RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

THIRD YEAR

B.A./B.SC. FIFTH SEMESTER (July – December), 2012

Mid-Semester Examination, September 2012

Date : 10/09/2012 **INDUSTRIAL CHEMISTRY (Honours)**

Time : 2 pm – 4 pm Paper : V Full Marks : 50

[Use Separate Answer Script for each Group]

Group – A

Unit - I

1. Define following terms (**any three**) : [3×1]
   a) Api Gravity
   b) Cloud and Pour point
   c) Diesel Index
   d) Sit
   e) Detonation

Unit – II

2. Answer **any three** : [3×3]
   a) What is reforming of petrol? How does reforming increase Octane number? Give any two reforming reactions.
   b) What is meant by knocking? How is it related to chemical constitution? Describe the function of TEL?
   c) Name the various fractions obtained in fractional distillation of Crude oil. Give composition by weight of cheical elements present in Crude Petroleum.
   d) How do you calculate the following thermal properties of petroleum.
      i) Thermal conductivity
      ii) Specific Heat
      iii) Heat of combustion
   e) Give the names of major Petro chemical companies in India. Give the projection of petrochemical companies in terms of turnover in India by 2012?

Unit – III

3. Answer **any two** : [4×2]
   a) What is meant by cracking of petroleum? Explain fludized bed catalytic method of obtaining gasoline? Explain its mechanism.
   b) Outline the steps involved in the distillation of crude oil? Give a sketch of crude distillation unit and also give a flowsheet of the desalting process.
   c) What is viscosity index? How viscosity and viscosity index are interrelated? How is viscosity index of oil measured? How to increase viscosity index of oil?
   d) A petrol contins 80% carbon and 20% hydrogen by weight. It has flue gas compositional data by volume as under :
      Carbon di oxide = 12·1%, carbon monoxide = 1·1%, oxygen = 1·3%, nitogen = 85·5%
      Calculate—
      i) Minimum air for complete combustion of 1kg petrol
      ii) Actual air supplied per kg of petrol
      iii) Calorific values of the petrol sample

Group – B

4. Write notes on **any five** with example where possible : [5×2]
   a) Mutagens
   b) LD_{50}
   c) Acid Rain
   d) Synergy
   e) Ozone hole
   f) Global warming
   g) $PM_{2\cdot5}$
   h) Green Economy

Group – C

(*Answer **any two** questions*)

5. What is oleum? Calculate equivalent H_2SO_4 content of 20 percent oleum. 1000 kg of pure naphthalene is sulfonated to 1,2-Naphthalene di sulfonic acid with 20 percent oleum. Calculate the theoretical quantity of equivalent sulfuric acid required for the reaction. Compute the quantity of reaction water generated. [1+1+3]

6. Write all the steps of reactions involved when Tetranitro methane is synthesised frm Acetylene in an ordnance Factory an attempt is made to produce TNT by one-step Nitration by a mixed Acid of under mentioned composition (Percent by mass) :
   HNO_3 - 25, H_2SO_4 - 55, H_2O - 15, Nitrobody - 5
   Calculate the theroetical value of DVS. Comment wheather such attempt is feasible or otherwise. [2+3]

7. Give three examples of commercial sulfonation (with equation) and uses of each in commerce and industry.
   Discuss materials of construction of equipments for industiral sulfonation [3+2]

8. Describe how Linear Alkyl Benzene Sulfonate (Acid slurry) is manufactured from Kerosene Alkylate.
   Illustrate how branded detergent powder of the types, "Surf" or "Tide", etc, are manufactured from Acid slurry. [3+2]

Group – D

(*Answer **any four** questions*)

9. What is the difference between dihedral angle and tortional angle? Give example. [2½]

10. What is the stablest conformer of 1, 2-ethanediol and why? [2½]

11. 1,2-dibromoethane contains 85% anti-conformer in gaseous phase but proportion of anti-conformer decreases in solution, why? [2½]

12. The energy bariers in ethyl halides (CH_3CH_2X, X = F, Cl, Br, I) are remarkably similar in magnitude despite considerable difference in the size of the halogens, why? [2½]

13. Draw the energy diagram of propane considering the $C_1 - C_2$ bond rotation, and specify the names of conformers. [2½]