Please check whether you have got the right question paper.

N.B: 1.   All questions are compulsory.

2.   Answer all sub questions together.

3.   Figures to right indicate full mark.

Q.1 a)   **Explain the terms (Any 5)**   5
i) Quantum numbers   ii) Rate law
iii) HOMO   iv) catalyst
v) Transition state   vi) Formal charge

b)   **Fill in the blanks.**   5
i) The rate constant for the first order reaction is………….if its half-life is one hour.
ii) The dipole moment for NH_3 is…………… than NF_3.
iii) Lewis structure for CO_3^{-2} is………………..
iv)The geometry for PCl_5 is…………………… as per hybridization concept.

v) Tetralkyl ammonium bromide is an example of………………….. catalyst

c)   **Match the following**   5

| Column A	Column B
1. Starch-iodine complex	Octahedral
2. Cr valence electrons (At.No.24)	charge transfer complex
3. BF_3	sp^2 hybridization
4. Water	specific acid
5. SF_6	$3d^4 4s^2$

Q.2 a)   Draw resonating structures for :   2
i) CH_3COO^- ii) NO_2^-

b)   Draw the molecular orbital diagram for ethane   3
c)   Define: primary isotope effect, Secondary isotope effect. State any one example to explain the concept   3
d)   Enlist various types of catalysis and explain electrophilic catalysis   3

Q.3	a)	Elaborate on group orbitals of planar methyl by drawing molecular orbitals	3
	b)	Represent molecular orbitals of water molecule and clearly indicate where lone pairs on oxygen are sitting?	
	c)	State Arrhenius rate law. Explain each term involved in it.	3
	d)	For a first order reaction calculate time required to complete 90% of the reaction if its half-life is 3hours.	2

Q.4	a)	Give strengths and weaknesses of Molecular orbital theory	3
	b)	State and explain any three rules for QMOT	3
	c)	Enlist various methods to follow fast kinetics and explain any one method	3
	d)	Add a note phase transfer catalysis	2

Q.5 a) Draw the resonating structure for the given molecule. Indicate the most stable structure   3
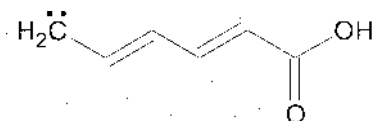
	b)	Explain the formation of carbanion by molecular orbital theory	3
	c)	The specific reaction rate at 273 K and 300 K are 2.56 x10^{-5} sec^{-1} and 15.8 x10^{-4} Sec^{-1}. Calculate the energy of activation (R= 8.314 JK^{-1}mol^{-1})	2
	d)	What are charge transfer complexes? Discus their applications	3

Q.6 a) Complete the following table on the basis of hybridization concept   3

Molecule	Hybridization state of the underlined atom	Bond angle
$\underline{S}F_6$		
$H_2\underline{O}$		
$\underline{C}$ in Ethylene		

	b)	Write a note on specific base catalysis	4
	c)	State and explain reactivity and selectivity principle	2
	d)	`Sulfonation of naphthalene at 80°C gives naphthalene-l -sulfonic acid and at 160°C gives naphthalene-2-sulfonic acid'- State clearly name of kinetically controlled product and thermodynamically controlled product in above reaction	2