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Question Paper Code : 11229

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026

First Semester

Civil Engineering

CY3151 – ENGINEERING CHEMISTRY

(Common to : All branches (Except Marine Engineering))

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between scale and sludge in boilers.
2. Define break point chlorination.
3. Differentiate between nanomaterials and bulk materials.
4. Define nanorod and mention one of its applications.
5. What is the reduced phase rule? Give an example.
6. What are hybrid composites? Give one example.
7. What is octane number and how is it related to knocking in petrol engines?
8. What is spontaneous ignition temperature? Give one example.
9. What are supercapacitors?
10. What is a microbial fuel cell? Give one application.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe the various processes involved in municipal water treatment. (10)
- (ii) Explain the principle of reverse osmosis. (6)

Or

- (b) With neat diagrams, explain the working principles, chemical reactions, advantages, and limitations of Ion Exchange Demineralisation and the Zeolite process.

12. (a) Discuss about the optical, electrical, mechanical, and magnetic properties of nanomaterials with suitable examples.

Or

- (b) (i) With neat diagrams, describe the preparation of nanomaterials using laser ablation and chemical vapor deposition methods.
- (ii) Discuss the applications of nanomaterials in medicine and electronics.

13. (a) Explain the one-component water system with a neat phase diagram. Discuss the different phase equilibria involved.

Or

- (b) Discuss the properties and applications of Metal Matrix Composites, Ceramic Matrix Composites and Polymer Matrix Composites?

14. (a) Explain the manufacture of metallurgical coke by the Otto-Hoffmann method with a neat diagram.

Or

- (b) Explain the ORSAT method for flue gas analysis with a neat diagram. What is the significance of the analysis in fuel combustion?

15. (a) (i) Describe the working of a light water nuclear power plant with a help of neat diagram. (8)
- (ii) Discuss the working principles and applications of solar cells. (8)

Or

- (b) (i) With a neat diagram, explain the construction and working of lead acid battery. (8)
- (ii) Explain the construction and working of $H_2 - O_2$ fuel cells. (8)