D 31109

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Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2022

(CBCSS)

Chemistry

CHE 3E 03—GREEN AND NANO CHEMISTRY

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Section A

Answer any **eight** *questions.*
Each question carries a weight of 1.

1. Explain the term " Atom Economy" of a reaction. How does it differ from "% yield" of a reaction ?
2. How does microwave irradiation promote reactions ?
3. Write an example of an ionic liquid and show how it can be prepared.
4. Describe the properties unique to a nanomaterial such as nanogold. How can nanogold be prepared ?
5. Explain the term solvothermal synthesis of nanomaterial.
6. Describe the principle and working of "scanning probe microscopes". What are these used for ?
7. Write the structure of a rotaxane and a catenane.
8. Explain surface plasmon resonance. How can it be studied ?
9. Explain the term "carbon clusters". How are these prepared ?
10. Describe the structure and bonding in C60.

(8 × 1 = 8 weightage)

Section B

Answer any **six** *questions.*
Each question carries a weight of 2.

11. Describe the green solvents that are environmentally friendly. List their advantages.
12. Discuss the benefits of the use of microwave energy versus conventional thermal heating as an alternative energy source in carrying out chemical reactions. Write examples.

Turn over

13. What are the structural features of phase transfer catalysts ? How do these work ? Explain with examples.

14. Discuss how nanomaterials can be synthesised by : (i) Top-down ; and (ii) Bottom-up methods. Give examples.

15. Describe with examples the use of solid acids in green chemistry.

16. What is meant by hydrodynamic cavitation ? How does it arise and what are its applications ?

17. Write a note on : (i) Fullerenes that are larger and smaller than C60 ; and (ii) Doping of C60.

18. What are nanowires ? Write an account of their synthesis, properties and applications.

(6 × 2 = 12 weightage)

Section C

Answer any **two** *questions.*
Each question carries a weight of 5.

19. Discuss the principles on which the practise of green chemistry is based.

20. Write short notes on :

    (i) Hydrothermal methods.

    (ii) Sol-gel methods.

    (iii) Gas phase condensation methods ; and

    (iv) Reverse micelle methods for the synthesis of nanomaterials.

21. Describe briefly the microscopic techniques used for the characterization of nanomaterials.

22. Write an account of carbon nanotubes with attention to types, preparation, characterization, structure, properties and applications

(2 × 5 = 10 weightage)