

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE  
Fourth Semester M.Sc Degree Examination, March /April 2019  
MCHE4B13 –Advanced Topics in Chemistry  
(2017 Admission onwards)

Time: 3 hours

Max. Weightage: 36

**Part A****Answer all questions. (Each question carries 1 weightage)**

1. What are nanosensors?
2. Write z-matrix of  $\text{NH}_3$ .
3. Differentiate between host-guest chemistry and self-assembly.
4. What are molecular machines?
5. What is meant by term drug action?
6. Explain prodrug with an example.
7. Explain pharmacophore.
8. Explain the importance of hydrogen bonding in crystal engineering.
9. Explain the design of drug-like molecules using spider-like scaffolds.
10. What is meant by deconvolution?
11. Write a note on bio catalysis.
12. Write a note on the reasons for low efficiency of solar cell.

**(12 x 1 = 12 Weightage)****Part B****Answer any eight questions. (Each question carries 2 weightage)**

3. Illustrate the top-down and bottom-up nano constructions with appropriate examples.
4. Write a short note on supramolecular interactions.
5. Give an account on ELISA and ELOSA tests.
6. What are quantum dots and quantum size effects?
7. Briefly explain Hartree-Fock SCF method.
8. Explain the pharmacokinetic phase of drug action.
9. Give a brief account on the synthesis and applications of nanocomposites.
10. What is molecular recognition? Explain the different factors of molecular recognition.

21. Explain the principle of nano-lithography.
22. Briefly explain Haughton's tea bag procedure for solid phase synthesis of peptides.
23. Discuss briefly 'Temperature-Programmed Desorption' method for determination of surface acidity of catalysts.
24. Write a short note on solar heaters and solar cookers.

(8 x 2 = 16 Weightage)

### Part C

Answer any two questions. (Each question carries 4 weightage)

25. Write short note on
  - (a) Fischer-Tropsch process.
  - (b) Preparation of Zeolites.
26. Discuss principle and fabrication of Dye sensitized solar cells based on  $\text{TiO}_2$  or  $\text{ZnO}$
27. Describe in detail the split-pool and parallel methods of solid phase synthesis of peptide.
28. What are the Quantitative-Structure-Activity relationships important in drug design?

(2 x 4 = 8 Weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE  
Fourth Semester M.Sc Degree Examination, March /April 2019  
MCHE4B12 –Instrumental Methods of Analysis  
(2017 Admission onwards)

Time: 3 hours

Max. Weightage: 36

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

- Solve the following equations using the correct number of significant figures.
  - $34.683 + 58.930 + 68.35112$
  - $45001 - 56.355 - 78.44$
- Explain the use of any two indicators for nonaqueous titrations.
- Explain the use of EBT in complexometric titrations?
- What are the characteristics of ion selective membranes?
- What are the advantages of biocatalytic membrane electrodes?
- Explain the role of supporting electrolyte in polarographic analysis.
- What features of a double beam spectrophotometer differentiate it from a single beam spectrophotometer?
- What is the principle of fluorimetry?
- What is ESCA? Explain.
- Write the applications of atomic fluorescence spectrometry
- How is gamma radiation measured?
- What are the detectors used in gas chromatography?

**(12 x 1 = 12 weightage)****Section B****Answer any eight questions. Each carries weightage 2**

- Write the different methods for the minimisation of determinate errors.
- Write a note on confidence limits.
- Explain the different types of EDTA titrations.

16. Discuss the limitations of glass electrode.
17. Explain the working, advantages and disadvantages of dropping mercury electrode.
18. Explain the principle and instrumentation of STM.
19. What are the advantages of spectrophotometric end point detection over other methods?
20. Differentiate between turbidimetry and nephelometry.
22. Explain the term spectral interference with reference to AAS. How is it corrected?
23. Discuss the instrumentation in DTA.
24. Write a note on ion exchange chromatography.

(8 x 2 = 16 weightage)

### Section C

Answer two questions. Each carries weightage 4

25. a) Analyses of a sample of iron ore gave the following percentage values for the iron content.:  
7.08, 7.21, 7.12, 7.09, 7.16, 7.14, 7.07, 7.14, 7.18, 7.11. Calculate the standard deviation and coefficient of variation.  
b) Explain with an example the variation of potential during a redox reaction.
26. a) Discuss the construction and working of glass electrode.  
b) Explain the principle, advantages and disadvantages of amperometric titrations..
27. a) Write a note on various types of ion selective electrodes.  
b) Explain the importance of selectivity coefficient.
28. a) Write a note on neutron activation analysis.  
b) Discuss the principle and applications of HPLC

(2 x 4 = 8 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE  
Fourth Semester M.Sc Degree Examination, March /April 2019  
MCHE4E06 –Natural Products & Polymer Chemistry  
(2017 Admission onwards)

Time: 3 hours

Max.weightage: 36

**Section A**

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

- 1 Briefly describe the biosynthetic pathway of papaverine in plants.
- 2 How do you isolate alkaloids from plants?
- 3 Write the structure of the three major compound present in the essential oil of citronella oil.
- 4 Write the general structure of flavones and chalcones.
- 5 What is isoprene and special isoprene rule? Write the structure of a terpenoid which does not obey this rule.
- 6 What do you mean by oleoresins? Mention any one oleoresin present in pepper.
- 7 What do you mean living polymers?
- 8 Write an example for group transfer polymerization reactions.
- 9 Give an account of glassy and rubbery states of polymers.
- 10 Write a note on stereo-regular polymers.
- 11 How it is possible to predict the reactivity ratios of monomers participating in a free radical copolymerization using Q-e scheme?
- 12 Write the Mayo- Walling equation of steady state. What is its significance?

(12 x 1 = 12 weightage)

### Section B

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

- 13 What are supramolecular systems? Illustrating an example, describe how the supramolecular systems exhibit molecular recognition.
- 14 Write a synthetic method for the preparation of Prostaglandin  $\text{PGF}_{2\alpha}$ .
- 15 Distinguish between dyes and Pigments. Discuss the importance of cyclic tetrapyrrole systems.
- 16 Discuss the structure elucidation of abietic acid.
- 17 Write a method of isolation of alkaloids. Describe the classification methods of alkaloids.
- 18 Describe the biosynthetic pathway of fatty acids and steroids.
- 19 Write a note on the use of Metallocenes in polymer chemistry.
- 20 Give an account of silicone rubbers.
- 21 Describe the synthesis and application for the following polymers. (a) PVA (b) PAN (c) PMMA
- 22 Differentiate between the static and dynamic methods used in the determination of molecular weights of the polymer.
- 23 Discuss using one example each for (a) Photo-refractive Polymers (b) photo-responsive polymers.
- 24 What is  $T_g$ ? What are the factors affecting  $T_g$ ?

(8 x 2 = 16 weightage)

### Section C

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

- 25 Derive Flory-Huggins equation for polymer solutions.
- 26 Explain the structural elucidation of atropine.
- 27 (a) Explain the kinetics and mechanism of cationic polymerisation.  
(b) What is Ziegler – Natta catalysts? Illustrating the mechanism of action, how it is useful in controlling polymerization process. What are its disadvantages?
- 28 What are hormones? Give classification of and physiology of Hormones. How will you elucidate the structure of Progesterones, and Estrogens?

(2 x 4 = 8 weightage)