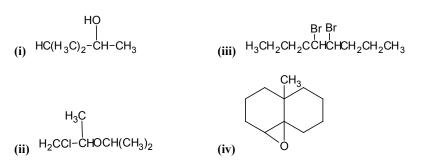


FEDERAL PUBLIC SERVICE COMMISSION **COMPETITIVE EXAMINATION-2016 FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT**

CHEMISTRY PAPER-II

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TIME AL PART-I(N			REE HOURS XIMUM 30 MINUTES	PART-I (N PART-II	- /	/UM MARK /UM MARK			
	- /						LS - 80		
NOTE: (i) Part-II is to be attempted on the separate Answer Book.									
(ii) Attempt ONLY FOUR questions from PART-II. ALL questions carry EQUAL marks.									
(iii) All the parts (if any) of each Question must be attempted at one place instead of at different									
places.									
(iv) Candidate must write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.									
(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must									
	be crossed.								
(vi)	(vi) Extra attempt of any question or any part of the attempted question will not be considered.								
(vii) Use of Calculator is allowed.									
PART-II									
Q. No. 2.	Write br	riefly or	n the following terms:			(2 each)	(20)		
	((i)	Hyper-conjugation	(ii)	Aromaticity				
	((iii)	Grignard's reagent	(iv)	S _N 1 reaction				
	((v)	Molecular chirality	(vi)	Monosaccharides				
	((vii)	Chemical shift	(viii	Glycolysis				
	((ix)	Detergents	(x)	Friedal Craft alkylation				

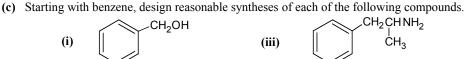
Q. No. 3. (a) How would you synthesize each of the following molecule from an alkene of appropriate (8) structure (structure of your choice).



- (b) Write the expected major product of the reaction of propyne with each of the following (6) reagents.
 - (i) Cu₂Cl₂, O₂, pyridine (iv) H₂O, HgSO₄, H₂SO₄ (ii) Na, ND₃
 - Di-isoamylborane, then NaOH, H₂O₂ (v)
 - [(CH₃)₂CHCH₂CH₂]₂BD Di-isoamylborane, then CH₃CO₂D (vi) then CH₃CO₂H
- (6)

CH₂OH (i) CHO (ii)

(iii)



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(i)

- (b) Draw the structures of the following molecules:
 - 5-(2,2-Dimethylpropyl)nonane (vi) 4-(2-Ethylbutyl)decane

(vii)

- (ii) 2,3-Dimethylhept-3-ene
- (iii) 1-Chloro-1-methoxy-2methylbut-1-ene
- (viii 5,5-Dichloro-3-methylhepta-3,6-

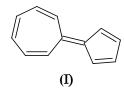
5-Ethyl-4,6-dimethylhept-4-en-2-yne

(iv) 6-Chloro-2-nitrooct-1-en-3-yne (ix) 6-bromo-5-chloro-9-

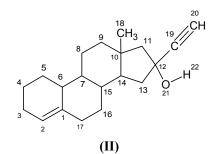
nitropentadecane

dien-1-yne

- (v) 8-Chloro-7-methoxy-5-methyl- (x) 6-chloroocta-1,3-diyne 4-nitroundec-5-ene
- (c) (i) The structure(I) given below has significant dipole moment. Which end of (2) the molecule would you expect to owe positive charge, and which tend to be negative.



(ii) The structure(II) given below is a component of certain oral contraceptives: (3)



Locate in this structure an example of each of the following bonds or atoms

- A highly polarized covalent bond
- Sp-hybrid carbon atoms
- A nearly unpolarized covalent bond

Q. No. 5.

(a)

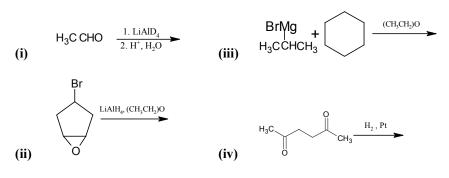
Consider the reaction of bromocyclohexane with each of the four reagents below, and (7) answer the questions below. Also write down the reaction mechanism in each case.

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H_2O	OH	CH ₃ COOH	CH ₃ COO ⁻
<i>(i)</i>	<i>(ii)</i>	(iii)	(<i>vi</i>)

- (i) What is the most important type of reaction mechanism in each case?
- (ii) Which reagent gives the most elimination product?
- (iii) Which reagent is most useful in synthesizing the alcohol?
- (b) Evaluate each of the possible alcohol syntheses below as being good (the desired (5) alcohol is major or only product), not so good (the desired alcohol is a minor product, or worthless).

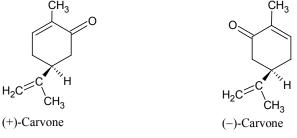
(i)
$$CH_3CH_2CI \longrightarrow CH_3CH_2OH$$
 (iv
 $O_2SOH_3C \longrightarrow CH_3 \xrightarrow{OH, H_2O, \Delta} CH_3OH$
(ii) $H_3CCHCH_3 \xrightarrow{OH, H_2O, \Delta} H_3CCHCH_3$
(iii) $H_3COCH_3 \xrightarrow{OH, H_2O, \Delta} CH_3OH$ (v) OH, H_2O, Δ
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(c) Write the major product(s) of each of the following reactions. It is implied that aqueous work-up has taken place in all those cases that require it to obtain the organic product.

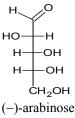


Q. No. 6. (a) The two isomers of carvone are given below. Which is **R** and which is **S**?



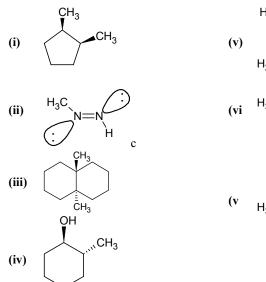


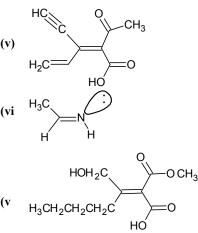
(b) The structure of compound given below is a sugar called (-)-arabinose. Its (3) specific rotation is -105°.



- (i) Draw enantiomer(s) of (–)-arabinose
- (ii) Draw diastereomer(s) of (-)-arabinose
- (iii) Does (-)-arabinose have any optically inactive diastereomers? If it does, draw one.
- (c) Assign E,Z designation to the following structures.

(7)

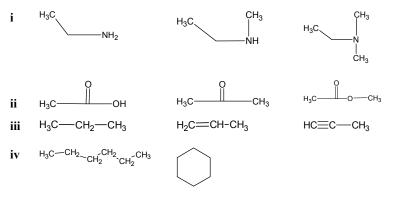




CHEMISTRY PAPER-II

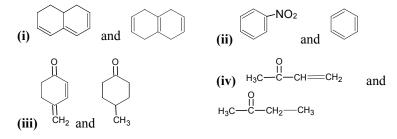
- (d) Draw the structures of the product(s) described for each reaction. Specify all (8) aspects of the stereochemistry.
 - (i) Stereospecific anti addition of bromine to cis- and trans-cinnamic acid.
 - (ii) Methanolysis of S-3-bromooctane with 6% racemization.
 - (iii) Stereospecific syn thermal elimination of acetic acid from 1R,2Sdiphenylpropyl acetate
 - (iv) Stereoselective epoxidation of bicyclo[2.2.1]hept-2-ene proceeding 94% fromtheexo face.
- Write a brief account on the following: Q. No. 7.
- (c) Primary structure of Proteins
- (b) Classification of Amino acids (d) Glycogenesis
- Q. No. 8. (a). Differentiate following using IR Spectroscopy?

(a) Biological importance of starch

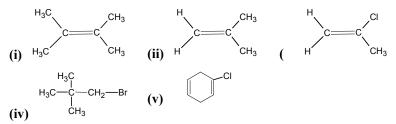


(b). What type of electronic transition are possible in the following compounds? (2)

- (i) Butadiene (iii) Acetaldehyde
- (ii) Diethyl ether Trimethylamine (iv)
- (c). How will you distinguish the following compounds using UV/Visible (4) spectrophotometer?



Give the chemical shift of the following compounds for each proton (d).



(5) (e). The mass spectrum of compound shows following peaks: m/e= 120, relative intensity=20% (M⁺ peak), m/e= 105, relative intensity=80%, m/e= 77, relative intensity=96%, m/e= 43, relative intensity=35%. Assign the structure which would be expected. Page 4 of 4

(4)

(20)

(5 each)

(5)