

FACULTY OF ENGINEERING**B.E. II – Semester (AICTE) (Suppl.) Examination, December 2019****Subject: Chemistry****Time: 3 Hours****Max.Marks: 70****Note: Answer all questions from Part-A and answer any five questions from Part-B****PART – A (10x2 = 20 Marks)**

- 1 Give Nernst equation for Calomel electrode
- 2 Explain the difference between electrode potential and half cell emf
- 3 Give the importance of break point chlorination
- 4 Why is an Iron pole inside the water corroded?
- 5 What are the monomers of Kevlar?
- 6 What are bio-degradable polymers? Give examples.
- 7 Define cetane number and Give its significance
- 8 Why are combustion calculations made?
- 9 Give bio-diesel combustion reaction
- 10 Explain the role of a catalyst with respect to the principles of green chemistry.

PART- B (50 MARKS)

- 11 a) Explain determination of pH of a solution using Quinhydrone electrode. (6)
- b) Calculate the thermodynamic parameters for the reaction at 25⁰C. (4)
 $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$. The temperature coefficient of emf is -0.25 mV/deg.
 The reduction potentials for Zn and Fe are -0.76V and -0.44V respectively.
- 12 a) Explain the theory of electro chemical corrosion taking rusting of Iron as an example. (5)
- b) A 100ml sample hard water required 60ml of 0.01M EDTA solution till Eriochrome black-T endpoint. After boiling the sample hard water, filtration and making it 100ml required 20ml of 0.01M EDTA solution up to Eriochrome black-T end point. Calculate the temporary hardness and the permanent hardness of hard water. (5)
- 13 a) Compare thermosets with thermoplasts with examples. (4)
- b) Explain conduction mechanism in poly acetylene and give applications of conducting polymers. (6)
- 14 a) Explain catalytic cracking by moving bed method giving its advantages. (6)
- b) A coal sample was analysed to have C=85% , H=5% , O=4% , S=1% , moisture =2% , N=0.5% and ash=2.5%. Calculate the minimum weight and volume of air required for complete combustion of 1kg of coal. (4)
- 15 a) Give sources of bio-diesel and preparation of bio-diesel. Compare bio-diesel with diesel. (6)
- b) Classify composites and give their applications. (4)
- 16 a) Discuss construction of lithium ion battery and discuss its chemistry and uses. (5)
- b) Explain cathodic protection methods to prevent corrosion and discuss where these methods are used. (5)
- 17 a) Describe construction and working of methanol oxygen-fuel cell and explain advantages of fuel cells. (6)
- b) Compare composition, properties and uses of LPG with CNG. (4)

FACULTY OF ENGINEERING

B.E. II-Semester (AICTE) (Suppl.) Examination, December 2019

Subject: Physics

Time: 3 Hours

Max. Marks: 70

Note: Answer all questions from Part-A and any five questions from Part-B

Part – A (20 Marks)

1. Give the definition of a crystal. Mention (only) Types of crystal systems.
2. What is Bragg's law? Explain each term in it
3. What is a Schottky defect?
4. Draw I-V Characteristic graph of a P-N junction diode for forward and reverse bias
5. What is Hall effect? Mention few applications of it.
6. What is wave function? Mention properties of wave function
7. Give the statement of Poynting theorem? Give its significance
8. What is Meissner effect? Give two applications of superconductors.
9. Distinguish between spontaneous emission and stimulated emission.
10. Define acceptance angle and Numerical aperture.

Part – B (50 Marks)

11. Describe Powder diffraction method for determination of Lattice constant.
12. What are crystal defects? Discuss in detail about all the defects present in the crystals.
13. Explain in detail Kronig-Penney model and its significance
14. Obtain expression for electronic polarizability. Discuss frequency and temperature dependence of dielectric polarization.
15. Obtain Time dependent Schrodinger wave equation.
16. Obtain the equation of a plane wave in free space.
17. What are the characteristics of LASER. Obtain expressions for Einstein's coefficients. Mention application of Lasers.

FACULTY OF ENGINEERING**B.E. II – Semester (CBCS) (Backlog) Examination, December 2019****Subject: Engineering Chemistry – II****Time: 3 Hours****Max.Marks: 70****Note:** Answer all questions from Part-A and answer any five questions from Part-B**PART – A (10x2 = 20 Marks)**

- 1 The resistance of a conductivity cell filled with 0.098N solution of KCl is 214 ohms at 25°C. Calculate the equivalent conductance of KCl solution, if the cell constant is 0.078cm^{-1} .
- 2 Write the Nernst equation for the electrode, potential of metal-metal ion electrode.
- 3 Differentiate primary and secondary batteries.
- 4 Write the Hydrogen–Oxygen fuel cell reactions for oxidation and reduction processes.
- 5 Explain galvanic corrosion.
- 6 Write four factors affecting rate of corrosion.
- 7 Write the Dulong's formula for the calculation of calorific value.
- 8 What is trans-esterification.
9. Define composite material.
- 10 Classify liquid crystals and explain them.

PART – B (10x5 = 50 Marks)

- 11 a) The equivalent conductivities at infinite dilution (Λ^∞) for CH_3COONa , HCl and NaCl are 91.0, 426.16 and $126.45\text{ ohm}^{-1}\text{ cm}^2\text{ eq}^{-1}$ respectively. Calculate the degree of dissociation constant, if the Λ^∞ of CH_3COOH is $130.0\text{ ohm}^{-1}\text{ cm}^2\text{ eq}^{-1}$. 5
 b). Explain the effect of dilution on various types of conductivities. 5
- 12 a) Describe lead–acid battery with discharging and charging reactions. 6
 b) Describe Methanol-Oxygen fuel cell. Write its reactions for oxidation and reduction processes. 4
- 13 a) Write a note on electrochemical corrosion. 6
 b) What is hot- dipping?
 Explain
 i) Galvanising ii) Tinning. 4
- 14 a) Explain the proximate analysis of coal and give its importance. 5
 b) What is knocking? Explain i) octane number ii) cetane number 5
- 15 a) What are the constituents of composites? Write the advantages and applications of composites. 5
 b) Write principles of green chemistry and give two examples of clean green technology. 5
- 16 a) Explain the determination of pH of a solution using quinhydrone electrode. 6
 b) Describe standard hydrogen electrode. Give its representation and write the reactions for oxidation and reduction processes. 4
- 17 a) What are the constituents of paint? Explain their functions. 6
 b) A sample of coal was found to contain the following composition.
 C= 81%, H= 5%, O = 8%, N = 1%. S =1% and ash = 4%. Calculate minimum amount of air required for complete combustion of 1kg coal sample. 4
