

Roll No. _____

[Total No. of Pages : 2

PGIIS-872 A-21
M.Sc. III Semester (CBCS) Degree Examination
CHEMISTRY
Essentials of Inorganic Chemistry
Paper : O.E.T - 3.1

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) Answer *All* the questions.
- 2) All questions carry *equal* marks.

Answer any **Eight** questions:

(8×2=16)

1. a) State the Bent's rule with an example.
- b) How would you expect bond lengths to vary in the dioxygen species O_2 , O_2^+ , O_2^- and O_2^{2-} ?
- c) What are the limitations of VSEPR theory?
- d) What are the essential and beneficial metals? What do you mean by essential trace elements?
- e) Though the copper is abundant in sea water, it was not involved at early stage of life evolution - comment on this statement.
- f) Which of the following Jahn Teller distortion?
 $[Ti(H_2O)_6]^{3+}$, $[Ni(H_2O)_6]^{2+}$, $[Co(NH_3)_6]^{3+}$ and $[Cu(H_2O)_6]^{2+}$.
- g) Define spin orbit coupling.
- h) Acetic acid has a different leveling effect upon strong acids. Justify the statement.
- i) Explain geometrical isomerism with an example.
- j) State HSAB rule and give the order of stability of BeF_2 and BeI_2 based on the rule.

2. a) Write Born - Land's equation for lattice energy of NaCl solid. Comment on the factors influencing the magnitude of lattice energy. (5+5+6=16)

b) What is resonance? Explain the resonance in CO_3^{2-} and NO_3^- ions.

c) Based on VSEPR theory model, explain the shapes of PF_5 , SF_6 and ClF_3 .

(OR)

c) Construct the MO energy diagram for CO_2 molecule. Calculate the bond order, comment on its magnetic properties.

3. a) Compare the mechanism of activity of Ca^{2+} - pump and Na^+ and K^+ ions. (5+5+6=16)

b) Outline the important properties which make Zn(II) biologically so important in non - redox metalloenzymes?

c) Comment on the selectivity of $\text{Na}^+ - \text{K}^+$ pump in transporting the Na^+ - and K^+ - ions.

(OR)

c) Write a note on metal (copper and Iron) assimilation in plants and bacteria.

4. a) Discuss the Gouy's method for the determination of magnetic moments of the complexes. (5+5+6=16)

b) Set up MO energy level diagram for octahedral complexes involving sigma bonding.

c) Write briefly on evidence on metal - ligand orbital overlap and spectrochemical series.

(OR)

c) Define geometrical isomerism. Discuss the geometrical isomerism of the type Ma_4b_2 and Ma_3b_3 .

5. a) What are leveling effect and differentiating solvents? Explain why the leveling effect operates. (5+5+6=16)

b) Write note on theoretical basis of hardness and softness.

c) Write a brief account on :

i) Steric effects on acid - base strength of compounds and

ii) Irving William series.

(OR)

c) Discuss in detail about the chemical reactions involved in liquid ammonia and anhydrous sulfuric acid.

PGIIS-872 A-21
M.Sc. III Semester (CBCS) Degree Examination
CHEMISTRY-IV
Organic Chemistry/Essential of Organic Chemistry
Paper : OET- 3.2
(Old & New Syllabus)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

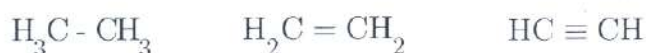
- i) Answer **All** questions
- ii) All questions carry equal marks.

Answer any **eight** of the following:

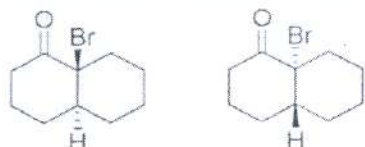
(8×2=16)

1. a) Write the Bond angle and Hybridization of carbons present in acetylene (C₂H₂) molecule.

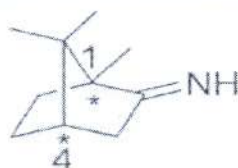
- b) Arrange the following molecules in increasing order C-C bond strength



- c) Identify the stereoisomerism relationship between the below two compounds.



- d) Write the absolute configuration at the two chiral centres of the below compound.

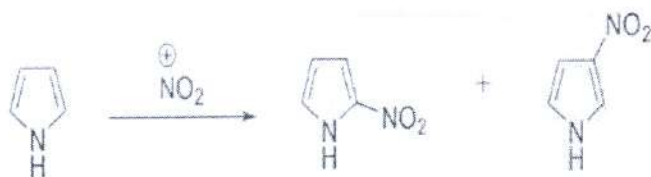


- e) What is primary kinetic isotopic effect?

- f) Classify below both reactions as addition, elimination, substitution, or rearrangement.



g) Predict the major and minor products in the below reaction.



h) Write the order of aromaticity of pyrrole, thiophene and furan and analyse the reason for the order.

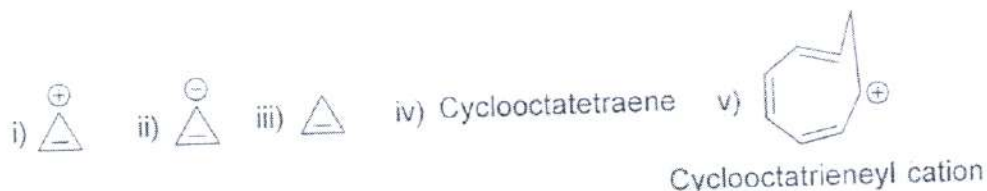
i) Explain why Pyrrole weaker base than pyridine.

j) Which of the below alkene gives a *meso* compound upon reaction with Br_2 in CH_2Cl_2 ? Write the *meso* product in Newman projection



2. a) How can we tell whether a compound is, aromatic (or) what is the criteria a compound should satisfy to be called aromatic? Explain with a suitable example. (5+5+6=16)

b) Label the below compounds in terms of aromatic, anti-aromatic, non-aromatic and homoaromatic compounds.



c) Give the labels for the below compounds in terms of their aromatic nature and give reasons for assigning the labels.

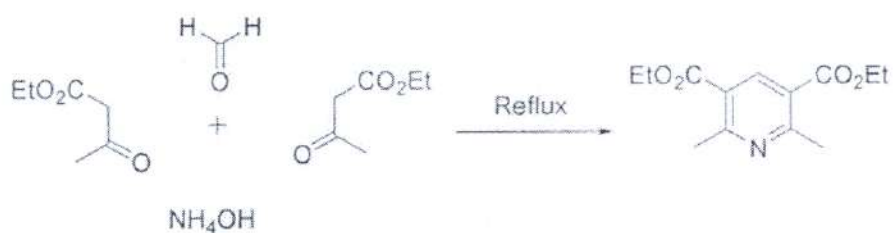


(OR)

c) Write the molecular orbital structure of the ethylene molecule (C_2H_4) by explaining the hybridization of orbitals present in carbons and mode of bonds formed from hybridized and unhybridized orbitals.

5. a) Write the possible mechanism of below reaction.

(5+5+6=16)



- b) Write the Fischer indole synthesis with possible mechanism.
c) Describe the below methods of syntheses with possible mechanism.
i) Paal-Knorr synthesis of pyrrole
ii) Paal - Knorr synthesis of furan.

(OR)

- c) Write any two methods for the synthesis of quinoline.

Roll No _____

[Total No. of Pages : 2

PGIIS-867 A-21
M.Sc. III Semester (CBCS) Degree Examination
ORGANIC CHEMISTRY
Natural Products
Paper : SCT- 3.1
(Old & New Syllabus)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- i) Answer all questions
- ii) All questions carry equal marks.

Answer any eight of the following:

(8×2=16)

1.
 - a) Draw the Haworth structure of maltose.
 - b) What is glycosidic bond? Predict the products for the reaction of β -D-Glucose with ethanol in presence of H^+ .
 - c) What is Diel's hydrocarbon? How it is obtained?
 - d) State Blanc's rule? Give its applications.
 - e) Give the chemical evidence for the presence of reactive methylene group in camphor.
 - f) Outline the steps involved in the following transformation.
 α -santonine \longrightarrow hyposantonine.
 - g) State Isoprene and Special isoprene rule. Write the structure of longifoline and indicate the isoprene units.
 - h) Sketch the biosynthesis of any one isoquinoline alkaloid.
 - i) What are lipids? Mention any one simple lipid structure.
 - j) Write a chemical test for the confirmation of methoxy group in alkaloids.
2.
 - a) How the ring size and structure of lactose is determined? **(5+5+6=16)**
 - b) Give a comparative account of deoxy sugars and amino sugars.
 - c) Describe any two modern methods for the synthesis of peptides.

Roll No _____

[Total No. of Pages : 2

PGIIS-868 A-21
M.Sc. III Semester (CBCS) Degree Examination
ORGANIC CHEMISTRY
Reaction Mechanisms
Paper : HCT 3.2
(Old & New Syllabus)

Time : 3 Hours

Maximum Marks : 80

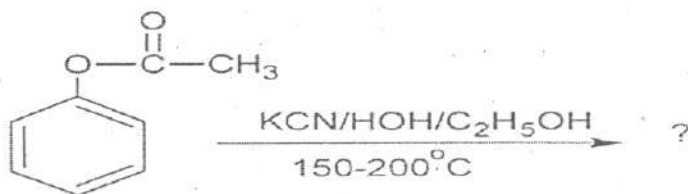
Instructions to Candidates:

- i) Answer **All** questions.
- ii) All questions carry equal marks.

Answer any Eight of the followings:

(8×2=16)

1. a) Arrange the following in the decreasing order of stability and justify your answer.
 $\text{CH}_3 \cdot \text{CH}_2$ $\text{Ph} \cdot \text{CH}_2$ $\cdot \text{CH}_3$ $\text{Ph}_2 \cdot \text{CH}$
- b) Give any one method for the generation of arylne.
- c) Outline a mechanism of a reaction involving σ -bond as neighbouring group participation.
- d) What is trans annular rearrangement? Give an example.
- e) What is saytseff elimination? Write one example.
- f) Sketch the mechanism of Kolbe reaction.
- g) Predict the product with suitable mechanism for the following:



- h) Outline the mechanism of Claisen rearrangement.
- i) Give a reaction involving sulphur ylide.
- j) What is eclipsing effect? Give an example.