Register No:

Date: 19-11-2020

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

B.Sc. CHEMISTRY- V SEMESTER

SEMESTER EXAMINATION- November 2020

CH 5118-ORGANIC CHEMISTRY

Time: 2 1/2 hrs. **Max.marks:70**

This question paper has three pages and contains three parts.

PART A

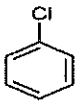
Answer any **SIX** questions. **(2 x 6 = 12)**

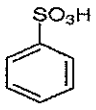
1. Based on Hückel's rule, illustrate how naphthalene is aromatic.
2. How does RMgX react with an alcohol? Identify the stronger base and the stronger acid in the reaction.
3. Show how you can prepare a 3^0 alcohol using RLi.
4. Write the reaction to convert a 2^0 alcohol to ketone.
5. Write acetal formation reaction of aldehydes.
6. What does TMS stand for in the context of NMR spectroscopy? What is it's use?
7. How is 1^0 amine prepared by Gabriel synthesis?
8. What is isoprene rule? What do you mean by a 'diterpene'?

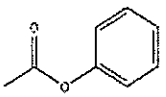
PART B

Answer any **EIGHT** questions. **(6 x 8 = 48)**

9. (a) Using 'resonance theory' explain the structure of benzene.
   (b) Label each of the following aromatic rings as activated or deactivated based on the substituent attached and state whether the group is *-o/-p* or *-m* directing.

i) 

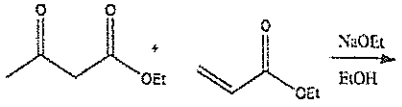
ii) 

iii) 

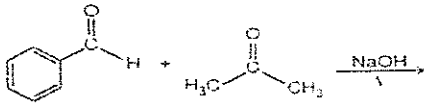
10. Write the general mechanism of electrophilic substitution reaction of benzene. Give the energy profile diagram.

11. (a) Between aldehydes and ketones, which is more reactive towards nucleophilic addition? Give reasons.
    (b) Give the mechanism of base catalysed aldol formation.

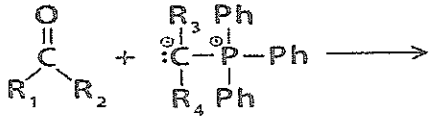
12. Complete the following reactions and name the reactions.
    (a)



(b)



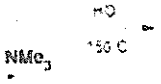
(c)



(2+2+2)

13. (a) Explain the effect of conjugation on UV absorption maximum using suitable examples.
    (b) Predict the number and multiplicity of peaks in the ^1H NMR spectrum of very pure ethanol.

14. (a) Give the products of the following reaction. Indicate the major product .



    (b) Write chemical equations for the reaction of 2^0 and 3^0 aliphatic amines with nitrous acid.

15. (a) Write the diazotization reaction of aniline followed by coupling with phenol.
    (b) Compare the basicity of 1^0, 2^0 and 3^0 alkyl amines in gas phase and give reason for the order.

16. (a) Write the mechanism of nucleophilic substitution at the acyl carbon of acid derivatives (addition-elimination mechanism).
    (b) Show how you would use the acetoacetic ester synthesis to prepare 2-pentanone, $CH_3COCH_2CH_2CH_3$

17. (a) Write chemical equations to show the reaction of acetone with HCN and reduction of the product formed using $LiAlH_4$.
    (b) Give an example each for the preparation of carboxylic acids by
    (i) oxidation of aldehydes (ii) cabonation of Grignard reagent

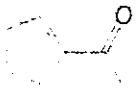
18. (a) What happens when citral is heated with $KHSO_4$? What information about the structure of citral can be derived from this reaction?
    (b) How do you show the point of linkage between pyridine and pyrrolidine rings in nicotine by chemical reactions?

PART-C

Answer any **TWO** questions. **(5x2=10)**

19. (a) Cyclopentadienyl cation whose structure is given below, is antiaromatic. Explain what this means in terms of it's π-electron energy, as compared to that of a corrsponding open chain compound.

    (b) How is the following compound prepared by aldol cyclisation?

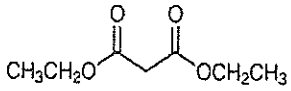


(2+3)

20. A compound with molecular formula C_7H_8O shows IR absorption near 3200-3550 cm^{-1}. It also shows ^{1}H-NMR signals as follows. Suggest a structure for the compound and assign the spectral data to the suggested structure.

δ(ppm)	multiplicity	Number of H
2.43	singlet	1
4.58	singlet	2
7.28	multiplet	5

21. (a) Would you assign a higher or a lower *pka* value to the following compound, as compared to acetone? Why?



(b) Which acid of each pair would you expect to be stronger?

i)

ii)

iii)

(2+3)

.....End of questions.....