Code No. E-5870/N/AICTE

FACULTY OF ENGINEERING

B.E.(EEE/EIE/CSE/CME/DS) I-Semester (AICTE)(Main & Backlog) Examination, February/March 2023

Subject: Chemistry

ime: 3 Hours **Max. Marks: 70**

ote: (i) First question is compulsory and answer any four questions from the remaining six questions. Each questions carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

(a) Differentiate between Galvanic and Electrolytic cell.
(b) How do you sterilize water by Chlorination?
(c) Write monomeric units of Nylon 6:6 polymer.
(d) Express Dulong's formula for the calculation of calorific value.
(e) What are the important sources of Biodiesel?
(f) Define Pitting corrosion.
(g) Explain any four requirements of a good fuel.

(a) How do you determine the P^H of a solution using Quinhydrone electrode?
(b) Define fuel cell. Discuss the construction and applications of Methanol-Oxygen fuel cell.

(a) Write the principle of EDTA method. Explain the determination of hardness of water by EDTA method.
(b) Define Electrochemical corrosion. Discuss the mechanism of electrochemical corrosion in detail.

(a) What are conducting polymers? Explain the mechanism of conduction in Polyacetylene.
(b) Define Biodegradable polymer. Discuss the properties and applications of Polylactic acid.

(a) Define Cracking. Illustrate the Catalytic cracking by Moving bed method.
(b) A sample of coal contain: C=80%; H=5%; O=1%; N=2% remaining being ash. Calculate the amount of minimum air required for complete combustion of 1 Kg of coal sample.

(a) Discuss the principles of Green chemistry in detail.
(b) Define composites. Explain the important applications of Composites.

(a) Explain the construction of Calomel electrode with a neat diagram.
(b) Discuss the surface coating process by Galvanizing method.

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Code No. D-2337/N/AICTE

FACULTY OF ENGINEEERING

B.E. (ECE/M/P/AE) / (AI& DS, AI& ML, IoT, IT) II - Semester (AICTE) (Main & Backlog)
(New) Examination, September/ October - 2022

Subject : Engineering Chemistry / Chemistry

Time : 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) State standard electrode potential.
   b) Differentiate between primary and secondary battery.
   c) State reverse osmosis.
   d) Outline the sacrificial anodic protection of corrosion controlling method.
   e) Explain the applications of conducting polymers.
   f) What is CNG and LPG.
   g) Give any two examples of clean technology.

2. a) Derive Nernst equation.
   Standard electrode potential of Zn^{+2} is (-0.076V). Calculate the electrode potential of 2M Zn^{+2} solution at 300K
   b) Describe the construction of Zn-Carbon battery in detail with neat diagram.

3. a) What is mean by de-ionized water . Explain the preparation of de-ionized water by Ion-Exchange method.
   b) Explain the factors effecting the rate of corrosion.

4. a) Explain the preparation properties and applications of polylactic acid and Nylon 6.6.
   b) Differentiate between thermoplastics and thermosetting resins.

5. a) Describe the Ultimate analysis of coal and its significance.
   b) Calculate the weight of Air required for combustion of 1 Kg of coal containing 75% of Carbon , 10% of Hydrogen, 3% of Nitrogen, 8% of Oxygen and 4% of Ash.

6. a) What are the composite materials? Discuss the types of composites.
   b) What are the sources of a bio-diesel? Explain the concept of transesterification and discuss the principles of green chemistry.

7. a) Explain the classification of fuels. How to prepare petroleum by fractional distillation.
   b) Explain the classification of conducting polymers and write the mechanism of conduction in poly-acetylene.

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Code No. D-2014/O/BL/AICTE

FACULTY OF ENGINEERING

B.E. (ECE, M/P, A.E, CSE/CME, IT) II - Semester (AICTE) (Backlog) (Old) Examination, September/ October – 2022

Subject: Chemistry

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all the questions. **(10 x 2 = 20 Marks)**

1. Define Electrode potential. Write Nernst equation for calculation of Electrode potential.
2. Define fuel cell. Write the cell reaction of CH_3OH-O_2 fuel cell.
3. What are the various units of hardness?
4. How is Galvanic Corrosion explained?
5. Write the method of preparation of Buna-S rubber and mention its two applications.
6. How is Functionality defined and what are the various types of monomers based functionality?
7. Differentiate LCV and HCV.
8. What is the composition of Gasoline and mention its uses?
9. Define composite materials and write two applications of them.
10. What is Trans esterification and what is its purpose?

PART – B

Note: Answer any five questions. **(5x10 = 50 Marks)**

11. (a) How is Lead – Acid storage battery constructed? Explain its functioning with cell reactions.
    (b) Calculate EMF of the following electrochemical cell at 298K
    $Zn(s)\ /Zn^{+2}(0.01M)\ //\ Cu^{+2}\ (0.001M)/Cu(s)$
    E° of Cu^{+2}/Cu is 0.34 V and Zn^{+2}/Zn is -0.76V.

12. (a) What is Cathodic protection and discuss the techniques available to carry it?
    (b) 100 ml of a water sample requires 20 ml of 0.01M EDTA solution to get the end point in a cmoplexometric titration. 100 ml of same water sample after eliminating temporary hardness requires 10 ml of same EDTA solution to get the end point. Calculate total temporary and permanent hardness of that water sample.

13. (a) Explain the preparation, properties and engineering applications of Bakelite and Nylon 6,6.
    (b) Write the differences between Thermoplastic and Thermosetting plastics.

14. (a) Discuss the following:
    (i) Octane number (ii) Cetane number.
    (b) Calculate the Gross and Net calorific values of a coal having the following composition Carbon = 80%, Hydrogen = 10%, Sulphur = 2%, Nitrogen = 2%, Rest is ash. (Latent het of steam is 587 cal/gr).

15. (a) How are Composite materials classified? Explain.
    (b) Write a note on Clean Technologies.

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16. (a) What are primary and secondary fuels? Describe the classification of coal into various ranks.
    (b) What are the various disinfection techniques available in potable water treatment and explain what is Break point chlorination.

17. (a) Explain the Ultimate analysis of coal and give its significance.
    (b) Mention the composition and uses of LPG and CNG.

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Code No: D-2331/N/BL/ AICTE

FACULTY OF ENGINEERING

B.E.(EEE/EIE/CSE/CME/DS) I Semester (AICTE) (Backlog) (New) Examination, September / October-2022

Subject: Chemistry

Time : 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) Differentiate between electrode potential and cell potential.
   b) Write any two units of hardness of water.
   c) Define degree of polymerization.
   d) How does the fuel can rated using Octane and Cetane number.
   e) Classify composites based on matrix.
   f) Write a note on Break point Chlorination.
   g) What are the important fractions of petroleum?

2. a) Define Reference electrodes. Disucss the construction of Calomel electrode in detail.
   b) Define secondary batteries. Explain Lead-Acid battery with its relevant reactions as electrolytic and voltaic cell.

3. a) Explain the determination of hardness of water by EDTA method.
   100ml. of water sample containing 1gm of $CaCO_3$ per litre required 18ml. of EDTA solution for titration. 22ml. of same EDTA required by 100ml. of hard water sample. Calculate total hardness of water.
   b) Discuss the factors influencing the rate of corrosion.

4. a) Write the preparation, properties and applications of the following polymers:
   i) Bakelite ii) Buna-S
   b) Define conducting polymers. Explain the mechanism of conduction in polyacetylene.

5. a) Calculate the Gross and Net calorific value of coal having the following composition:
   C = 85%, H = 8%, S = 1%, N = 2% and ash = 4% (Latent heat of steam = 587 cal/gm).
   b) Define cracking. Explaing catalytic cracking of liquid fuel by Moving Bed method.

6. a) Explain the twelve principles of Green chemistry in detail.
   b) Discuss the properties and significance of composites.

7. a) Explain the construction and applications of Methanol-Oxygen fuel cell.
   b) Write a note on the following:
   i) Corrosion control method by Sacrificial anodic method
   ii) Biodegradable polymers : Polylactic acid

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FACULTY OF ENGINEERING

Code No. 15002/AICTE

B.E. I-Semester (AICTE) (Backlog) Examination, July 2021

Subject : Chemistry

Time: 2 hours

Max. Marks: 70

Note: Missing data, If any, may be suitably assumed.

PART – A

Answer any five questions. **(5x2 = 10 Marks)**

1 Define the terms i) single electrode potential ii) e.mf.of a cell

2 Calculate the reduction potential of the following electrode at 25°c.

$Zn_{(s)} / Zn^{2+}_{(a=0.05\,m)}$ $\left(E^{o}_{Zn^{2+}/Zn} = -0.76V\right)$

3 Specify the salts which are responsible for temporary and permanent hardness of water.

4 Explain waterline corrosion.

5 Give one example each for condensation and co-polymers.

6 Mention the applications of conducting polymers.

7 Define the terms i) HCV and ii) LCV

8 Write the composition of CNG

9 Explain properties of composites.

10 Give any two examples of clean technology.

PART – B

Answer any four questions. **(4x15 = 60 Marks)**

11 a) How do you determine pH of a solution by using Quinhydrone electrode? Explain.

b) Write the charging and discharging reactions involved in pb-Acid battery.

12 a) 100ml of a water sample required 20ml of $\frac{N}{50}$ H_2So_4 for neutralisation to phenolphthalein end-point. After this, methyl orange indicator was added to this and further acid required was again 20ml. Calculate the alkalinity of water as $CaCO_3$ in ppm.

b) What is corrosion of metals? Describe the mechanism of electro chemical corrosion by i) hydrogen evolution ii) Oxygen absorption

13 a) Explain the mechanism of free radical polymerization.

b) Write the preparation and properties of Bakelite.

14 a) Calculate the volume of air required for complete combustion of $1m^3$ of gaseous fuel having the composition : CO=46%, CH_4=10%, H_2=4% C_2H_2=2%, N_2=1% and remaining being CO_2.

b) Define the terms i) Octane Number and ii) cetane number and mention their significance.

15 a) Discuss the principles of Green chemistry.

b) Classify the composites based on matrix, reinforcement and ply.

16 a) Derive Nernst equation and explain its importance.

b) Write a note on break point chlorination.

17 a) What are biodegradable polymers? Explain the properties and applications of polylactic acid.

b) What is Proximate analysis of coal? What is its usefulness?

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Code No. D-2331/N/AICTE

FACULTY OF ENGINEERING

B.E. (CSE/CME/DS/ECE/EEE/EIE) I – Semester (AICTE) (Main & Backlog) Examinations, March / April 2022

Subject: Chemistry

Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1.
(a) What is galvanic cell? Write its anodic and cathodic reactions.
(b) What do you mean by Hot dipping?
(c) Distinguish between addition and condensation polymerization.
(d) Define Cracking. Write its significance.
(e) Differentiate between HCV and LCV.
(f) Explain concept of trans-esterification.
(g) What is a biodiesel? Give one example.

2. (a) What is Fuel cell? Explain construction and applications of Methanol-Oxygen fuel cell.
(b) Calculate the EMF of the following cell at 27 °C with the help of Nernst equation. Write the cell reactions.
$A1|A1^{3+}(0.001M) \parallel Ag^{+}\ (0.01M)|Ag$ ($E°_{Al^{3+}|A1} = -1.66V$ and $E°_{Ag^{+}|Ag} = 0.801\ V$)

3. (a) Explain the estimation of permanent hardness of water by EDTA method.
(b) Describe the various factors influencing the rate of corrosion.

4. (a) Explain preparation, properties and uses of Bakelite.
(b) Discuss classification and applications of conducting polymers.

5. (a) Describe concepts of fuel rating with the help of octane number and cetane number.
(b) Define fuel. Explain the classification and characteristics of fuels.

6. (a) Discuss concept and principles of green chemistry. Give one example for clean technology.
(b) Explain the classification and general applications of Composites.

7. (a) Describe preparation and applications of poly-lactic acid.
(b) What is cathodic protection? Explain sacrificial anodic protection method.

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Code No. 15289/AICTE

FACULTY OF ENGINEERING

B.E II-Semester (AICTE) (Main) Examination October, 2021

Subject: Engg. Chemistry / Chemistry

Time: 2 Hours **Max. Marks: 70**

Note: i) First Question is compulsory and answer any three questions from the remaining six questions.
ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.
iii) Missing data, if any, may suitably be assumed.

Answer any four questions from the following **(4 x 4 = 16 Marks)**

1 (a) Distinguish between electrolytic and electrochemical cells.
(b) What do you mean by pitting corrosion?
(c) Explain break point chlorination.
(d) Define the term 'monomer'. Write its functionality with few example.
(e) Write the composition and uses of CNG.
(f) What is 'knocking'? Write its significance.
(g) Define 'atom economy'.

(3 x 18 = 54 Marks)

2 (a) What is secondary battery? Explain construction and applications of lead-acid battery.
(b) Determine the EMF of the following cell at 25°C with the help of Nernst equation by finding the net reaction.

$$Mg|Mg^{2+}(0.01M)|Cu^{2+}(0.001M||Cu$$

$$(E^{\circ}Mg^{2+}|Mg = -2.364V and E^{\circ}Cu|Cu^{2+} = -0.334V)$$

3 (a) How do you estimate the temporary hardness of water by EDTA method?
(b) Define corrosion. Discuss the various factors influencing the rate of corrosion.

4 (a) Differentiate thermoplastic and thermosetting resins.
(b) Explain the preparation, properties and uses of PVC and Nylon 6:6.

5 (a) Define Fuel. Describe the requirements of good fuel.
(b) Explain proximate and ultimate analysis of coal.

6 (a) Describe the properties and significance of biodiesel.
(b) Explain the classification of composites based on matrix and reinforcement.

7 (a) Discuss the mechanism of conduction in poly-acetylene and its applications.
(b) What is hot dipping? Explain surface coating method of galvanizing.

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Code No. 15014/AICTE/BL

FACULTY OF ENGINEERING

B.E. II - Semester (AICTE) (Backlog) Examination, October 2021

Subject: Chemistry

Time: 2 Hours

Max. Marks: 70

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer any five questions. (5x2 = 10 Marks)

1 What are Primary and Secondary batteries?
2 What is a reference electrode? Give one example with its electrode potential value.
3 Explain colloidal conditioning.
4 What is sacrificial anodic protection method?
5 How is Butyl rubber prepared? Mention its two applications.
6 What is Condensation polymerization?
7 Define Octane number and what is its significance.
8 Mention the composition and uses of CNG.
9 Give the classification of composites based on Matrix.
10 What is Atom economy in green chemistry and mention its importance?

PART – B

Note: Answer any four questions. **(4x15 = 60 Marks)**

11 (a) How is ZN-C battery constructed? Explain its functioning with necessary cell reactions.
(b) Calculate electrode potential of Copper when it is placed in a Copper solution of 0.1 M Concentration and at a temperature 40°C. Standard reduction electrode potential of Cu is +0.33 Volt.

12 (a) Describe the mechanism of electrochemical corrosion with a suitable example.
(b) A sample of water contains 16.2 Mg of $Ca(HCO_3)_2$, 73 Mg of $Mg(HCO_3)_2$, 48 Mg of $MgSO_4$, 22.2 Mg o $CaCl_2$ and 50 Mg of Na_2SO_4 per liter. Calculate its temporary permanent and total hardness.

13 (a) How are conducting polymers classified? Explain the mechanism of conductance in Poly-acetylene.
(b) Write the synthesis, properties & applications of Kevlar.

14 (a) What are the characteristic features of composite materials? Explain.
(b) Explain the following
(i) Trans esterification (ii) Carbon neutrality.

15 (a) What is Cracking technique? And describe catalytic cracking by moving bed method.
(b) Calculate the volume of air required for complete combustion of 1m3 of gaseous fuel having the composition CO = 40%, CH_4 = 10%, H_2 = 40%, C_2H_2 = 4%, N_2 = 2% and rest is CO_2.

16 (a) Explain the proximate analysis of coal and give its importance.
(b) Discuss knocking and antiknocking property including their relation to chemical composition of Gasoline and Diesel.

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17 (a) How is the Fractional distillation of crude oil carried out? Mention the composition and uses of various fractions obtained during the process.

(b) Write a note on Ion exchange process of softening hard water with necessary diagram.

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Code No. 2958/AICTE/M

FACULTY OF ENGINEERING

B.E. (ECE/M/P/AE/CSE/CME/IT) (AICTE) II-Semester (Backlog) Examination, December 2020

Subject: Chemistry

Time : 2 Hours **Max. Marks: 70**

PART – A

Note: Answer any five questions. **(5 x 2 = 10 Marks)**

1 Define knocking and how can it be minimized.

2 What is meant by exhaust of ion exchangers? How can the cation and anion exchangers can be regenerated?

3 Define functionality of monomer and degree of polymerisation.

4 Explain the significance of octane and cetaine numbers.

5 What is carbon neutrality of biodiesel?

6 Define single and standard electrode potentials.

7 Write the synthesis of an elastomer BUNA-S. Mention.

8 Give an account of catalysis.

9 'Corrosion of water filled steel tanks occur below the waterline'. Justify.

10 Mention two half-cell reactions of methanol-orxygen fuel cell.

PART – B

Note: Answer any four questions. **(4 x 15 = 60 Marks)**

11 (a) Classify the reference electrodes with suitable examples.
(b) How do you determine the pH of a solution by using glass electrode?

12 (a) A sample of hardwater on analysis is found to contain 13.6 mg/lit of calcium sulphate, 7.3 mg/lit of magnesium bicarbonate, 12 mg/lit of magnesium sulphate, 9.5 mg/lit of magnesium chloride and 100 mg/lit of organic matter. Calculate total, permanent and temporary hardness of water in °French and °Clarke.
(b) Discuss the following with suitable examples.
(i) sacrificial anodic protection (ii) Impressed current cathodic method

13 (a) Explain the mechanism of conduction and write the applications of conducting polymers.
(b) Explain the preparation, properties and Engineering applications of NYLON 6 : 6 and Kevlar.

14 (a) Explain the proximate analysis of coal to ascertain its quality and its significance.
(b) An oil on analysis gave the following results. C = 85% ; H = 12% and oxygen = 3%. Find the weight of minimum air required for burning of 1kg of fuel.

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15 (a) Describe the process of fractional distillation of petroleum. Mention the composition and uses of petroleum fractions.
(b) Describe the process of moving bed catalytic cracking. Write its advantages over fixed bed catalytic cracking.

16 (a) Explain the twelve principles of green chemistry. Give examples of clean technology.
(b) Write the properties and applications of reinforced composite materials.

17 (a) Discuss the reverse osmosis method for desalination of brackish water. Mention its advantages.
(b) Explain any six factors influencing the rate of corrosion.

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