



Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27

**BSc. BIOCHEMISTRY - III SEMESTER**

END SEMESTER EXAMINATION: February 2022

(Examination conducted in January-March 2022)

**BCH 320- Inorganic, Environmental and Organic Chemistry**

Time- 2 ½ hrs

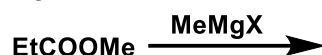
Max Marks-70

This question paper contains 4 printed pages and four parts.

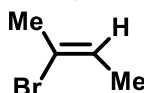
**Part A**

**Answer any 16 out of 18 questions; each question carries 1 mark = 16 marks**

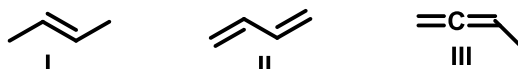
1. The order of nucleophilicity is  $\text{RNH}_2 > \text{ROH}$ . Yes/No?
2. Mention the product for the following reaction



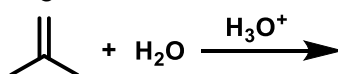
3. What is the conformation (*E/Z*) for below compound?



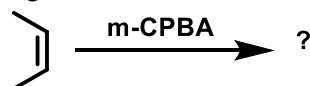
4. Which one among the following structures is a conjugated system?



5. Which of the compound given below form salt with NaOH?  
(a)  $\text{RCOOH}$  (b)  $\text{RCOOMe}$  (c)  $\text{RCONR}_2$
6. What is the difference between condensation and hydrolysis reaction?
7. Mention the product for the following reaction



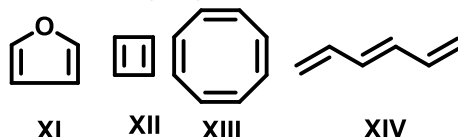
8. Mention the product for the following reaction.



9. Thermodynamically controlled product forms at higher temperature. Yes/No?
10. Mention the product for the following reaction



11. Which one is more basic aryl amine or alkyl amine?
12. Which compound(s) shown below is(are) aromatic?



13. Mention the product for the following reaction.

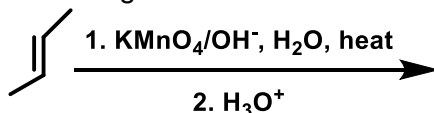


14. Name a plant often used for phytoremediation because it is a hyperaccumulator?

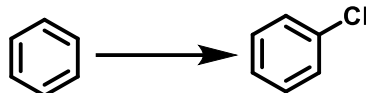
15. Why has molybdenum(4d) rather than Cr(3d) metal been utilized more biologically? Give any one reason.

16. Give another name for Lindane?

17. Mention the product for the following reaction.



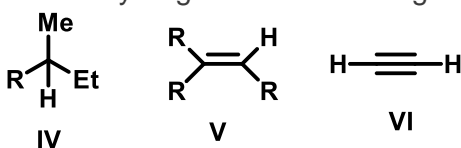
18. Mention the reagent required for the following transformation.



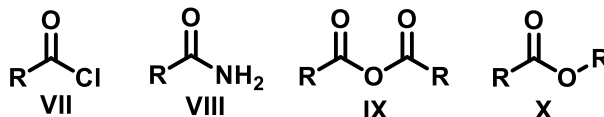
### Part B

**Answer any 10 out of 12 questions; each question carries 2 mark = 20 marks**

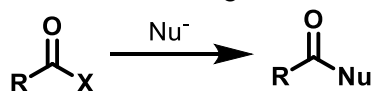
19. Compare the acidity of terminal hydrogen of the following compounds. Give rationale.



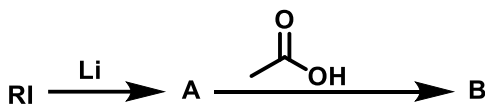
20. Compare the relative reactivity of carboxylic acid derivatives toward nucleophile substitutions.



21. What should be the nature of X for the following reaction?



22. Draw the structure of **A** and **B**.

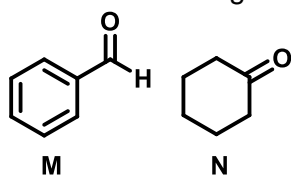


23. Explain which one is the major product for the reaction between 1,3 buta-diene and HCl at 100 °C or more.

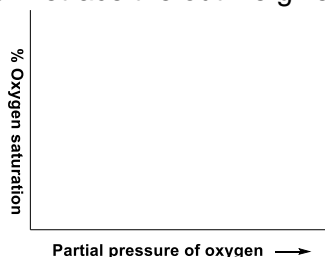
24. With a set of chemical equations explain how magnesium in chlorophyll helps in trapping the sunlight during photosynthesis.

25. Give two ways by which mercury exerts its toxicity in man?

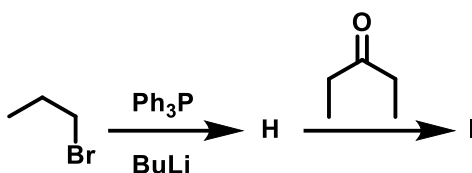
26. Indicate the number of  $\alpha$  hydrogens in the following molecules:



27. Mention any two reagents for the preparation of carboxylic acid from alcohol.  
 28. Retrace the outline given and plot the graph for (i) Myoglobin and (ii) Hemoglobin



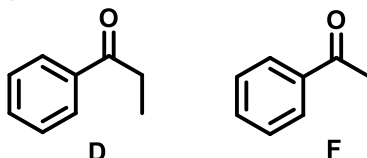
29. Acidity of phenols is higher in comparison to the alcohols and water molecules. Explain.  
 30. What are the structures of H and I?



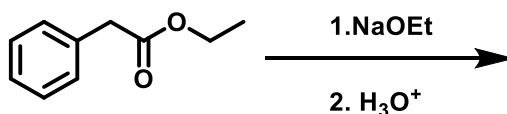
### Part C

**Answer any 8 out of 10 questions; each question carries 3 mark = 24 marks**

31. Draw the reaction mechanism to form hemiacetal from of an aldehyde.  
 32. What is a Friedel-Craft reaction? Suggest an acyl chloride that could be used for the synthesis of the following compounds.



33. Give the reaction for the monoalkylation of malonic ester.  
 34. Which is more reactive between aldehyde and ketone? Justify your answer.  
 35. Give the mechanism and the product formed in the following reaction.



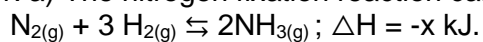
36. Write a detailed mechanism for the sulfonation of benzene, including all resonance form.  
 37. Draw the mechanistic details of synthesis of *O*-hydroxybenzaldehyde from phenol.  
 38. Explain the role of cytochrome in the electron transport chain.  
 39. Many industries revolve around electroplating, list the major pollutants entering the waterbodies due to this industry and explain how they can be removed.  
 40. Provide a mechanism for the following reaction.



### Part D

**Answer any 2 out of 3 questions; each question carries 5 mark = 10 marks**

41. a) The nitrogen fixation reaction can be represented by



Explain the role of nitrogenases in the above process.

b) Write the optical isomers of the complex  $[\text{PtCl}_2(\text{en})_2]$

(3+2=5)

42. (a) Why is the calcium salt of EDTA used instead of sodium salt in chelation therapy?

(b) What is the reason for the following

(i) toxicity of mercury is dependent on the oxidation state of mercury.

(ii) plants have very high pesticide level compare the soil they are grown in.

(iii) Industrial effluences have low BOD and COD level.

43. Match the following.

(a)  $\text{PhMgBr}$  + epoxide

(b)  $\text{PhMgBr}$  +  $\text{CH}_3\text{CHO}$

(c) Ozonolysis of tetra substituted alkenes

(d) Phenol +  $\text{NaOH}$  +  $\text{CO}_2$

(e) Aldehyde + Amine

(i) Salicylic acid

(ii) Ketone

(iii) Secondary alcohol

(iv) Schiff base

(v) Primary alcohol