

determine all possible Jordan canonical forms for a linear operator $T: V \rightarrow V$ whose characteristic polynomial is $2)^3(t-5)^2$.

V be a vector space of polynomials $f(t)$ of degree less than 4 and real coefficients. Define inner product on V

$\langle f, g \rangle = \int_{-1}^1 f(t)g(t) dt$. Apply the Gram-Schmidt orthogonalization process $\{1, t, t^2, t^3\}$ to find an orthogonal basis $\{f_0, f_1, f_2, f_3\}$ of V . 5+5

782/Chem UG/6th Sem/CHEM-H-CC-T-14/23

U.G. 6th Semester Examination - 2023

CHEMISTRY

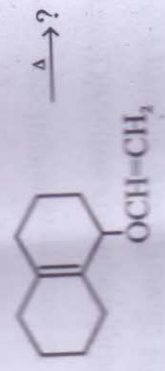
[HONOURS]

Course Code : CHEM-H-CC-T-14

Full Marks : 40 Time : 2½ Hours

The figures in the right-hand margin indicate marks. Candidates are required to give their answers in their own words as far as practicable.


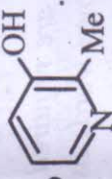
1. Answer any five of the following questions: 2×5=10
 - a) Identify the hydrogen bonds between the conjugate base pairs of DNA.
 - b) What is ninhydrin? Mention its reaction with α -amino acid.
 - c) Predict the product with mechanism:



- d) Generally, pyridine does not allow Friedel-Craft reaction. Explain.

e) Neither the glucose nor the fructose part of sucrose exhibits mutarotation. What information regarding the structure of sucrose is obtained from the above fact?

f) Decarboxylation of quinoline-2-carboxylic acid is far easier than quinoline-3-carboxylic acid. Explain.

g) Transform  into 

h) Write down the preferred conformation of 1-methyl-1-phenylcyclohexane and justify your answer.

2. Answer any two of the following questions:

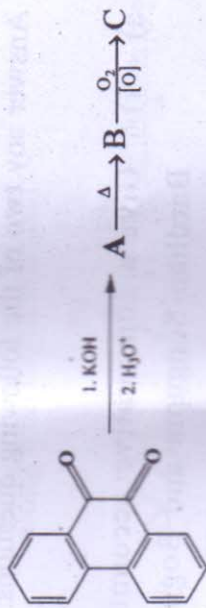
5 × 2 = 10

a) i) Explain why anthracene cannot be prepared by succinolation of naphthalene.

ii) How can you convert naphthalene into 2-bromonaphthalene? Explain with mechanism. 2+3=5

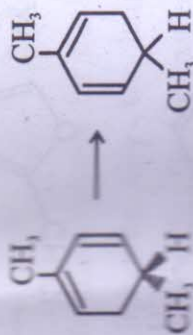
b) i) Directions of dipole moments in furan and pyrrole are different. Explain.

ii) What are A, B, C of the following reactions?



2+3=5

c) i) Suggest mechanism for the following transformation and depict the absolute stereochemistry of the chiral centre.



ii) Outline a chemical method for the determination of N-terminal amino acid of a protein. 2+3=5

d) i) Mutarotation is more rapid when catalysed by 2-pyridone compared to the mixture of phenol and pyridine. Explain.

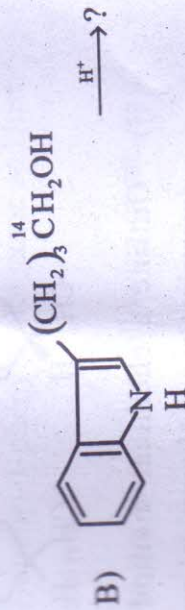
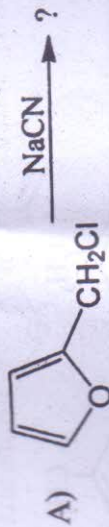
ii) β -D-glucopyranose undergoes oxidation with bromine-water 250 times as fast as that of α -D-glucopyranose. Explain.

3. Answer any two of the following questions:

$$10 \times 2 = 20$$

a) i) Give a comparative account on the Bardhan-Sengupta and Bogert-Cook methods of synthesis of Phenanthrene. What is the side product of them?

ii) Write down the product(s) of the following reactions:

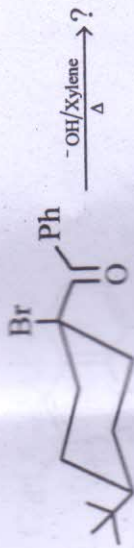


$$(3+1)+3+3=10$$

b) i) In the Fischer indole synthesis, a phenyl hydrazone is converted into an indole by the action of an acid through [3,3]-sigmatropic rearrangement. Explain.

ii) Outline an experiment to decide which of the two nitrogens of phenylhydrazone is lost during the above reaction.

iii) Give the product of the following reaction along with the mechanism:



iv) Write the different interactions responsible for stabilizing the secondary structure of a protein.

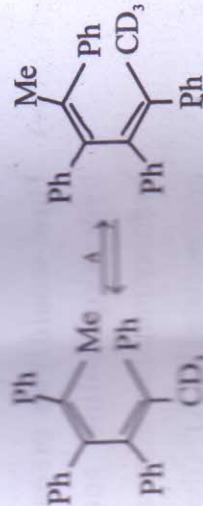
v) Explain endo-selectivity in the Diels-Alder reaction with proper example.

$$2+2+2+2+2$$

c) i) Write down the scheme for the synthesis of the dipeptide, Gly-Ala, using DCC promoted peptide bond formation.

ii) How does RNA differ from DNA with respect to its structure and function?

iii) Explain the following observation:



iv) Explain why [1,5]-sigmatropic H-shift in penta-1,3-diene is facile but [1,3]-sigmatropic H-shift does not occur.

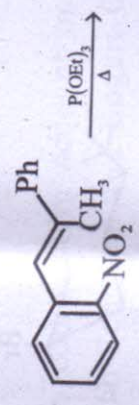
Full Marks : 40

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own words as far as

UNIT
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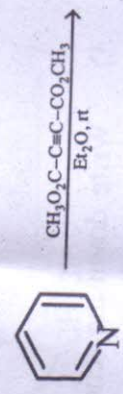
1. Answer any three of the following
 - i) Distinguish between
 - ii) What is vulnerability
 - iii) What is risk perceptibility
 - iv) What is meant by assessment?
 - v) What is meant by impact study?

v) Predict the product in the following reaction: 2+2+2+3+1=10



d) i) How would you distinguish chemically between ribose and 2-deoxyribose?

ii) Predict the product(s) with plausible mechanism:



iii) Predict the product(s) with stereochemistry of the following reaction:



iv) How would you prepare 2-methyl-4-hydroxyquinoline and 4-methyl-2-hydroxyquinoline using aniline and ethyl acetoacetate (EAA)? Give mechanisms of the reactions involved. 2+2+3+3=10