

43

1M4M20146

(Pages : 2)

Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE  
Fourth Semester MSc Degree Examination, March/April 2020

MCHE4E06 – Natural Products & Polymer Chemistry

(2018 Admission onwards)

Time: 3 hours

Max. Weightage : 36

### Section A

Answer *all* questions. Each question carries *one* weightage

1. What do you mean by oleoresins? Mention any one oleoresin present in pepper.
2. Discuss the biosynthesis of prostaglandins.
3. How do you establish the position of double bond in cholesterol?
4. Write the structure of Flavone, Flavonol, Isoflavone and Chalcone.
5. Write the steps involved in the biosynthesis of Papaverine.
6. Write the structure of Indigo. Explain a synthetic method of preparation of indigo.
7. Write the structure of the three types of Carotene.
8. What is Kaminsky catalyst? Explain its advantages.
9. How crystallinity of polymer can be estimated from density data?
10. Write a note on photoresponsive polymers.
11. Write the structure, synthesis and applications of PMMA.
12. Explain how the reactivity ratios of monomers participating in a free radical copolymerization can be predicted using Q-e scheme?

(12 x 1 = 12 weightage)

### Section B

Answer any *eight* questions. Each question carries *two* weightage

13. Discuss the classification of natural products based on physiological activity. Give an example for each class.
14. Elucidate the structure of Cortisone.
15. Write the steps involved in the conversion of cholesterol to testosterone.
16. Write the steps involved in the biosynthesis of Papaverine and Quinine.

17. Discuss the classification of Anthocyanins. Explain two colour reactions to detect anthocyanins.
18. Write a note on Squarine dyes.
19. Make a brief note on conducting polymers with examples.
20. Explain how stereoregular polymers are synthesized using Ziegler-Natta catalyst?
21. Explain the synthesis structure and applications of vinyl and acrylic polymers.
22. Explain the thermodynamic data of polymer solution.
23. Differentiate between the static and dynamic methods used in the determination of molecular weights of the polymer.
24. What is gelation? Write a note on branching coefficient.

(8x2 = 16 weightage)

### Section C

Answer any *two* questions. Each question carries *four* weightage

25. Elucidate the structure of Abeitic acid. Discuss the steps of synthesis of Abeitic acid.
26. Explain light scattering method for the determination of molecular weight of polymers.
27. Write the structure of Cholesterol, Cortisone, Ergosterol, Oestrone, Androsterone, Porgestronone, Corticosterone, and testosterone.
28. Write a note on
  - a) Silicone polymers.
  - b) Flourine containing polymers.
  - c) Polycarbonates.
  - d) Polyanilines.

(2x4 = 8 weightage)



44

M4M20145

(Pages : 2)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, March/April 2020

MCHE4B12 – Instrumental Methods of Analysis

(2018 Admission onwards)

Time: 3 hours

Max. Weightage : 36

**Section A**

**Answer all questions. Each carries weightage 1**

1. TG and DTA are complimentary techniques. Justify the statement.
2. What is thermometric titration?
3. What is the role of ion exchanger in demineralization of water?.
4. Write *Ilkovic* equation and explain the terms.
5. Calculate variance for the set of data: 20.3, 20.2, 20.4, 20.1 and 20.3 .
6. What is the function of an atomizer in AAS?
7. What is the main criterion for deciding whether turbidimetry or nephelometry should be used in the analysis of a medium containing suspended particles?
8. What are the advantages of coloumetry over volumetric method?
9. Which ions can be measured with liquid membrane electrodes?
10. Express mechanism for gel permeation chromatography.
11. What is the effect of particle size on a DTA curve?
12. Explain the features of a double beam spectrometer over single beam spectrometer.

**(12 x 1 =12 weightage)**

**Section A**

**Answer eight questions. Each carries weightage 2**

13. Explain briefly principle and applications of AFM.
14. Explain two dimensional paper chromatography.
15. Explain the instrumentations in DSC. What are the advantages of DSC over DTA?
16. What is half wave potential? Give its significance.
17. Write a note on factors affecting TG curve.



Briefly explain the instrumentation of UV-visible spectrophotometry.

Write a note on detectors used in GC.

Discuss the applications of Auger electron spectroscopy.

What is SEM? How do you collect information's in SEM? Explain.

Explain briefly 'Anodic stripping voltammetry'.

Discuss the construction and working of glass electrode.

What is TEM? What are the types of information's would you get from TEM analysis?

Discuss.

**(8 x 2= 16 weightage)**

### **Section C**

**Answer any two questions. Each carries weightage 4**

Discuss the principle involved in HPLC. Give a brief account on the different types of detectors used in this. What are its important applications?

Write a brief account of neutron activation analysis. What are the advantages and disadvantages of this technique?

Discuss various statistical treatments of analytical data.

Write a note on:

- (a) Redox indicators
- (b) Adsorption indicators
- (c) Indicators for non-aqueous titrations
- (d) Metal ion indicators

**(2 x 4 = 8 weightage)**

43

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(Pages : 2)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester MSc Degree Examination, March/April 2020

MCHE4B13 - Advanced Topics in Chemistry

(2018 Admission onwards)

Time: 3 hours

Max. Weightage : 36

**Part A**

**Answer all questions (Each question carry 1 weightage)**

1. What are quantum dots? Give its dimensionality.
2. "Bottom-up technique is more convenient for nano fabrication"-Explain.
3. What are the ways in which nanocatalysis is attractive?
4. Write Z-matrix for formaldehyde.
5. Supramolecules are very common in nature, write down some examples and mention which interaction is present in it.
6. Explain the term self assembly. Which are the forces that drive self assembly?
7. What are the advantages of using solid phase chemistry? For which type of molecules is it advantageous to use solid phase chemistry?
8. What is spider like scaffold? Illustrate its use with an example.
9. What are the Ideal characteristics of targeted drug delivery system?
10. What is a pro drug?
11. Write a brief note on Fisher-Tropsch process.
12. Write a note on water desalination Process.

**[1x12=12 Weightage]**

**Part B**

**Answer any eight questions(Each question carry 2 weightage)**

13. Write down the synthesis and application of any two synthetic polymers.
14. Describe various steps in free radical polymerisations with examples.
15. Write a note on different types of Pople's style basis sets.
16. Briefly discuss Hartree-Fock SCF method.
17. Write a note on Hapten inhibition test.
18. Briefly discuss supramolecular photochemistry.



19. Briefly explain the Houghtons Tea bag procedure for solid phase synthesis.
20. Discuss any four physicochemical properties in drug.
21. Briefly discussed automated parallel synthesis.
22. How does a three way catalyst work?
23. How TPD method is useful for the determination of surface acidity of heterogeneous catalyst?
24. Compare the environmental impact of coal, oil and natural gas.

[2x8=16 Weightage]

### Part C

Answer any two questions (Each question carry 4 weightage)

25. Explain the following
  - a. Application of nanomaterials in medicine and electronics.
  - b. The characterization methods of nanomaterials using STM and AFM.
26. Discuss the type of interactions used in supramolecular chemistry and include a (molecular) example for each interaction.
27. Discuss the following
  - a) Biocatalysis.
  - b) Nanocatalysis.
  - c) Polymer supported catalysis.
28. What are solar cells? Discuss the working principle, fabrication, performance, stability and efficiency of CdS/Cu<sub>2</sub>S solar cell.

[2x4=8 Weightage]