D **416B4** **Total pages: 2**

Register No: …… Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

EIGHTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2024

Chemical Engineering

(2020 SCHEME)

Course Code : 20CHT446

Course Name : Nanomaterials and NanoTechnology

Max. Marks : 100 **Duration:3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Write a short note on the history of nanomaterials.
2. Differentiate zeta potential and surface charge of the nanoparticles.
3. Give any three salient features of green synthesis of nanomaterials.
4. Differentiate between laser pyrolysis and laser ablation.
5. Write a short note on nanobiosensors.
6. Highlight any three important properties of nanocomposite materials.
7. Highlight the differences between scanning electron microscopy and transmission electron microscopy.
8. Secondary electrons and Auger electrons are not same. Justify the statement.
9. Write short notes on nanocatalysis.
10. Give any two examples of nanocatalysis and its advantages.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. Discuss on metallic nanomaterials and illutstrate surface plasmon resonance with its optical applications. 14

OR

12. Describe zeta potential and methodology used to determine the zeta potential of nanoparticles. 14

MODULE II

13. Write a detailed note on the synthesis, properties and applications of carbon nanotubes. 14

OR

14. Explain mechanical milling, laser sputtering and electrochemical explosion for the synthesis of nanoparticles with the help of neat diagrams. 14

MODULE III

15. Describe the mechanism of synthesis of ceramic matric nanocomposites. 14
    i) Matrix forming by pyrolysis.
    ii) Matrix froming by sintering.

OR

16. Explain the mechanism of controlled drug delivery using nanotechnology with a suitable example. 14

MODULE IV

17. Illustrate the working principle and instrumentation of a differential thermal analyzer. 14

OR

18. Illustrate the working of dynamic light scattering instrument for the determination of nanoparticle size distribution. 14

MODULE V

19. Explain the mechanism of atomic manipulations using scanning tunneling microscopy with a neat schematic diagram. 14

OR

20. Explain the principle, working and applications of a micro electro-mechanical system using a neat diagram. 14

****