Name: Utkarsh Kumar Mishra	Printed Pages:
Student University Roll No.:	
School of Engineering Second Sessional Examination, Odd Semester (AS: 2023-24) B. Tech: CSEYear:1Semester:1	
Course Title: ENGINEERING CHEMISTRY Course Code: NBS 4103	Max Marks: 60 Time: 3hrs

Instructions if any: Read the question Carefully.

	SECTION 'A' Q.N.1. Attempt all parts of the following:	Course Objective	Marks
a)	Write all the four quantum of $4f^{13}$.	1	1
b)	Conducting properties of Graphite.	3	1
c)	What is Metamerism?	2	1
d)	Define Enantiomers.	2	1
e)	Define Particulate matter and their effects.	2	1
f)	What is the monomer unit of Natural Rubber?	1	1
g)	Define IS 14543.	3	1
h)	Define Biofuel.	1	1

	SECTION 'B' Q.N.2. Attempt any two parts of the following:	Course Objective	Marks
a)	(i) Write down the electronic configuration, bond order and magnetic behaviour of CN and NO molecule. (ii) A face-centered cubic element (atomic mass 60) has a cell edge of 400pm. What is its density? (N_A= 6.023×10^{23})	4	6
b)	What is optical activity? Give the stereoisomers of tartaric acid. How do you account for lack of optical activity in meso -tartaric acid.	2	6
c)	Write down the principle, operation and application of HPLC.	3	6
d)	Write short notes on (2+2+2) (i) Thermoplastic and Thermosetting resin (ii) Mechanism of Free radical polymerization (iii) Classify the polymer on the basis of Mode of Synthesis and Tacticity	3	6

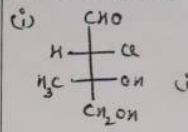
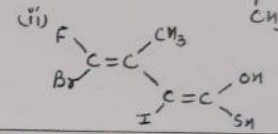
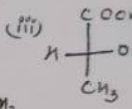
	SECTION 'C'	Course Objective	Marks
Q.N.3. Attempt any two parts of the following:			
a)	What do you understand by liquid crystalline state? Discuss the classification of liquid crystals and write their application.	1	5
b)	(i) What are the Nanomaterials? Give sol gel method for the synthesis of Nanoparticles. (ii) Define Schottky defect and Frenkel defect.	1	3+2
c)	Derive second order reaction when the concentrations of reactants are different.	1	5
Q.N.4. Attempt any two parts of the following:			
a)	What do understand by conformations? Draw the various conformation of n-butane and explain their order of stability using energy profile diagram.	2	5
b)	Give TWELVE principles of Green Chemistry.	1	5
c)	Assign R, S and E, Z Nomenclature: (i)  (ii)  (iii) 	2	5
Q.N.5. Attempt any two parts of the following:			
a)	A sample of water on analysis was found to contain the following impurities: 21mg/lit $Ca(HCO_3)_2$, 25 mg/lit $Mg(HCO_3)_2$, 15mg/lit $CaSO_4$, 5.2 mg/lit $MgSO_4$ and 16.4mg/lit $CaCl_2$. Calculate temporary, permanent and total hardness of water.	4	5
b)	State Zeolite process for the removal of hardness of water. Discuss its advantages and disadvantages.	4	5
c)	Write short notes on:- (2+1+1+1) (i) Types of Transitions in UV Spectroscopy (ii) Define ISO/ IEC 17025:2017 (iii) Bathochromic Shift (iv) Chromophore	3	5
Q.N.6. Attempt any two parts of the following:			
a)	Discuss classification and application of conducting polymer. or What are Persistant Organic Pollutants. Write down their application with examples.	1 or 4	5
b)	Give the structure and uses of following polymers: Bakelite, Kevlar, PTFE, Terylene, Nylon 6,6	3	5
c)	Write short notes on the following: (1+1+1+2) (i) Biocomposites (ii) Biodegradable polymer (iii) Bioplastics (iv) What are Endocrine Disrupting Chemicals? Give their examples and effects.	1,4	5

Table 1 Mapping between COs and questions
(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	1a,1f,1h,3a,3b,3c,4b,6a,6c	1+1+1+5+5+5+5+3=31
CO2	1c,1d,1e,2b,4a,4c	1+1+1+6+5+5=19
CO3	1b,1g,2c,2d,5c,6b	1+1+6+6+5+5=24
CO4	2a,5a,5b,6a,6c	6+5+5+5+2=23

Marks
5
5
5
5
5
5
5
5
5
5
5
5

Differentiate between scope and lifetime of

factorial of a numbers using recursion.