RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

THIRD YEAR B.A./B.SC. FIFTH SEMESTER (July – December) 2014 Mid-Semester Examination, September 2014

: 15/09/2014 Date

INDUSTRIAL CHEMISTRY (Honours) Paper : V

Time : 2 pm – 4 pm

Full Marks : 50

[Use a separate answer book for each group]

Group – A

- Define the following terms (any three) : 1.
 - a) API gravity
 - b) Aniline Point
 - c) Diesel Index
 - d) SIT
 - e) Detonation

2. Answer any three :

- a) Name the various fractions obtained in fractional distillation of crude oil. Give composition by weight of chemical elements present in crude oil. [2+2]
- b) Distinguish between Diesel fuel and gasoline fuel. What is LPG? Differentiate between LPG and natural gas. [2+2]
- c) What is meant by reforming of Petrol? How does reforming increase octane number. Give one example of reforming reaction. [1+2+1]
- d) Define octane number and cetane number. What is the significance of octane number and cetane number for which these are used? [2+2]
- e) How do you calculate the following thermal properties of petroleum? [1+1+1+1]
 - Latent heat of vaporization i)
 - ii) Thermal conductivity
 - iii) Heat of combustion
 - iv) Specific heat

<u>Group – B</u>

(Answer Question No. 3 and any one from the rest)

1000kg dry benzene is nitrated to mononitrobenzene. Mononitrobenzene is recovered by steam 3. distillation. The composition of mixed acid is as under:

	(kg)
Fuming HNO ₃	970
98% H ₂ SO ₄	1485
Nitrobody	30
Water	100

Calculate (i) DVS of the mixed acid assuming R = 0.90 (as set in process)

(ii) % composition of the spent acid mixture left in reactor after removal of mononitrobenzene. [5+5]

[3×4]

[3×1]

- a) Distinguish between processes of "Sulfonation" and "Sulfation" with examples. 4.
 - b) Outline synthesis and use of
 - i) Sodium cyclohexyl sulfamate
 - ii) Dioctyl Sulfosuccinate (Igipon T)
- a) Give examples with chemical equations where HOCl (its derivative), COCl₂, and SOCl₂ are used as 5. chlorinating agents in replacement reactions.
 - Discuss about materials of construction of reaction vessels suitable for halogenation process. [3+2]b)
- Describe with sketch the Biazzi Process for continuous Nitration of glycerine. State one use (other than 6. explosive) or trinitroglycerine. [5]

- 7. Write short notes on (any two):
 - a) Bhopal
 - b) Treatment of waste water
 - c) Green house gases
 - d) Vehicular pollution

<u>Group – D</u>

8. (a) Draw the potential energy curve for *n*-propane molecule and discuss about the relative stability of the conformations? [3]

Or

- (b) i) Write the most stable conformation for 1-chloro ethane-2-ol and explain the reason for stability.
- ii) What is torsion angle? $[1\frac{1}{2} + 1\frac{1}{2} = 3]$
- 9. (a) What do you mean by Cs pathway of inversion of cyclohexane chair form —explain with diagram. [3]

Or

- (b) i) Explain 1,3 diaxial interaction for 1,3 dimethyl cyclohexane and draw the most stable conformation.
- ii) What is banana bond?

10. Answer any two.

- i) 1,4 cyclohexane diol is more stable in its boat conformation —explain.
- ii) cis-4-t-butylcyclohexyl tosylate undergoes solvolysis at a faster rate than the corresponding trans isomer. How can you account for this fact?
- iii) When 4-isopropyl cyclohexanone is treated with LiAlH₄, the axial alcohol is found to be major — explain.

[1+2+2]

[2×5]

[2 + 1 = 3]

[2+2=4]