F-Y. B. pharm (Regular + Re Exam) CBGS (Sem I)
Sub: POC Date 10/12/2013

Con-code 9 - IP
Con. 10073–13.

NJ– 8368

(3 Hours) **[Total Marks : 70**

N.B.: (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

Q1a. Explain the following terms: (5)
i) Electronic configuration
ii) Heterogeneous catalyst.
iii) Transition state
iv) Bonding orbital
v) Electron donor acceptor complex

Q1b. Answer the following questions: (10)
i) Give reaction coordinate diagram for SN^1 reaction.
ii) Rate constant for a reaction is 0.556 s^{-1}. How long will it take to complete 90% of the reaction?
iii) Draw Lewis structure for N_2H_4. Calculate the formal charge on N.
iv) Identify the symmetry elements in an MH_3 system.
v) State the hybridization involving d-orbitals seen in organometallic compounds.

Q2a. Explain primary isotope effect with suitable example. (2)
Q2b. Write a note on electrophilic catalysis. (2)
Q2c. With the help of a suitable example, explain the concept of a three centre- two electron bond. (3)
Q2d. Complete the following sentences: (4)
i. Isotope effect $k_H/k_D > 1$ is called as ..... and $k_H/k_D < 1$ is called as .....
ii. The following reaction is a example of ..... catalysis:

iii. As more chlorines attach to CH_4, the molecular dipole ....., though the number of bond dipoles .....
iv. Group electronegativity of an alkenyl is ..... than that of an alkynyl group.

Q3a. Explain- For a first-order process, the half-life does not depend on initial concentration of reactant. (2)
Q3b. Explain use of Eyring's plot for the determination of activation parameters. (3)
Q3c. Represent the molecular orbitals of a planar methyl fragment using a Walsh diagram. Identify the HOMO and the LUMO for the same. What is the preferred geometry for this fragment? (3)
Q3d. Explain how the group orbitals of an MH_2 system can be used to account for formation of singlet carbene. (3)

Q4a. Write a note on metal ion catalysis. (2)
Q4b. Explain various methods to follow fast kinetics. (3)
Q4c. Compare and contrast between MOT and VBT. (3)
Q4d. Discuss any three rules of QMOT giving suitable examples. (3)

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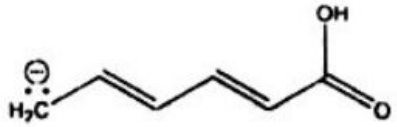
Q5a. Explain why alkenes are more polarizable than alkanes. (1)
Q5b. The specific reaction rate of a chemical reaction at 273 K and 300 K are 2.56×10^{-5} sec^{-1} and 15.8×10^{-4} sec^{-1}. Calculate the energy of activation ($R = 8.314\ JK^{-1}mol^{-1}$). (2)
Q5c. Draw resonating structures for the given molecule. Indicate the most stable structure.



(2)
Q5d. With the help of a suitable example of a reactive intermediate, explain the MOT version of "hyperconjugation effect". (3)
Q5e. What are charge transfer complexes? Discuss their applications. (3)

Q6a. Sulphonation of naphthalene with sulfuric acid gives 1-naphthalenesulphonic acid at 80°C and 2-naphthalenesulphonic acid at 160°C. Explain the underlying principle. (2)
Q6b. Bromination is more selective than chlorination of alkanes. (2)
Q6c. Explain the formation of water molecule and the bond angles therein using hybridization theory. (3)
Q6d. Write a note on specific acid catalysis/ general base catalysis. Explain correlation graphs for reaction rates with acidity function. (4)