Roll No.	2	0	1	5	0	4	1	1	1	5

B. Tech. Second Semester (CE & EC)
Major paper Examination 2015-16

Subject Code : BAS-09 **Subject Name** : Engineering Chemistry

Time: 03 Hrs. **Max. Marks:** 40

Note: *Attempt all questions.*

Q1. Attempt any three of the following questions. Q.1 (a) is compulsory.

(a) Explain: i) bivariant, ii) univariant and iii) invariant system in the phase diagram of water. (4)

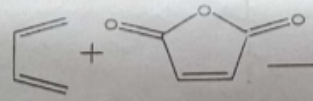
(b) Discuss the difference between nematic and smectic liquid crystal with example. (3)

(c) Discuss the following type of cubic structure: i) simple cubic, ii) body-centred cubic and iii) face- cantered cubic. (3)

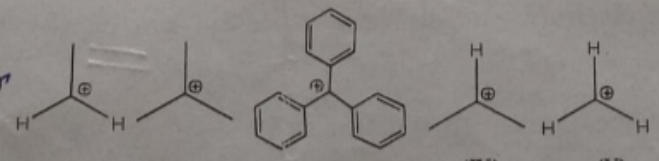
(d) Give molecular orbital diagrams and calculate the bond order of HF and CO. (3)

Q2. Attempt any three of the following questions. Q.2 (a) is compulsory.

(a) Complete reactions (A) and explain. In part (B) arrange I, II, III, IV and V into decreasing order in term of carbocations stability and explain. (4)

(A)  Product

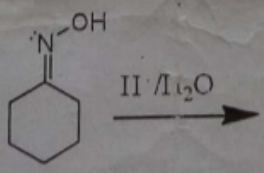
buta-1,3-diene furan-2,5-dione

(B) 

(I) (II) (III) (IV) (V)

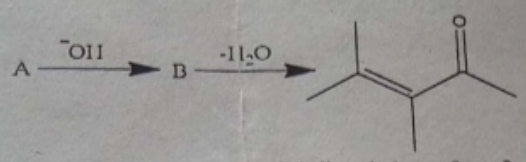
(b) What is dihedral angle? Draw the energy diagram of butane conformation in respect to dihedral angle from 0°C - 360°C. (3)

(c) Complete this reaction with mechanism (3)



Product

(d) Find A and B, explain with suitable mechanism. (3)



3,4-dimethylpent-3-en-2-one

Q3. Attempt any three of the following questions. Q.3 (a) is compulsory.

(a) What are the characteristic of good fuels? 0.98g weight of fuel contains 90% of C and 8% of H. The bomb calorimeter details are: amount of water = 1450g; water equivalent of the calorimeter = 450g; rise in temperature of water = 1.8°C; latent heat of steam = 587cal/g and specific heat of water = 1cal/g. Calculate the **HCV** and **LCV**. (4)

(b) Write an explanatory note on conducting polymers with examples. (3)

(c) Draw the flow diagram of Portland cement manufacturing by rotary kiln technology. Also write the chemical reaction involve in formation of clinker. (3)

(d) Synthesis of poly-methylmethacrylate (PMMA) by using free radical polymerization with mechanism. (3)

Q4. Attempt any three of the following questions. Q.4 (a) is compulsory.

(a) List all the electronic transitions possible for (a) CH_4, (b) CH_3Cl, (c) $H_2C{=}O$ and (d) $H_2C = CH_2$. (4)

(b) Give the applications of IR spectroscopy. (3)

(c) What do you understand by the position of the signal in a NMR spectrum? How many ^{1}H-NMR signals are expected in the following compound: (a) CH_3-CH_2-CH_3, (b) $CH_2{=}CH_2$, (C) $(CH_3)_2C{=}O$ and (d) C_6H_5-CH_3.

(d) What do you mean by water softening? Explain the lime – soda process for water softening.