B **569B2** **Total pages: 2**

Register No: …… Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER B.TECH DEGREE EXAMINATION(R), NOVEMBER 2024

Common to Electrical and Electronics Engineering & Food Technology

(2024 SCHEME)

Course Code : 24BSE1003-A

Course Name : Engineering Chemistry

Max. Marks : 50 **Duration:2.5 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Write any three essential qualities required for drinking water.
2. List any three applications of liquid crystals.
3. How Henderson's equation is applied in the determination of pKa of a weak acid?
4. How Nernst equation is utilised in the potentiometric estimation?
5. Name the instrument used for determining the calorific value of a fuel? Give the equation for calculating HCV when this instrument is used for the experiment.

PART B

(Answer one full question from each module, each question carries 7 marks)

MODULE I

6. 1.0 g of $CaCO_3$ was dissolved in HCl and diluted to 1 litre and shaken well. 50 ml of this standard hard water requires 45 ml of EDTA while 50 ml of sample hard water requires 18 ml of EDTA. On the other hand, 50 ml of boiled hard water sample requires 12 ml of EDTA solution. Calculate total, temporary and permanent hardness of the water sample. 7

OR

7. How suspended impurities and microorganisms are removed during municipal water treatment? 7

MODULE II

8. Explain the preparation of Phenol-formaldehyde resin. Mention its two properties and two applications. 7

OR

9. What are nanomaterials? Explain its classification based on chemical composition. 7

MODULE III

10. Explain any two cathodic protection methods. 7

OR

11. Explain the construction of calomel electrode with a neat diagram. 4
    Calculate the single electrode potential of Zn electrode dipped in 0.50 M $ZnSO_4$ solution at 24°C. 3
    Given that $E^0_{Zn^{2+}/Zn}$= - 0.76 V

MODULE IV

12. Explain the instrumentation of thermogravimetric analysis (TGA) and give any two applications of TGA. 7

OR

13. Explain the principle and instrumentation of X-ray diffraction studies (XRD). 7

MODULE V

14. What are lubricants? How are they classified? 7

OR

15. Describe any three properties of lubricants with their significance. 7

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