BSM-140

Roll No. | | | | | | | | | | | |

B. Tech.
Year: I. Sem: I
Test-I 2023-24
MINOR TEST 2024-25
Environmental Science and Green Chemistry

Time: **2 Hr.** Max Marks: **20**

*Note: Attempt **ALL** questions. ALL questions carry equal marks.*

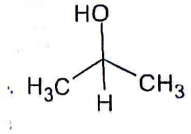
			Marks	CO	BL	PO	PI Code
Q1.		***Attempt any Two parts of the following*** ***(Unit 1 & Unit 2)***					
	a)	Define and explain giving examples: i) inductive effect and ii) mesomeric effect iii) electrophile iv) nucleophile	4	1	2	7, 1	
	b)	Draw the molecular orbital diagram of O_2 molecule and explain its paramagnetic nature. Also calculate the bond orders of O_2, O_2^+ and O_2^-.	4	1	3	7, 1	
	c)	Describe the phenomenon of Global warming and explain the reasons behind it. How can global warming be controlled?	4	2	2	7, 1	
Q2.		***Attempt any Two parts of the following.*** ***(Unit 1)***					
	a)	Draw the molecular orbital diagram of NO molecule. Arrange NO, NO^+ and NO^-. in increasing order of bond length.	3	1	3	7, 1	
	b)	Define hydrogen bonding and explain the following: i) o-Nitrophenol is more volatile than p-nitrophenol; ii) Glycerol is more viscous than ethanol.	3	1	3	7, 1	
	c)	Explain the mechanism of Aldol condensation reaction.	3	1	2	7, 1	
Q3		***Attempt any Two parts of the following.*** ***(Unit 2)***					
	a)	Describe the layers of atmosphere and explain the phenomenon of temperature inversion.	3	2	2	7, 1	
	b)	Describe the role of Ozone layer present at the stratosphere. Explain the process of formation and depletion of ozone layer. What are harmful effects of ozone layer depletion?	3	2	2	7, 1	
	c)	Discuss the Lime-Soda process of water softening.	3	4	2	7, 1	

BSM-140

B. Tech.
Year: I Semester: 2024-25
Major Examination: 2024-25
Environmental Science and Green Chemistry

Time: 3 Hrs. Max Marks: 50

Note: Attempt ALL questions. ALL questions carry equal marks.

		Marks	CO	BL	PO	PI Code
Q1.	Attempt any **Five parts** of the following. (Unit I & Unit 2)					
a)	How does atomic radius vary across a period and down a group? Explain with examples. Describe the trends in atomic radius and the factors influencing these changes.	2	1	2	1	1.5.1
b)	Draw the MO diagram of CO molecule and determine the bond order of CO^+ molecule.	2	1	2	1	1.5.1
c)	Explain the following: i) HF has higher boiling point then HCl ii) p-nitrophenol is more soluble in water than o-nitrophenol	2	1	2	1	1.5.1
d)	Explain the mechanism of Beckmann Rearrangement.	2	1	2	1	1.5.1
e)	Write a short note on acid rain and its harmful effects.	2	2	1	1, 7	1.5.1
f)	Explain the principle of Lime-Soda process. Give the chemical reactions taking place during the softening of water with this process.	2	4	2	1, 7	1.5.1
g)	Write a short note on the main impurities present in water and their effects.	2	5	1	1, 7	1.5.1
Q2.	Attempt any Two parts of the following. (Unit-3)					
a)	Explain the principle of UV-Visible spectroscopy. Describe various applications of this technique.	5	1, 3	2	1,7	1.5.1
b)	Describe various types of vibrations taking place in a molecule. Draw the fundamental modes of vibrations for H_2O molecule.	5	1, 3	2	1	1.5.1
c)	Explain the following terms (Any five) i) Triplet state, ii) Intersystem crossing, iii) Absorbance iv) Shielding and de-shielding v) Chemical Shift, vi) Internal Conversion vii) Vibrational Relaxation	5	1, 3	2	1	1.5.1
Q3.	Attempt any Two parts of the following. (Unit-3)					
a)	Predict the number of signals that will be observed in the ^{1}HNMR spectrum of the following compounds: i) $CH_3–CH_2–CH_2–CH_3$ ii)) $CH_3–CH_2–COO–CH_3$ iii) $CH_2=CHCl$ iv)  v) 	5	3	3	1	1.5.1
b)	What are bio-degradable polymers? Give the synthesis of any two bio-degradable polymers. **OR** Write a short note on the problems posed by the use of non-biodegradable polymers.	5	2, 6	2	1,7	1.5.1

c)	Write an explanatory note on the incineration and its use for the disposal of polymeric waste.	5	2, 6	2	1, 7	1.5.1
Q4.	Attempt any Two parts of the following. (Unit-4)					
a)	Explain the 12 principles of green chemistry and their importance in modern chemical practices.	5	6	2	1,7	7.3.1
b)	Explain the importance of green solvents in chemical reactions. How do they contribute to eco-friendly chemical processes? Give two examples of green solvents and reactions.	5	6	2	1,7	7.3.1
c)	Compare traditional chemical synthesis pathways with green chemical synthesis pathways. Highlight the differences in terms of efficiency, waste production, and environmental impact with the help of two examples of industrial chemicals.	5	6	2	1,7	7.3.1
Q5.	Attempt any Two parts of the following. (Unit-4)					
a)	What is microwave heating in green chemistry? Explain its advantages over conventional heating methods. Give two examples of reactions facilitated by microwave heating.	5	6	2	1,7	7.3.1
b)	Illustrate the use of ultrasound technique in green chemistry methodologies. How does it improve reaction efficiency? Give two examples of reactions facilitated by ultrasound.	5	6	2	1,7	7.3.1
c)	Discuss the role of green reagents in sustainable chemical processes. Provide two examples of commonly used green reagents.	5	6	2	1,7	7.4.1