B.Sc.(Honours) Examination, 2019

Semester-IV (CBCS)
Chemistry (Honours)
Core Course: CC-9
(Organic Chemistry)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.
Answer ***any four*** questions.

1. a) Define 'Neighbouring Group Participation'. Do you agree with the statement 'Retention of Configuration in an organic transformation may be a result of involvement of neighbouring group participation'? Justify your answer. 2+3
   b) Predict the stereochemical change of acetolysis for both the *erythro* and *threo*- isomers of 3-methoxy-2-bromobutane in the presence of silver acetate in acetic acid. 5

2. a) What is Cram's rule for nucleophilic addition to a carbonyl group? Predict the product (with proper stereochemistry) when PhMgI reacts with (*S*)-α-aminobenzylphenyl ketone under optimum reaction conditions. 2+3
   b) What is 'isoprene rule'? Explain with proper example. 2+1
   c) How do you prove that nicotine contains a pyridine nucleus in its molecule? How does it join itself with other part of the structure? 2

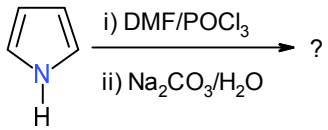
3. a) How do you differentiate the *cis*-citral from its *trans*-isomer using chemical method? 3
   b) What do you expect when citral is treated with aqueous solution of potassium carbonate? What conclusion can you draw from the result? 2
   c) Offer the mechanistic pathway through which 'DCC' reagent activates a substrate to form amide bond. 2
   d) Predict the structures of the following products with plausible mechanism (***any one***): 3

   i) D-Galactose $\xrightarrow[H^+]{\text{acetone}}$? $\xrightarrow[H^+/MeOH]{NaH/MeI}$?

   ii) D-Glucose $\xrightarrow[NaOAc]{Ac_2O}$? $\xrightarrow{HBr}$? $\xrightarrow{EtS^{(-)}}$?

4. a) Outline chemical tests to differentiate between each of the following pairs: 1.5×4
      i) D-Glucose and D-Fructose
      ii) D-Mannose and methyl α-D-mannopyranoside
      iii) D-2-deoxyglocose and D-3-deoxyglucose
      iv) Sucrose and Lactose
   b) Why is starch but not cellulose digestible by humans? 2
   c) What is invert sugars and why is it so named? 2

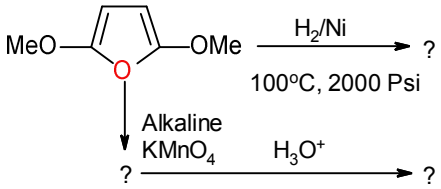
5. a) Pyrrole, thiophene and furan – all are susceptible to electrophilic attack at their α-position. Justify the phenomenon. 2
   b) Write down the product with plausible mechanism of the following reaction: 2+1



   c) When furan is heated with Br_2/MeOH, what would be the expected product? Explain with reaction mechanism. 2

P.T.O.

d) Predict the products in the following transformations: 3



6. a) Comment on the dipole moment character of naphthalene and its isomeric compound, azulene. 2

b) On the basis of resonance structures, predict which bond(s) of naphthalene will be the shortest. Give at least one experimental evidence in support of your answer. 4

c) Naphthalene reacts with Conc. H_2SO_4 at low temperature to give 1-naphthalene sulfonic acid, while at high temperature, 2-naphthalene sulfonic acid is obtained, explain. 4

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