RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR B.A./B.SC. SECOND SEMESTER (January – June) 2014 Mid-Semester Examination, March 2014

Date : 24/03/2014 Time : 11 am - 1 pm INDUSTRIAL CHEMISTRY (Honours)

Paper : II

Full Marks : 50

[Use a separate Answer Book for each group]

<u>Group – A</u>

<u>Unit – I</u>

(Answer <u>any two</u> of the following)

- 1. a) Justify the observation with proper mechanism that addition of bromine to maleic acid gives $d\ell 2$, 3- dibromosuccinic acid whereas addition of bromine to fumeric acid gives meso-2, 3dibromosuccinic acid.
 - b) The typical reactions of alkenes are electrophilic addition reactions, whereas the reactions of benzene ring are electrophilic substitution reactions. Explain why? [3+2]
- 2. a) How do you carry out the following conversion? $H_3CCH_2C \equiv CH \longrightarrow CH_3CH_2CH_2CHO$
 - b) Discuss the addition of HBr to 2-methylpropene in presence of dibenzoyl peroxide. Predict the product with proper mechanism. [2+3]
- 3. a) Discuss the general mechanism of electrophilic aromatic substitution. Give evidence in favour of the fact that the electrophilic aromatic substitution reactions occur not by a concerted mechanism but by a stepwise mechanism of which the first step is the rate determining step.
 - b) Phenol undergoes nitration reaction faster than benzene and gives mainly o- and p- nitrophenol. Explain briefly with the help of intermediate σ -complexes. [2¹/₂×2]

<u>Unit – II</u>

(Answer <u>any one</u> of the following)

- 4. a) Give IUPAC name to each of the following :
 - i) $K_3[Fe(CN)_5(CO)]$
 - ii) $[Pt(Py)_4][PtCl_4]$
 - b) What do you mean by ambidentate ligands? Give an example of a complex compound where such ambidentate ligand has been used.
 - c) Write down the structure for different isomers of $[Co(NH_3)_3Cl_3]$. [2+2+1]
- 5. a) Discuss how hardness of water can be estimated using EDTA?
 - b) Show that overall stability constant of a complex ML_6 can be written as a product of stepwise stability constants. [3+2]

<u>Unit – III</u>

(Answer <u>any two</u> of the following)

- 6. a) Can the quantum efficiency be greater than 1? Explain.
 - b) After some time why the quantum yield of HI decomposition reaction decreases from 2. [2+3]
- 7. a) Photolysis of acetaldehyde is given below. $CH_3CHO \xrightarrow{hv} CH_3 + CHO$

$$CH_{3} + CH_{3}CHO \xrightarrow{k_{2}} CH_{4} + CH_{3}CO$$

$$CH_{3}CO \xrightarrow{k_{3}} CO + CH_{3}$$

$$CH_{3} + CH_{3} \xrightarrow{k_{4}} C_{2}H_{6}$$
Show that $\frac{d[CO]}{dt} = k_{2} \left(\frac{I_{abs}}{2k_{4}}\right)^{\frac{1}{2}} [CH_{3}CHO].$

- b) Calculate the energy of one photon of light of wavelength 2500Å.
- 8. a) Explain that zero-th order reaction must be multistepped.
 - b) For the reaction $2NO+Cl_2 \rightarrow 2NOCl$, it was found that on doubling concentration of both the reactants, the rate increases eightfold. But on doubling the concentration of chlorine alone, rate only doubles. What is the overall order? [2+3]

[4+1]

<u>Unit – IV</u>

(Answer <u>any one</u> of the following)

- 9. a) Explain why NMR signals are weak?
 - b) Give reasons behind using TMS as reference in NMR studies.
 - c) PMR spectrum of n-propanol shows signals at 9·1τ, 8·40τ, 6·4τ& 7·7τ. Identify the peaks. Give reasons.
 [1+2+2]
- 10. Explain from potential energy consideration why the peak for methyl protons of CH₃OH split into a multiplet? Explain the nature of the multiplet. [5]

<u>Group – B</u>

(Answer <u>any four</u> of the following. Each carries <u>5 marks</u>)

11. Explain in a few sentences he meaning of **any five** of the following :

a) Accuracy	b) Error	c) Repeatability	d) Linearity	e) Drift
f) Sensitivity	g) Fidelity	h) Speed of Response		

- 12. Name three types of Panels and explain with a diagram any one of them.
- 13. Name five inferential methods of Level Measurement and describe any one.
- 14. Compare the advantages and disadvantages of the orifice plate and Venturi Tube flow measuring devices.
- 15. Answer any three of the following :
 - a) State Kirchhoffs Laws
 - b) Explain Thevenins Theorem
 - c) State Maximum Power Transfer Theorem
 - d) Explain Superposition Theorem
- 16. Two cells are connected in parallel and supply a circuit having a resistance of 1 ohm. Their emfs are 2.05v and 2.15v and their internal resistances are 0.05 and 0.04 ohms respectively. Calculate the current in each cell.
- 17. Draw a neat sketch of a d.c generator and lable the parts.
- 18. A short shunt compound generator delivers a load current of 30A at 220V and has armature, series field, and shunt field resistances of 0.05Ω , 0.03Ω and 200Ω respectively. Calculate the induced emf and the armature current. Allow 1 V per brush for contact drop.

80^余Q