Seat No.: _____ Enrolment No._____

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_2S ore is more abundant in nature than Ag_2O 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**

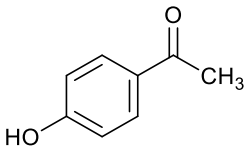
(c) How would you find the equivalence point in Acid–Base titration by conductivity meter? Explain. **07**

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^{-}

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

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

C=O stretching ----------

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

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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 (Chlorofloro 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: • Quantum dots • Fullerenes • Carbon nanotube	**03**

(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 $[Ni(CN)_4]^{2-}$

(iii) Categorize following solids as covalent, ionic or metallic solids.
KF, Dry ice, Sand, Iodine, Diamond, Graphite.

(iv) In your wordsgive reason, whyionic 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 biofertlilizer
- 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: $Mg(HCO_3)_2$ = 36.5 mg, $Ca(HCO_3)_2$ = 40.5 mg, NaCl=16.7 mg, $CaSO_4$ = 17 mg, and $MgSO_4$ = 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:- $MgCl_2$ = 95 PPM; $Mg(HCO_3)_2$ = 146 PPM; $CaSO_4$ = 136 PPM; $Ca(HCO_3)_2$ = 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).

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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**

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Seat No.: _____ Enrolment No._____

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. (1) Electronic Configuration (2) Electro Negativity (3) Polymer	**03**
	(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. (1) Desalination (2) Alloys (3) Inhibitors	**03**
	(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. (1) Acids (2) Oxidation states (3) Orbital	**03**
	(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. (1) Hard Water (2) Brackish Water (3) Glass Fibre	**03**
	(b)	Write a short note on Alloy with illustrations.	**04**
	(c)	What is corrosion? Explain any on type of corrosion in detail with a diagram.	**07**
Q.4	**(a)**	Define the following terms with suitable examples. (1) Rubber (2) Vulcanisation (3) Fibre	**03**
	(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. (1) Fuels (2) Calorific value	**03**

(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) Writ 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**

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Seat No.: _____ Enrolment No._____

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: (i) H_2O is liquid at room temperature while H_2S is gas. Why? (ii) What is coordinate bond? Give example of a coordinate compound.	**04**
	(c)	Discuss 'Zeolite processes of softening of water with neat diagram.	**07**
		OR	
Q.3	**(a)**	Define pH. Calculate pH of .02 N H_2SO_4.	**03**
	(b)	Differentiate between: (i) Stretching and bending vibration (j) Thermosetting and thermoplastic polymer	**04**
	(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: (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.	**03**
	(b)	Answer the following: (i) What are polar and non-polar covalent bonds? (ii) Write electronic configuration of Cr(Atomic Number 24)	**04**
	(c)	Write a brief note on protective coating.	**07**

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Seat No.: _____ Enrolment No._____

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, ^oCl and ^oFr.	**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**

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