

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
Fourth Semester M.Sc Chemistry Degree Examination, April 2024
MCH4C12 – Instrumental Methods of Analysis
(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

Section A Short Answer

Answer 8 Questions out of 12.

Each question carries a weightage of 1 (8 X 1 = 8)

- 1) Four crystals were grown from a solution and the length of each crystals in millimetres are 10, 8, 6 and 8. Calculate the standard deviation of the length of the crystals.
- 2) What are redox indicators ? Give any two examples.
- 3) Explain the principle of complexometric titrations.
- 4) Explain the limitations of glass electrodes.
- 5) Explain the applications of polarography.
- 6) What are the advantages of amperometric titrations.
- 7) What are the advantages of fluorimetry?
- 8) Discuss the principle of Auger electron spectroscopy.
- 9) Briefly discuss the theory of X-ray diffraction spectroscopy
- 10) Write any four applications of Dynamic Mechanical Analysis (DMA)
- 11) Explain the principles of Differential Scanning Colorimetry (DSC).
- 12) Explain the application of thermometric titrations.

Section B Short Essay

Answer 4 Questions out of 7.

Each question carries a weightage of 3 (4 X 3 = 12)

- 13) Explain the process of post precipitation and co precipitation in gravimetric analysis.
- 14) Write an account of titrations in nonaqueous media.
- 15) Explain the principle and application of chronopotentiometry.
- 16) Write a note on coulometry.
- 17) Differentiate nephelometry and turbidometry.
- 18) Explain the theory, instrumentation and applications of SEM.
- 19) Explain the principle and instrumentation of Thermomechanical analysis (TMA)

Section C Essay

Answer 2 Questions out of 4.

Each question carries a weightage of 5 (2 X 5 = 10)

- 20) Explain the classification of errors and the methods of minimisation of errors.
- 21) Discuss different polarographic techniques and comment on their detection limit.
- 22) Discuss the theory principle and instrumentation of atomic absorption spectroscopy.
- 23) Explain the principle and advantages of various detectors used in gas chromatography.

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Chemistry Degree Examination, April 2024

MCH4E06 – Natural Products & Polymer Chemistry

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

Section A Short Answer**Answer 8 Questions out of 12.****Each question carries a weightage of 1 (8 X 1 = 8)**

- 1) How are carbohydrates classified?
- 2) Establish the nature and position of OH in cholesterol.
- 3) Write the structure of Oesterone, Androsterone, Cortisone, Ergosterol and Corticosterone.
- 4) Write the steps involved in the biosynthesis of Quinine.
- 5) Explain two colour reactions to detect anthocyanins.
- 6) What are the structural differences between Phthalocyanin and Porphyrin?
- 7) What is kinetic chain length? How is it related to degree of polymerization?
- 8) Distinguish between T_g and T_m of polymers.
- 9) What is meant by poly dispersity index? Explain its significance.
- 10) Give the commercial importance of polycarbonates.
- 11) Write a short note on polymer solutions.
- 12) How can we avoid the temperature range problems in liquid crystals?

Section B Short Essay**Answer 4 Questions out of 7.****Each question carries a weightage of 3 (4 X 3 = 12)**

- 13) Write the steps involved in conversion of Cholesterol to Testosterone.
- 14) Elucidate the structure of Androsterone.
- 15) Write a note on Squarenes, Cyanines and Phthalocyanines.
- 16) Write a note on supramolecular chemistry.
- 17) What is chain transfer constant? How can it be measured?
- 18) Discuss the principle and applications of membrane osmometry for the determination of the molecular weight of polymers.
- 19) Explain the synthesis, structure and applications of PVC, PVA and PAN.

Section B Essay
Answer 2 Questions out of 4.
Each question carries a weightage of 5 (2 X 5 = 10)

- 20) Discuss the isolation methods of essential oils. Write the structure of the constituents of oleoresins of pepper, chilly and ginger.
- 21) Write the steps involved in the biosynthesis of Papaverine and Quinine.
- 22) Discuss the following polymerization techniques.
 - a) Solution polymerization
 - b) Suspension polymerization
 - c) Emulsion polymerization
- 23)
 - a) What are conducting polymers? Write down the conditions for a polymer to become conducting.
 - b) What is photoresist? Discuss the classification of negative and positive photoresist with examples for each.

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41
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Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
Fourth Semester M.Sc Chemistry Degree Examination, April 2024
MCH4E09 – Advanced Topics in Chemistry
(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

Section A Short Answer
Answer 8 Questions out of 12.
Each question carries a weightage of 1 (8 X 1 = 8)

1. What information can EDAX provide about a sample?
2. What are the advantages of the Gaussian programme?
3. What are basis sets? Why it is important?
4. What are calixarenes? Why it is called so?
5. Explain the working principle of supramolecular electronic devices.
6. What are analgesics? Explain with examples.
7. Differentiate between homogenous and heterogeneous catalysts?
8. Explain the working principle of solar cookers.
9. What is the role of iodide/triiodide in DSSC?
10. Discuss any four Film deposition techniques.
11. How does the stability of dyes influence the efficiency of dye-sensitized solar cells?
12. Discuss the working principle of DLS.

Section B Short Essay
Answer 4 Questions out of 7.
Each question carries a weightage of 3 (4 X 3 = 12)

13. What are the advantages of ab initio methods? Explain.
14. How do you construct the Z-matrix of methanol?
15. Write a short note on the physicochemical factors and biological activities.
16. Differentiate between SAR and QSAR.
17. Write a short note on the selectivity of catalysts.
18. Write a short note on the fabrication of CdS/Cu₂S solar cells.
19. Briefly discuss the Electronic structure of organic semiconductors.

Section C Essay

Answer 2 Questions out of 4.

Each question carries a weightage of 5 (2 X 5 = 10)

20. Briefly explain the working of electron microscopies (i) TEM and (ii) SEM.
21. Explain the different methods used for the determination of surface area and pore structure of catalysts.
22. Explain the principle and applications of phase transfer catalysis.
23. Briefly discuss the applications of nanomaterials.