**TDC Odd Semester Exam., 2020**
**held in July, 2021**

CHEMISTRY

( Honours )

**( 3rd Semester )**

Course No. : CHMH–302

**( Organic Chemistry—III )**

*Full Marks* : 35
*Pass Marks* : 12

*Time* : 2 hours

*The figures in the margin indicate full marks for the questions*

Answer **five** questions, taking **one** from each Unit

UNIT—I

**1.** *(a)* *p*-Toluidine reacts with benzene diazonium chloride to form a compound which on boiling with dilute $H_2SO_4$ gives four products (excluding nitrogen). Discuss with reactions. 3





*(b)* How can you convert aniline to *p*-dinitrobenzene? 2

*(c)* Give the product(s) of the following reaction and explain their formation : 2


+ $N_2CHCO_2C_2H_5$ ⟶ ?

**2.** *(a)* Nitration of cinnamic acid affords *p*-nitrocinnamic acid. Explain. 2

*(b)* Carry out the following conversion : 2

Nitrobenzene ⟶ *m*-anisidine

*(c)* $MeCOCH_2Cl$ $CH_2N_2$

$C_4H_7ClO$ (*A*) $C_4H_7ClO$ (*B*)

(*A*) is a ketone and (*B*) is an epoxide. Suggest structures for (*A*) and (*B*) and mechanism for their formations. 3

UNIT—II

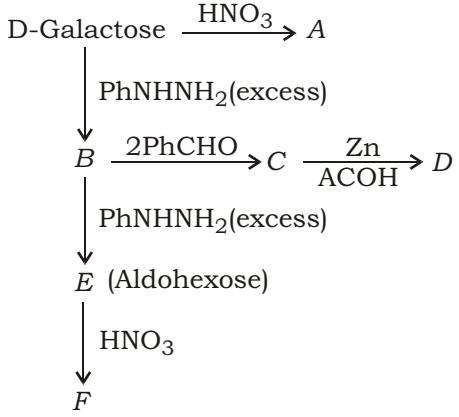
**3.** *(a)* Two aldohexoses *X* and *Y* produce identical osazone. *Y* or nitric acid oxidation gives an optically inactive dicarboxylic acid. Two successive Ruff degradation of *Y* produces D-threose. Aldohexoses *Z* and *X* can give identical dicarboxylic acids on nitric acid oxidation. Identify *X*, *Y* and *Z* with supporting reasoning. 3

*(b)* Outline the reaction pathways to convert the following : 2×2=4

*(i)* D-Arabinose to D-Mannose

*(ii)* D-Arabinose to D-Erythose

**4.** *(a)* Follow the reactions :




Identify *A*, *B*, *C*, *D*, *E* and *F*. 3

*(b)* Neither the glucose nor the fructose part of sucrose exhibits mutarotation.

What information is obtained from the above fact regarding the structure of sucrose? 2

*(c)* Both the methyl- -D-glucopyranoside and methyl- -D-glucopyranoside do not undergo mutarotation while both of - and -D-glucose undergo mutarotation. Why? 2





UNIT—III

**5.** *(a)* What are terpenoids? State the isoprene rule and special isoprene rule. Mention two examples of terpenoids which are exceptions to the above rules. 1+2+1=4

*(b)* How can you synthesize citral from acetone? 2

*(c)* How will you prove that gereneol contains two double bonds? 1

**6.** *(a)* Write the structure of nicotine. How is nicotine isolated from tobacco leaf ? How would you show that nicotine contains a pyridine nucleus? 1+2+2=5

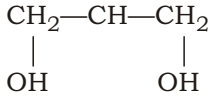
*(b)* Provide a synthetic route of (7) nicotine, taking nicotinonitrile as one of the starting materials. 2

UNIT—IV

**7.** *(a)* Show the mechanism for the formation of a segment of poly (vinyl chloride) containing three units of vinyl chloride and initiated by hydrogen peroxide. 2

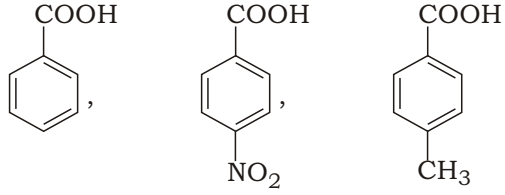
*(b)* What are Zeigler-Natta catalysts? Describe the mechanism of Zeigler-Natta polymerization of substituted ethene. 1+2=3

*(c)* If a small amount of glycerol is added to the reaction mixture of toluene-2,6-diisocyanate and ethylene glycol during the synthesis of polyurethane foam, a much stiffer foam is obtained. Explain. 2



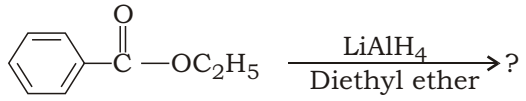
Glycerol

**8.** *(a)* Arrange the following compound(s) in increasing order of acidity and justify your choice : 2



*(b)* How is citric acid synthesized from glycerol? 2

*(c)* Provide the products of the following reactions and suggest mechanism of reactions : 1½×2=3

*(i)* 

*(ii)* $H_3C(CH_2)_3COOC_2H_5 \xrightarrow{Na/EtOH} ?$

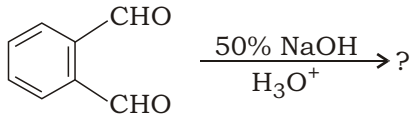


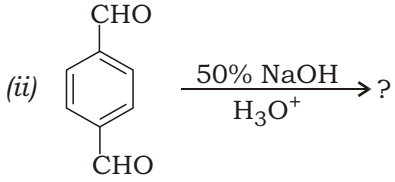


UNIT—V

**9.** *(a)* What product is obtained when benzaldehyde is heated with propanoic anhydride and sodium propanoate? Give the mechanism of the reaction. 3

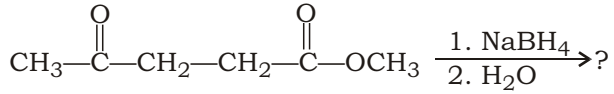
*(b)* Give the products and mechanism of each of the following reactions : 2×2=4

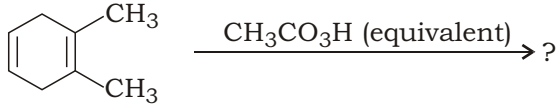
*(i)* 

*(ii)* 

**10.** *(a)* Give the product of the following reactions : 1×3=3

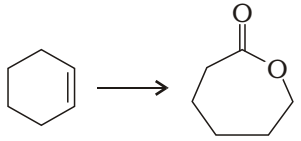
*(i)* $CH_3CH_2CH_2\,C{\equiv}N \xrightarrow[Pd/C]{H_2} ?$

*(ii)* 

*(iii)* 

*(b)* An alkene is treated with $OsO_4$ followed by aqueous $NaHSO_3$. When the resulting diol is treated with $HIO_4$, the only product obtained is an unsubstituted cyclic ketone with molecular formula $C_6H_{10}O$. What is the structure of the alkene? Explain the reaction(s). 2

*(c)* Carry out the following conversion : 2

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