Name: Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

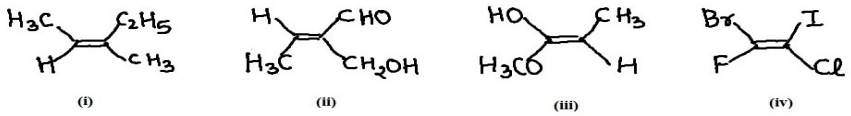
Course: B.Sc.(H) Chemistry **Semester: II**
Program: Organic chemistry-I **Time 03 hrs.**
Course Code: CHEM 1005 **Max. Marks: 100**

Instructions: Attempt all the questions

SECTION A

S. No.		Marks	CO
Q 1	Explain the mechanism of Friedel Craft alkylation and Friedel Craft acylation.	4	CO4
Q 2	Define the relative configuration with suitable examples.	4	CO2
Q 3	Compare aromaticity, anti-aromaticity and non-aromaticity.	4	CO4
Q 4	What are electrophiles? Explain in detail with examples.	4	CO1
Q 5	Give two methods to differentiate pentane from 2-pentene.	4	CO3

SECTION B

Q 6 (i)	Arrange the following compounds in order of decreasing activity towards electrophilic substitution: C_6H_5OH, $C_6H_5NO_2$, C_6H_6, $C_6H_5CH_3$, $C_6H_5OCH_3$	5	CO4
(ii)	Assign E and Z notations in the following compounds:  (i) (ii) (iii) (iv)	5	CO2
Q 7	Define racemization and method of resolution with suitable examples.	10	CO2
Q8 (i)	An organic compound 'A' having molecular formula C_8H_9Br produces a hydrocarbon 'B' with molecular formula C_8H_8 on treatment with alc. KOH. 'B' decolorizes bromine water in CCl_4 to form 'C'. 'C' reacts with $NaNH_2$ to form 'D', which gives white precipitates with ammonical silver nitrate and red precipitates with ammonical cuprous chloride. Give the structural formulae of 'A', 'B', 'C' and 'D'. Also, explain the reactions involved.	6	CO3
(ii)	An alkane with m.w. 114 formed only one substitution product. Suggest the structure of alkane. Also, mention all the isomers of the alkane.	4	CO3
Q9	(i) Cyclopropane and cyclobutane is less stable while higher members of the same class are highly stable. Why? Explain in detail. (ii) What happens when n-butyl chloride reacts with alcoholic KOH? Discuss the	10	CO3

	mechanism. OR Why are alkenes more reactive than alkynes towards addition reactions? Discuss the mechanism of the addition of Br_2 and HCl on propene. Also, discuss the stereochemistry of addition on Br_2 on propene.		
	SECTION-C		
Q10 (i)	Arrange the following with reasoning: a. n-heptane, 2-methyl hexane, 3,3-dimethylpentane (decreasing order of boiling point) b. n-pentane, n-hexane, n-heptane (increasing order of melting point) c. ethane, ethene, ethyne (increasing order of reactivity)	**2+2+2**	**CO3**
(ii)	Explain various reactions of aromatic electrophilic substitution reactions.	**4**	**CO4**
(iii)	Define aromaticity in three membered and five membered ring system.	**10**	**CO4**
Q 11(i)	Convert: a. 1,4-dichlorobutane into cyclohexane b. Ethane into mesitylene. c. 2,2-dibromopropane to 2-hexyne. d. Malonic ester to cyclobutane. OR Complete the following: $a.¿¿$ $b.CH_3-C\equiv CH\ HOCl(¿\ excess)$ c. CH_2=CH-COOH + HBr $\rightarrow$ d. $CH_3-C\equiv CH+C_2H_5MgBr\rightarrow$ e.  + $Br_2\rightarrow$ f. $BrCH_2-CH_2-CH_2Br+Na\rightarrow$	**12**	**CO3**
(ii)	Explain why? a. Toluene shows o,p- directing influence in electrophilic substitution reactions.	**8**	**CO1**

	b. Phenoxide ion is more stable than phenol. c. Maleic acid is stronger acid than fumaric acid. d. Aniline is considered as a weak base. OR Explain why? a. Chlorobenzene has strong withdrawing Cl group but shows o,p-directing nature. b. Alcohols are neutral while phenols are acidic. c. Glycerol dissolves in water. d. Carboxylic acid does not give reactions of carbonyl group.		

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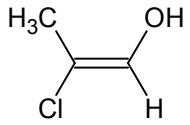
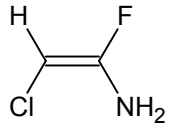
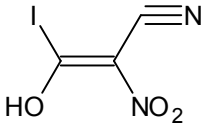
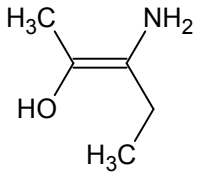
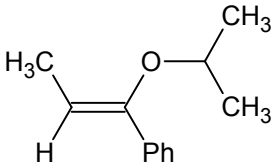
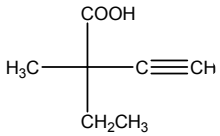
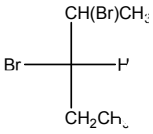
SECTION A

S. No.		Marks	CO
Q 1	Discuss the difference between Friedel Craft alkylation and Friedel Craft acylation.	4	CO4
Q 2	Define meso structures with suitable examples.	4	CO2
Q 3	Discuss the rules for finding out aromaticity.	4	CO4
Q 4	What are nucleophiles? Explain in detail with examples.	4	CO1
Q 5	Give two methods to differentiate 2-butyne from 1-butyne.	4	CO3

SECTION B

Q 6 (i)	Explain the general mechanism of aromatic electrophilic substitution reactions.	5	CO4
(ii)	Discuss chirality or asymmetry in optically active compound.	5	CO2
Q 7	Define geometrical isomerism in details with 'E' and 'Z' notations for the following compounds: (i)  (ii)  (iii)  (iv)  (v) 	10	CO2
Q 8 (i)	Compound 'A' $C_5H_{12}O$ on dehydration gives an alkene 'B' C_5H_{10}. Alkene 'B' on ozonolysis gives 'C' and 'D'. 'C' does not react with alkaline $KMnO_4$, while 'D' gives corresponding acid. What will be the structure of 'A', 'B', 'C' and 'D'? Write the complete chemical reaction.	6	CO3
(ii)	A hydrocarbon, C_4H_{10} (A) on monochlorination gives a compound C_4H_9Cl (B), which on treatment with Na metal gives an another hydrocarbon (C). On halogenation of 'C', only one monosubstituted product is possible. What is the structural formula of A, B and C? Write down the reaction sequence also.	4	CO3

Q9	(i) Explain Baeyer strain theory for the stability of cycloalkanes. What are its limitations? (ii) What happens when 1-butyne undergoes reductive ozonolysis in the presence of Zn? Discuss the mechanism. OR (i) Discuss the mechanism of addition of HBr on propene. (ii) What happens when t-butyl chloride reacts with alcoholic KOH? Discuss the mechanism.	**10**	**CO3**
	SECTION-C		
Q10 (i)	Identify R and S configurations in the following compounds:   OR Discuss specific rotation with all the terminology.	**5**	**CO2**
(ii)	An organic compound 'A' (C_5H_8O) on treatment with Zn-Hg/conc. HCl gives an hydrocarbon 'B' (C_5H_{10}), while on exposure to light gives another hydrocarbon 'C' (C_4H_8). Deduce the structure of compounds 'A', 'B' and 'C' and give the reactions. Also, write down all the possible isomers of 'B'. OR Convert: a. Ethane to m-dinitrobenzene b. 1,4-dichlorobutane to cyclohexane	**3+2**	**CO3**
(iii)	Explain aromaticity in cyclopropenyl ion and cyclopentadienyl ion. OR Explain aromaticity in heterocyclic compounds with suitable examples.	**10**	**CO4**
Q11 (i)	Complete the following: $a.¿¿$ $b.CH_3-C\equiv C-CH_3\ HOCl(¿\ excess)$ c. CH_2=CH-CHO + HBr → d. $CH_3-C\equiv CH+CH_3MgBr\rightarrow$ e.  + Br_2 → f. $BrCH_2-CH_2-CH_2-CH_2Br+Na\rightarrow$	**12**	**CO3**
(ii)	Explain why? a. Chlorobenzene is deactivating but o,p-directing in nature.	**8**	**CO1**

	b. Nitroacetic acid is stronger acid than acetic acid. c. Glucose is an organic compound but still soluble in water. d. Trimethylamine is weaker base than dimethylamine.		