



Registration number:  
Date & Session:

**ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27**  
**B.Sc. BIOCHEMISTRY - III SEMESTER**  
**SEMESTER EXAMINATION: OCTOBER 2022**  
(Examination conducted in December 2022)  
**BCH 322 – INORGANIC AND ORGANIC CHEMISTRY**

Time- 2 hrs

Max Marks-60

**This question paper contains THREE printed pages and THREE parts**

**Part A**

**Answer any TEN of the following questions**

**(10 x 2 = 20)**

1. In the complex  $[M(CO)_4]$ , what is the oxidation state and coordination number of the element 'M'?
2. Name the metal present in carboxypeptidase A and mention its importance.
3. Write the chemical equation of Friedel-Crafts acylation of benzene.
4. Write the chemical reaction of synthesis of secondary alcohol ( $R_2CHOH$ ) using Grignard reagent ( $RMgX$ ).
5. Arrange the following compounds in increasing order of their relative reactivity.  
(i) Acid anhydride (ii) acid chloride (iii) amide (iv) ester
6. Write the chemical equation of hemiacetal formation.
7. Arrange the following in increasing order of their basic strength in gas phase.  
(i) Primary amine (ii) ammonia (iii) tertiary amine (iv) secondary amine
8. What is Wittig reaction?
9. Give an example of application of alkyne as nucleophile in C-C bond formation.
10. Write the structure of product obtained when toluene is reacted with hot alkaline potassium permanganate.
11. What is crossed Claisen condensation? Give an example.
12. Give any one method of synthesis of butyllithium ( $CH_3CH_2CH_2CH_2Li$ ).

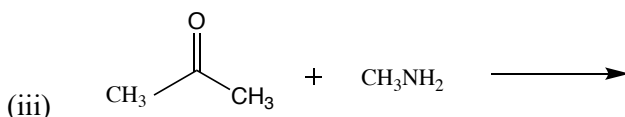
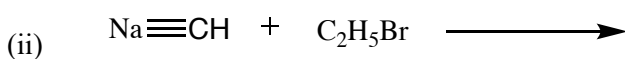
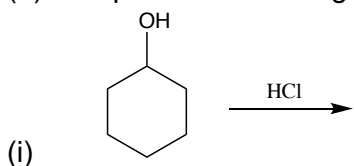
**Part B**

**Answer any FIVE of the following questions**

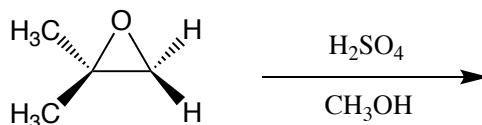
**(5 x 6 = 30)**

13. (a) Draw a labelled energy level diagram for crystal field splitting pattern for octahedral complexes. **(3+3)**  
(b) Give an example for each of the following ligands.  
(i) monodentate (ii) bidentate (iii) hexadentate
14. (a) Write the mechanism of Claisen condensation reaction. **(3+3)**  
(b) Write the keto- and enol- forms of the following compounds.  
(i) 2-propanone (ii) ethanal (iii) cyclohexanone

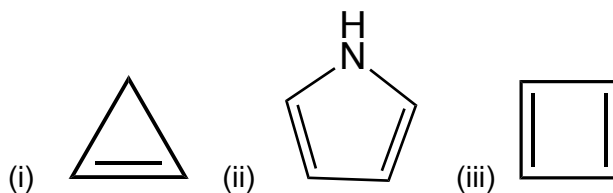
15. (a) Outline the steps involved in the aldol condensation reaction. **(3+3)**  
 (b) Between aldehydes and ketones, which is more reactive and why?
16. (a) What is the product obtained when 2-methylpropene is treated with hydrochloric acid? Justify your answer and write the mechanism of reaction involved. **(3+3)**  
 (b) What is Markovnikov's rule? Explain using a suitable example.
17. (a) Write the chemical reaction of action of nitrous acid on the following: **(3+3)**  
 (i) primary aromatic amine (ii) secondary aromatic amine.  
 (b) Complete the following reactions:



18. (a) What do you mean by oxidative cleavage of alkenes? Explain using a suitable example. **(3+3)**  
 (b) What is the preferred product formed in the following reaction? Justify your answer.



19. (a) Write the mechanism of nitration of benzene. **(3+3)**  
 (b) Identify the following molecules as aromatic, antiaromatic and nonaromatic on the basis of Huckel's rule.



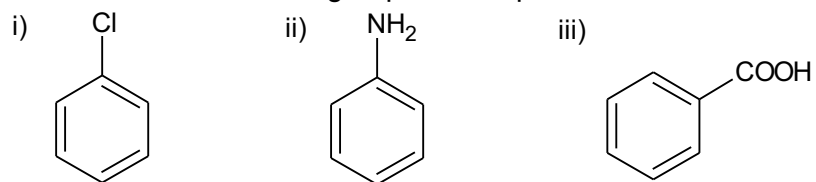
### Part C

Answer any TWO of the following questions

**(2 x 5 = 10)**

20. Between the complexes,  $[\text{Cr}(\text{NH}_3)_6]^{3+}$  and  $[\text{CrF}_6]^{3-}$ , which would absorb in longer wavelength region of visible spectrum? Give reason in support of your answer. (Hint:  $\text{NH}_3$  is stronger field ligand than  $\text{F}^-$ ).

21. Suggest a mechanism to synthesize 3-ethyl-2-pentanone using ethyl acetoacetate as starting material.
22. Identify the following aromatic rings as activating or deactivating based on the substituents attached and state whether the group is ortho-para or meta director.



x-----End of questions-----x