

**Reg. No. :** \_\_\_\_\_

**Question Paper Code : 70077**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

First Semester

Civil Engineering

CY 3151 — 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. Why is calgon conditioning better than phosphate conditioning?
  2. Write the importance of break point chlorination.
  3. Write any two application of nanomaterials.
  4. What are carbon nano tubes? What are its types?
  5. Give the definition of a hybrid composite with an example.
  6. Represent the reduced phase rule with an equation. When is it used?
  7. Mention few advantages of diesel over petrol as a fuel.
  8. Distinguish between octane number and cetane number.
  9. What are the advantages of perovskite solar cells?
  10. Write the definitions of critical mass and multiplication factor in a fission reaction.

## PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the differences between (1) sludge and scale, (2) hard water and soft water (3) priming and foaming (4) internal treatment and external treatment. (8)

- (ii) Explain (1) cation and anion exchangers (2) COD and BOD measurement. (8)

Or

- (b) (i) With a neat diagram, explain the principle, process, advantages and limitations of Zeolite process. (8)

- (ii) Outline a method to determine various alkalinites in a given sample of water. (8)

12. (a) (i) Explain the differences between nanoparticle nanocluster, nanorod, nano wire and nanotube with respect to their structure, property and use. Give examples. (10)

- (ii) State and brief on any five applications of nanomaterials in medical field. (6)

Or

- (b) (i) Compare the optical, electrical, mechanical and magnetic properties of bulk and nanomaterials with examples. (10)

- (ii) How is carbon Nanotubes prepared by CVD process. (6)

13. (a) (i) Explain the one component water system with a phase diagram. Explain the system using phase rule. (12)

- (ii) Write a note on polymer matrix composites. (4)

Or

- (b) (i) Draw the lead silver phase diagram and explain using phase rule. (12)

- (ii) Write a note on Pattinson process. (4)

14. (a) (i) With a schematic diagram of the Orsat apparatus write the procedural steps involved in the flue gas analysis. (8)

- (ii) What is meant by knocking in IC engine? Explain the mechanism. (8)

Or

- (b) Discuss the manufacture of metallurgical coke by Otto Hoffmann method byproduct recovery method with a neat sketch. (16)

15. (a) Discuss the construction and working of a nuclear reactor with a neat diagram. Explain the functioning of its components in detail. (16)

Or

- (b) (i) Schematically represent a Li-ion battery and label its important features. (3)

- (ii) What is the difference between capacitor and a supercapacitor? (3)

- (iii) Write the anodic and cathodic reactions involved during charging and discharging of a Pb-Acid battery. (10)