

GUJARAT TECHNOLOGICAL UNIVERSITY
BE –SEMESTER 1&2(NEW SYLLABUS)EXAMINATION- WINTER 2018

Subject Code: 3110001**Date: 04-01-2019****Subject Name: Chemistry****Time: 10:30 am to 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

	Marks
Q.1 (a) Discuss the periodic trends of followings- a. Electron negativity b. Ionization enthalpy c. Electron affinity	03
(b) Give reason- a. Ag ₂ S ore is more abundant in nature than Ag ₂ O ore. b. LiCl has more covalent characters than NaCl. c. CO ₂ is linear in structure while SO ₂ is bent. d. Vulcanized rubber is more stable and stronger.	04
(c) Explain the suitable method to analyze the percentage of moisture, volatile matter and ash content in a coal sample.	07
Q.2 (a) What do you understand by hardness of water? Name any four salts those are responsible for the hardness of water.	03
(b) Give the reaction for synthesis of biodegradable polymer nylon-2-nylon-6. Write the name the monomers.	04
(c) What is corrosion? Do you think rusting is electrochemical process? Justify with the help of involved redox reactions.	07
OR	
(c) What are alloys? Do you think alloys are better choice than pure metal for making of various tools? Justify your answer with the help of examples.	07
Q.3 (a) What are the allowed and forbidden transitions?	03
(b) Give labelled schematic diagram for refining of petroleum by fractional distillation.	04
(c) What are fibers? Give the reaction for preparation of terylene polyester and its important properties.	07
OR	
Q.3 (a) Distinguish between absorption and emission spectra.	03
(b) Give labelled schematic diagram for treatment of waste water.	04
(c) What are elastomers? Give reaction for preparation of neoprene rubber and its important properties.	07
Q.4 (a) Write any three applications of nanomaterial in textile industries.	03
(b) A unique phase of matter shows long range order and used in the display systems. Give the name of that phase and discuss its other three applications.	04
(c) Explain the fermentation processes for preparation of Ethanol.	07
OR	
Q.4 (a) Discuss the applications of nanomaterial in catalysis.	03
(b) Write any one specific application of following polymers- a. Polyvinyl chloride b. Glyptal c. Low density polyethene d. High density polyethene	04

(c) Explain the fermentation processes for preparation of Acetic acid. **07**

Q.5 (a) Write the any three advantages of bio-fertilizers over chemical fertilizers. **03**

(b) Explain the top down method for synthesis of nano-materials. **04**

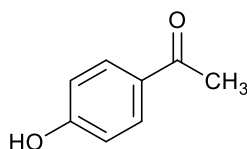
(c) How would you find the equivalence point in Acid–Base titration by conductivity meter? Explain. **07**

OR

Q.5 (a) Write any six characteristic of good fuel. **03**

(b) Explain the bottom up method for synthesis of nano-materials. **04**

(c) What is infra-red (IR) spectroscopy? Why symmetrical stretching in CO_2 is IR inactive? Below given molecules shows some strong IR absorbance bands in the spectrum. Assign the given bands (1740 , 2850 , 3050 and 3400 cm^{-1}) to appropriate bonds present in molecule. **07**



1740 , 2850 , 3050 and 3400 cm^{-1}

(Methyl) C-H stretching -----

(Phenyl) C-H stretching -----

C=O stretching -----

(Phenyl) O-H stretching -----

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– I & II (NEW) EXAMINATION – WINTER 2019****Subject Code: 3110001****Date: 02/01/2020****Subject Name: Chemistry****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
Q.1	(a) Define hardness of water and differentiate between temporary and permanent hardness	03
	(b) Explain the principle of UV-VIS spectroscopy and list down main components of UV-VIS spectrophotometer.	04
	(c) Distinguish between addition and condensation polymerization and explain the mechanism of free radical addition polymerization.	07
Q.2	(a) Draw a well labeled diagram of fractional distillation of crude petroleum showing its various fractions.	03
	(b) Answer the following (i) CFC's (Chlorofluro Carbons) are considered very stable. Draw the Lewis dot structure of CF_2Cl_2 and explain for their stability. (ii) Giving reason, arrange the following elements in increasing order of electro negativity: C, F, N, O	04
	(c) What do you understand by 'wet or electrochemical corrosion'? Explain mechanism of electrochemical corrosion.	07
OR		
	(c) (i) Explain how corrosion control can be brought about by the cathodic protection. (ii) Alloying is done to improve usefulness of metals. Justify the statement.	07
Q.3	(a) Outline the applications of nanotechnology in catalysis	03
	(b) State Lambert and Beer's law and deduce its mathematical expression.	04
	(c) Differentiate between proximate and ultimate analysis of coal and explain proximate analysis giving its significance.	07
OR		
Q.3	(a) What are the effects of nanoscale dimension on mechanical and optical properties of material?	03
	(b) Write a brief note on interaction of electromagnetic radiation with matter.	04
	(c) (i) Octane number is used to predict about the efficiency of gasoline. Comment on it. (ii) Define calorific values of a fuel. Distinguish between gross and net calorific value and give relation between these two.	07
Q.4	(a) What do you infer by following terms:	03
	<ul style="list-style-type: none"> • Quantum dots • Fullerenes • Carbon nanotube 	

- (b) Answer the following: 04
 (i) Distinguish between hard acid/base and soft acid/base. Classify following as hard acid/base or soft acid/base: Li^+ , SCN^- , Al^{3+} , Sn^{4+} , Au^+ , Pt^{2+} , F^- , OH^-
 (ii) Which atom has smaller atomic radii: Be (atomic number = 4) or F (atomic number = 9). Give reason.
- (c) Explain ethanol production using fermentation technology with a neat and labeled process flow diagram, showing all the steps involved. 07
- OR**
- Q.4** (a) Give an outline of Bottom up approach of synthesis of nanomaterial 03
 (b) Answer the following: 04
 (i) Based on their positions in the periodic table, predict which has the smallest first ionization energy: Li, Cs, N, F, I.
 (ii) write coordination number and shape of $[\text{Ni}(\text{CN})_4]^{2-}$
 (iii) Categorize following solids as covalent, ionic or metallic solids. KF, Dry ice, Sand, Iodine, Diamond, Graphite.
 (iv) In your words give reason, why ionic compounds are hard but brittle .
- (c) (i) Discuss the role of biotechnology in food industry and medicines 07
 (ii) Give examples of following:
 • A microorganism used as biofertilizer
 • A biosurfactant
 • Organism used in acetic acid production.
- Q.5** (a) Differentiate between ferrous and nonferrous alloys. 03
 (b) What are the draw backs of natural rubber? How are its properties improved? 04
 (c) Give a comparative account of Zeolite process and Ion exchange process used for softening of water. 07
 Calculate temporary and permanent hardness in ppm, for a water sample, one litre of which show following result on analysis: $\text{Mg}(\text{HCO}_3)_2 = 36.5$ mg, $\text{Ca}(\text{HCO}_3)_2 = 40.5$ mg, $\text{NaCl} = 16.7$ mg, $\text{CaSO}_4 = 17$ mg, and $\text{MgSO}_4 = 15$ mg.
- OR**
- Q.5** (a) Answer the following: 03
 (i) State Pilling bedworth rule and describe its significance.
 (ii) The Copper equipment should not possess a iron nail in it. Give reason
 (b) Explain the preparation, properties and any one specific use of the following polymers:- 04
 (a) Buna-S rubber
 (b) Nylon-2-nylon-6
 (c) Write principle of softening of hard water by Lime soda process. 07
- Calculate the quantities (in Kg) of lime and soda required to soften 50,000 liters of hard water containing the following salts:- $\text{MgCl}_2 = 95$ PPM; $\text{Mg}(\text{HCO}_3)_2 = 146$ PPM; $\text{CaSO}_4 = 136$ PPM; $\text{Ca}(\text{HCO}_3)_2 = 162$ PPM. Assume that the lime used is only 85% pure and soda is only 95% pure.
- (Given: Atomic mass of Ca = 40; Mg = 24; H = 1; O = 16; S = 32; C = 12; Cl = 35.5).

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-I & II (NEW) EXAMINATION – WINTER 2020****Subject Code:3110001****Date:17/03/2021****Subject Name:Chemistry****Time:10:30 AM TO 12:30 PM****Total Marks:56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

	Marks
Q.1 (a) Define Hardness. Explain the types of Hardness.	03
(b) What do you understand by priming and foaming problems in boiler?	04
(c) Discuss the ion exchange process for water softening.	07
Q.2 (a) What are the characteristic of good fuels?	03
(b) Discuss the proximate analysis of coal.	04
(c) Give the composition of biogas. With the help of a diagram explain a biogas plant.	07
Q.3 (a) Discuss, with example the types of polymerization.	03
(b) Explain with example condensation polymerization.	04
(c) Discuss linear and cross-linked polymers.	07
Q.4 (a) Write short notes on Brittleness and Weld ability	03
(b) What are alloys? Discuss the necessity of making alloys.	04
(c) What is corrosion? Discuss the mechanism of electrochemical corrosion.	07
Q.5 (a) What is nanomaterial? State its sources and properties.	03
(b) Write the application of nanomaterial in catalysis and medicine.	04
(c) Explain the refining process of petroleum by fractional distillation.	07
Q.6 (a) Write ,in brief, applications of biotechnology.	03
(b) What are enzymes? Mention their general characteristics.	04
(c) Discuss the manufacture of ethyl alcohol by fermentation process with neat flow diagram.	07
Q.7 (a) Give an outline of fermentation process.	03
(b) Define PH and Conductance	04
(c) What is bio membrane? Write the activities of plasma membrane.	07
Q.8 (a) Write the reaction involved for the production of ethanol by fermentation of starch.	03
(b) What is spectroscopy? Write the application of UV-Visible spectroscopy.	04
(c) Write a notes on plant and animal biotechnology.	07

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-1/2 EXAMINATION – WINTER 2021****Subject Code:3110001****Date:22/03/2022****Subject Name:Chemistry****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define the following terms with suitable examples. **03**
(1) Electronic Configuration
(2) Electro Negativity
(3) Polymer
- (b) What are Nano Materials? Mention the properties of Fullerenes. **04**
- (c) How will you soften the water and list the methods of treating domestic water? **07**
- Q.2** (a) Define the following terms with suitable examples. **03**
(1) Desalination
(2) Alloys
(3) Inhibitors
- (b) What is meant by Polymerization with examples? **04**
- (c) Explain Lewis representation of simple molecules and ions with suitable examples. **07**
- OR**
- (c) Give a detail study of various sources and impurities present in water and how can these impurities be removed. **07**
- Q.3** (a) Define the following terms with suitable examples. **03**
(1) Acids
(2) Oxidation states
(3) Orbital
- (b) Write a short note on structure of an atom. **04**
- (c) Mention physical properties of metals. **07**
- OR**
- Q.3** (a) Define the following terms with suitable examples. **03**
(1) Hard Water
(2) Brackish Water
(3) Glass Fibre
- (b) Write a short note on Alloy with illustrations. **04**
- (c) What is corrosion? Explain any one type of corrosion in detail with a diagram. **07**
- Q.4** (a) Define the following terms with suitable examples. **03**
(1) Rubber
(2) Vulcanisation
(3) Fibre
- (b) Write a short note on liquid crystals. **04**
- (c) Give a detail study of fibres along with suitable examples. **07**
- OR**
- Q.4** (a) Define the following terms with suitable examples. **03**
(1) Fuels
(2) Calorific value

- (3) Fermentation
- (b) Write a short note on “top down and bottom up” approach for synthesizing a nano material. **04**
- (c) How will you analyze a coal sample? Explain. **07**
- Q.5** (a) Give full form of the following along with formula- **03**
- (1) PE
- (2) ABS
- (3) PVC
- (b) Write a short note on characteristics of a good fuel. **04**
- (c) How will you conduct a fractional distillation of crude oil? **07**
- OR**
- Q.5** (a) Define the following terms with suitable examples. **03**
- (1) Cetane number
- (2) Conductance
- (3) pH
- (b) Write a short note on enzyme. **04**
- (c) Explain principles of spectroscopy with their applications. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-I &II (NEW) EXAMINATION – SUMMER-2019****Subject Code: 3110001****Date: 03/06/2019****Subject Name: Chemistry****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
Q.1	(a) Define electron affinity and discuss its variation in periodic table.	03
	(b) What do you understand by hardness of water? Differentiate between temporary and permanent hardness.	04
	(c) What is polymerization? Give a detailed classification of polymers with suitable examples.	07
Q.2	(a) What is vulcanization of Rubber? Why vulcanization is done?	03
	(b) Write characteristics of a good fuel.	04
	(c) With a neat and well labeled diagram, explain fractional distillation of petroleum.	07
	OR	
	(c) Give classification of fuel. Discuss proximate analysis of fuel.	07
Q.3	(a) Write monomers, properties and uses of following polymers: (i) Bakelite (ii) Nylon 66	03
	(b) Answer the following:	04
	(i) H ₂ O is liquid at room temperature while H ₂ S is gas. Why?	
	(ii) What is coordinate bond? Give example of a coordinate compound.	
	(c) Discuss 'Zeolite processes of softening of water with neat diagram.	07
	OR	
Q.3	(a) Define pH. Calculate pH of .02 N H ₂ SO ₄ .	03
	(b) Differentiate between:	04
	(i) Stretching and bending vibration	
	(j) Thermosetting and thermoplastic polymer	
	(c) Write a note on disadvantages of using hard water in boiler.	07
Q.4	(a) What are alloys? Give example and explain why alloying is done?	03
	(b) Write a short note on 'top down' and 'bottom up approach' to synthesize Nanomaterials.	04
	(c) What is 'Fermentation'? Explain manufacturing of ethanol by fermentation process.	07
	OR	
Q.4	(a) Write a brief note on physical properties of metals.	03
	(b) What are Nanomaterials? Write a note on application of Nanomaterials.	04

- (c) Discuss application of biotechnology in agriculture and medicinal field. **07**
- Q.5** (a) What are fullerenes? Explain properties of fullerenes in short. **03**
 (b) Write principle of UV-VIS spectroscopy. **04**
 (c) What is corrosion? Explain wet corrosion or electrochemical corrosion of iron. **07**
- OR**
- Q.5** (a) Give Reason: **03**
 (i) First ionization energy (IE_1) of Nitrogen (atomic Number = 7) is higher than Oxygen (atomic Number = 8).
 (ii) Noble gases (Group 18) have zero valency.
 (b) Answer the following: **04**
 (i) What are polar and non-polar covalent bonds?
 (ii) Write electronic configuration of Cr (Atomic Number 24)
 (c) Write a brief note on protective coating. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-I & II(NEW)EXAMINATION – SUMMER 2022****Subject Code:3110001****Date:04-08-2022****Subject Name:Chemistry****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) What is call pH? How it is significant in the chemistry of daily life?	03
	(b) What is a bioreactor? Give any three important properties of enzymes.	04
	(c) Define the term 'ionization energy' and explain the trends in columns and periods with examples.	07
Q.2	(a) What is the basic principle of IR spectroscopy? Give any two applications of spectroscopic technique.	03
	(b) What are electron affinity and electronegativity? Give difference between them.	04
	(c) What are the two major types of coal analysis? Explain any one of them with its significance.	07
	OR	
	(c) What are biodegradable polymers? Give their properties with examples. How they are important in today's scenario?	07
Q.3	(a) Explain the term 'metallic bond' with electron sea model.	03
	(b) Give the structures of natural rubber and vulcanized rubber. Enlist the advantages of vulcanized rubber.	04
	(c) Give definition and purpose of alloy making. Explain about copper alloys with examples.	07
	OR	
Q.3	(a) Explain corrosion inhibitors with examples.	03
	(b) Write characteristics of good fuel.	04
	(c) Explain bottom-up approaches of nanomaterial synthesis.	07
Q.4	(a) A water sample contains 272 mg of calcium sulphate in a liter. Calculate the hardness in terms of CaCO ₃ equivalent in ppm, mg/L, °Cl and °Fr.	03
	(b) What is call electromagnetic spectrum? Give the names of different regions with their ranges of wavelengths in increasing order.	04
	(c) Explain the role of biotechnology in the field of agriculture and medicine.	07
	OR	
Q.4	(a) Enlist advantages and disadvantages of biofertilizers.	03
	(b) Explain the terms hard soft acids and bases with examples.	04
	(c) What is called boiler feed water? Explain internal treatments for softening of water.	07
Q.5	(a) Explain the terms : Octane and Cetane numbers	03

- (b) What is brackish water? How Reverse Osmosis is used for water treatment? **04**
- (c) Explain ionic polymerization with mechanisms with examples. **07**
- OR**
- Q.5** (a) Define the terms : Liquid crystals, Glass fibers, Cathodic protection **03**
- (b) How protective coatings are useful against corrosion problem? Explain with examples. **04**
- (c) Give general applications of nano-materials and future perspectives of nano-chemistry **07**
