



বিদ্যাসাগর বিশ্ববিদ্যালয়  
**VIDYASAGAR UNIVERSITY**

**Question Paper**

**B.Sc. Honours Examinations 2021**

(Under CBCS Pattern)

**Semester - V**

**Subject: CHEMISTRY**

**Paper: C 12-T & P**

**(Organic Chemistry - V)**

**Full Marks : 60 (Theory-40 + Practical-20)**

**Time : 3 Hours**

*Candidates are required to give their answer in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Group - A**

**(Theory : Marks - 40)**

Answer any *three* of the following questions :

12×3=36

- (a) Draw the energy profile diagram and discuss the ring inversion of cyclohexane following the C<sub>2</sub> pathway. Although cis-1,2 dimethylcyclohexane is optically active, it exists as inseparable dl pair, hence optically inactive — Explain.  
(b) Why are both the conformers of trans-2-chlorocyclohexanol equally populated?

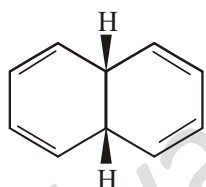
Solvolysis of cis-4 tert butyl cyclohexyltosylate takes place at a faster rate than that of trans isomer — Why?

(3+3)+(3+3)

2. (a) Why do Glucose and Sucrose on treatment with excess phenyl hydrazine gives same osazone? During oxidation of glucose with bromine, the alpha anomer has been found to undergo oxidation slower than the beta anomer — Explain mechanistically.
- (b) Mutarotation of Tetramethyl D-glucose does not take place in presence of pure phenol or pyridine, but does so in a mixture of both — Explain. Why do aldoses react with Fehling's solution, but not with sodium bisulphite? (3+3)+(3+3)

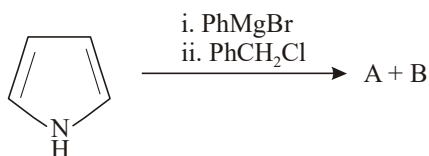
3. (a) Discuss the double helical structure of DNA in details. Synthesize Guanine using Fischer's method.
- (b) What is solid phase peptide synthesis? Mention its advantages. In N-terminal detection of polypeptides Edmann degradation approach is superior to the Sanger's method. Why? (3+2)+(2+2+3)

4. (a) During the reaction of Cyclopentadiene with Maleic anhydride, endo product predominates over exo product — Explain. Suggest a stereospecific method of conversion of trans - 5,6 dimethyl -1, 3-cyclohexadiene to cis-5, 6, Dimethyl-1, 3-cyclohexadiene.
- (b) (i) Using FMO approach explain why Diels Alder Reaction between Butadiene and Ethylene is thermally allowed, but not catalysed by UV light — Explain.
- (ii) Predict the product with mechanism.

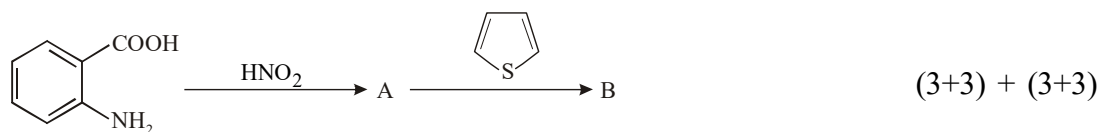


(3+3)+(3+3)

5. (a) Why does Furan-2-aldehyde undergo Cannizzaro reaction but Pyrole-2-aldehyde does not? Write down the steps involved with mechanism in Skarup Quinoline synthesis starting from aniline and acrolein.
- (b) (i) Predict the products with plausible mechanism;

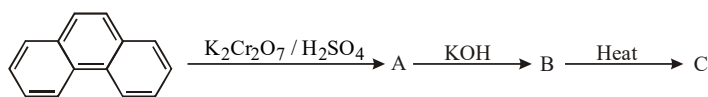


(ii) Find out A and B with mechanism;



6. (a) Write down the structure of two Pyrimidine bases. What do you mean by inversion of cane sugar? Explain mechanistically what happens when cis-2 amino cyclohexanol is treated with  $\text{NaNO}_2$  and dil HCl. (2+2+2)

(b) (i) Find A, B and C



(ii) How will you resolve a racemic mixture of amino acids? (3+1+2)

### Part - B

Answer any *two* of the following questions : 2×2=4

1. Why does Proline produce a yellow coloured complex in the Ninhydrin test ? 2
2. Write down the characteristic features of pericyclic reaction? 2
3. How does periodic acid oxidation help to determine size of rings in sugars ? 2
4. What do you mean by I strain ? 2

### (Practical : Marks - 20)

#### Part - A

Answer any *one* of the following questions : 15×1=15

1. Write down the principle and procedure involved in separating a mixture containing two amino acids using TLC.
2. Write down the principle and procedure involved in separating a mixture of glucose and sucrose using Paper chromatographic technique.
3. Write down the principle and procedure involved in separating a mixture of fluorescein and methylene blue using TLC.

### Part - B

Answer any *one* of the following questions :

5×1=5

1. Predict the number of signals, their approximate chemical shifts along with splitting pattern in the proton NMR spectrum of any of the following compounds
  - (a) 4-Aminobenzoic acid
  - (b) Salicylamide
  - (c) 4-Nitroaniline
2. Mention the procedure of column packing during separation of a mixture of dyes by column chromatographic technique.
3. Mention the significant peaks in the IR spectrum (mention approx. frequency and mode of vibration involved) of any one of the following compounds
  - (a) trans-Cinnamic acid
  - (b) Vanillin
  - (c) Mesityl oxide