a) Polymeric nature of haemoglobin
   b) Cooperative interaction between the heme groups
   c) Steric effects in the structure of haemoglobin
   d) Presence of two α and two β peptide chains in haemoglobin

8. Clotting of blood is influenced by the presence of
   a) Mg^{2+} ions
   b) K^{+} ions
   c) Ca^{2+} ions
   d) Na^{+} ions

9. A metal ion can be precipitated as its sulphide
   a) If the ionic product $[M^{2+}]\,[S^{2-}]$, is greater than the solubility product
   b) If the ionic product $[M^{2+}]\,[S^{2-}]$, is smaller than the solubility product
   c) By maintaining the concentration of H^{+} ions
   d) By suppressing the dissociation of H_2S

10. While performing the confirmatory test for the detection of phosphate radical using ammonium molybdate reagent, the appearance of a canary yellow precipitate is due to the formation of
   a) $NH_4[PMo_6O_{20}]$
   b) $NH_4[PMo_{15}]$
   c) $(NH_4)_2[PMo_6O_{20}]$
   d) $(NH_4)_3[PMo_{12}O_{40}]$

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Choose the correct answer in each case: 1×10

1. In which condition Beer's law is not applicable – a) light is in visible range b) light is monochromatic c) colourless solvent used d) solute is dissociated.

2. What will be the effect of addition of NaCl on the rate of $K_2S_2O_8$ and KI reaction?
   a) Rate constant will increase b) Rate constant will decrease c) Rate constant will remain constant d) Rate constant will increase only when temperature will increase

3. What is the unit of molar extinction coefficient?
   a) Litre^{-1} mol cm^{-1} b) Litre mol^{-1} cm^{-1} c) Litre mol^{-1} cm d) Litre^{-1} mol^{-1} cm^{-1}

4. The relative surface tension of 10% aqueous NaCl solution with respect to pure water at a particular temperature is
   a) = 1 b) < 1 c) ≈ 10 d) >1

5. The frequency of transition of a rigid rotator in wave number unit from J = 1 to J = 2 level is
   a) $2\overline{B}$ b) $4\overline{B}$ c) $\overline{B}$ d) $6\overline{B}$

6. The selection rule for vibrational rotational transition of NO is
   a) $\Delta v = \pm 1$ b) $\Delta J = \pm 1$ c) $\Delta v = \pm 1$ & $\Delta J = \pm 1$ d) $\Delta v = \pm 1$, $\Delta J = 0, \pm 1$

7. The P-branch absorption in vibrational-rotational spectra of a molecule was observed for transition
   a) $\Delta v = +1$, $\Delta J = -1$ b) $\Delta v = +1$, $\Delta J = +1$ c) $\Delta v = \pm 1$, $\Delta J = -1$ d) $\Delta v = +1$, $\Delta J = 0$

8. Symmetric stretching mode of vibration in CO_2 molecule is
   a) Raman inactive but IR active b) Raman active but IR inactive c) Raman inactive and IR inactive d) Raman active and IR active

9. Which one is not related with colloids?
   a) Peptization b) Brownian motion c) Polarizability d) Tyndall effect

10. Clausius Mosotti equation can be well applied for
    a) HCl b) CH_4 c) H_2O d) CH_3Cl

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F.M. – 10

FAKIR CHAND COLLEGE CENTRE (C551)

Choose the correct option in each case and report (no need to write the answer in sentence): **1x10**

1. The fundamental structural unit of tarpene is-

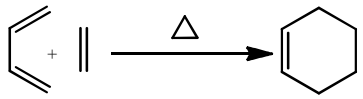
a) Neoprene b) Isoprene c) butadiene d) ethylene

2. Functional group present in citral-

a) ketone b) aldehyde c) amine d) acid

3. Example of bio-catalyst-

a) enzyme b) vitamin c) lipid d) none of these

4. 

Atom economy percentage of the above reaction is

a) 50% b) 80% c) 90% d) 100%

5. Source of reserpine is

a) Rauwolfia b) Cinchona bark c) Opium poppy plant d) *Duboisia hopwoodii*

6. Which of the following reactions are least atom economical?

a) Elimination Reaction b) Addition Reaction c) Substitution Reaction d) Rearrangement Reaction

7. Which of the following is most harmful?

a) Bhopal gas tragedy b) Flexborough disaster c) Minamata Disease d) Itai-Itai Disease

8. In your opinion which of the following is the best in Green experiments?

a) Using water as solvent b) using ethanol as solvent c) using ionic liquids as solvent

d) solvent-free reactions

9. In a chemical reaction the requirement of energy can be kept to a minimum by using

a) microwave irradiation b) sonication c) photochemical activation d) Thermal activation

10. In your consideration which one is most important green solvent?

a) Ionic liquids b) Water c) PEG d) Fluoro solvents

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F.M. – 10

FAKIR CHAND COLLEGE CENTRE (C551)

Choose the correct option in each case and report (no need to write the answer in sentence): **1x10**

ANSWER ANY TEN

1. Gutta Parcha is an example of

   a) syndiotactic polymer b) isotactic polymer c) atactic polymer d) none of these

2. PMMA is a

   a) periodic copolymer b) stereoblock copolymer c) homopolymer d) alternating copolymer

3. Buna-N is

   a) an elastomer b) a fiber c) a thermosetting polymer d) a thermoplastic polymer

4. How many types of addition polymerization are there?

   a) 1 b) 2 c) 3 d) 4

5. In condensation polymerization the number of monomers must be

   a) Two or more b) Three or more c) Two d) Three

6. PDI value of all natural polymers is

   a) 0 b) 1 c) 2 d) 3

7. Number average molecular weight can be determined by

   a) osmotic pressure measurement b) freezing point measurement c) melting point measurement d) all of these

8. The WLF Equation is:

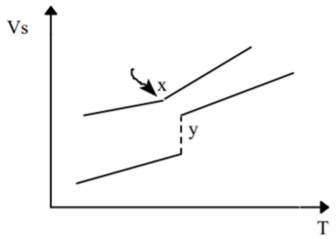
   a) A four-parameter model for stress relaxation.

   b) An expression for the shift factor that is used in the time-temperature superposition principle.

   c) The relationship between intrinsic viscosity and molecular weight.

   d) None of the above

9. Consider the two transitions from the “solid” to the liquid or rubbery state shown below on a plot of specific volume vs. temperature;



a) The transition X is a T_g while transition Y is a crystalline melting point.

b) Y is the T_g while X is the T_m.

c) X and Y are melting points, but X is the T_m of a semi-crystalline material and Y is the T_m of an almost perfect crystal.

d) All the above three

10. In Flory-Huggins concept

a) Small solute molecule dissolved in small molecule solvent

b) b) large solute molecule dissolved in small molecule solvent

c) c) Small solute molecule dissolved in large molecule solvent

d) d) large solute molecule dissolved in large molecule solvent

11. Molecular weight of PVP in water can be determined by

a) Drop weight method b) Viscometer c) Stalagmometer d) Differential scanning calorimeter (DSC)

12. The degree of crytalinity depends on

a) Crystal preparation and processing techniques

b) Impurity and fillers present in it

c) Strain-induced crystallization, size and structure

d) All of the above