Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering / Science

End Sem Examination May-2024

EN3BS14 / BC3BS04 Engineering Chemistry

Programme: B.Tech. / B.Sc. Branch/Specialisation: All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. What is the purpose of lubricants in machinery? **1**

(a) To increase friction (b) To reduce friction

(c) To increase wear (d) To increase heat generation

ii. Iodine value is related to _____. **1**

(a) Fats and oils (b) Alcohols

(c) Esters (d) Unsaturated Hydrocarbons

iii. Which of the following is condensation polymer? **1**

(a) Polystyrene (b) Neoprene

(c) Natural rubber (d) Nylon-6:6

iv. Which property of polythene makes it suitable for packaging materials? **1**

(a) High electrical conductivity

(b) Low density

(c) High strength-to-weight ratio

(d) Thermal stability

v. What is the primary material used in the fabrication of optical fibers? **1**

(a) Copper (b) Aluminum (c) Silica (d) Iron

vi. Which element constitutes fullerenes? **1**

(a) Carbon (b) Hydrogen (c) Oxygen (d) Nitrogen

vii. Spectroscopy is the study of interaction between electromagnetic radiation and _____. **1**

(a) Matter (b) Molecular weight

(c) Temperature (d) Pressure

viii. Which region of the electromagnetic spectrum has the lowest energy? **1**

(a) Infrared (b) Ultraviolet (c) Visible (d) Radiowave

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ix. Which of the following quantity is not a state function- **1**
(a) Temperature (b) Entropy
(c) Enthalpy (d) Work

x. Out of ice, water and vapour, the most random state is- **1**
(a) Ice
(b) Water
(c) Vapour
(d) Both (a) and (b)

Q.2 i. List any four functions of lubricating oils. **2**

ii. Compare and contrast the mechanisms of fluid film lubrication and boundary lubrication. **3**

iii. Describe the saponification number and Iodine value of lubricating oils. Write down its significance. **5**

OR iv. An oil sample under test has a saybolt universal viscosity of 64 S at 210° F and 600 S at 100° F. The high viscosity standard (Pennsylvanian oil) gave the saybolt universal viscosity of 64 S at 210°F and 400 S at 100° F. The low viscosity standard (Gulf oil) possesses a saybolt viscosity of 64 S at 210° F and 700 S at 100° F. Calculate the viscosity index of the oil sample under test. **5**

Q.3 i. Write down atleast four classification of polymers. **4**

ii. Explain the synthesis of Bakelite and discuss its properties and uses. **6**

OR iii. Compare and contrast the properties of PVC and Teflon, highlighting their differences and similarities. **6**

Q.4 i. What is graphene? Write its application. **3**

ii. What are superconductors? Write down its properties. **7**

OR iii. Give detailed analysis of Fullerenes with it's structure, properties and applications. **7**

Q.5 i. Write a detailed note on the types of molecular vibrations with diagram. **4**

ii. Discuss the assessment of Gas chromatography with instrumentation and applications with diagram. **6**

OR iii. Discuss the assessment of UV -Visible spectroscopy with principle and instrumentation with diagram and applications. **6**

Q.6 Attempt any two:

i. Explain the following terms by giving examples & its significance- **5**
(a) Enthalpy (b) Entropy

ii. What do you understand by corrosion? Give a brief account of how the iron open to atmosphere gets rusted. Explain with complete reactions and preventive methods. **5**

iii. Define EMF. Write in detail four applications of EMF. **5**

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Marking Scheme

BC3BS04/EN3BS14 Engineering Chemistry

Q.1	i)	What is the purpose of lubricants in machinery? a) To increase friction b) To reduce friction c) To increase wear d) To increase heat generation	**b**
	ii)	Iodine value is related to ___. a) Fats and oils b) Alcohols c) Esters d) Unsaturated Hydrocarbons	**d**
	iii)	Which of the following is condensation polymer? a) Polystyrene b) Neoprene c) Natural rubber d) Nylon-6:6	**d**
	iv)	Which property of polythene makes it suitable for packaging materials? a) High electrical conductivity b) Low density c) High strength-to-weight ratio d) Thermal stability	**c**
	v)	What is the primary material used in the fabrication of optical fibers? a) Copper b) Aluminum c) Silica d) ~~Plastic~~ (Iron)	**c**
	vi)	Which element constitutes fullerenes? a) Carbon b) Hydrogen c) Oxygen d) Nitrogen	**a**
	vii)	Spectroscopy is the study of interaction between electromagnetic radiation and….. a) Matter b) Molecular weight	**a**
		c) Temperature d) Pressure	
	viii)	Which region of the electromagnetic spectrum has the lowest energy? a) Infrared b) Ultraviolet c) Visible d) Radiowave	**d**
	ix)	Which of the following quantity is not a state function: (a) Temperature (b) entropy (c) Enthalpy (d) Work	**d**
	x)	Out of ice, water and vapour, the most random state is (a) Ice (b) Water (c) Vapour (d) Both ice and water	**c**
Q.2	i.	List any four functions of lubricating oils. **½ mark each**	**2**
	ii.	Compare the mechanisms of fluid film lubrication and boundary lubrication. **1 mark each** at least three comparision.	**3**
	iii.	Describe the saponification number and Iodine value of lubricating oils. **2.5 marks** (1.25+1.25) ~~What does it indicate about the presence of contaminants in the oil?~~ **2.5 marks** Write down it's significance	**5**
OR	iv.	An oil sample under test has a saybolt universal viscosity of 64 S at 210o F and 600 S at 100o F. The high viscosity standard (Pennsylvanian oil) gave the saybolt universal viscosity of 64 S at 210oF and 400 S at 100o F. The low viscosity standard (Gulf oil) possesses a saybolt viscosity of 64 S at 210o F and 700 S at 100o F. Calculate the viscosity index of the oil sample under test. **Formula 1mark 4 marks for solution** Ans. 3333	**5**
		Write down atleast four classification	
Q.3	i.	~~Differentiate between thermosetting and thermoplastics.(atleast 4 differences)~~ of polymers. ~~with suitable~~ example. **1 mark each**	**4**
	ii.	Explain the synthesis of Bakelite **3 marks** (All three steps) and discuss its properties **2 marks** (four properties) and uses. **1 mark** (atleast ~~two properties~~ two uses	**6**
OR	iii.	~~Compare the properties of PVC and Teflon, 3 marks~~ (atleast three similar properties and three differences)	**6**

Q3 (iii) Compare and Contrast the Properties of PVC and Teflon, highlighting their differences and Similarities.

[3 marks for Comparing Similarities
3 marks for differences] = 6

P.T.O.

[2]

[3]

Q.4	i.	What is graphene? **1 mark** Write its application. **2 mark** (at least four applications)	**3**
	ii.	What are superconductors? ~~**1 mark**~~ 2 marks ~~Compare the properties of Type I and Type II superconductors.~~ ~~**3 marks each**~~ Write down its properties (~~at least six~~) - 5 marks	**7**
OR	iii.	Give detailed analysis of Fullerenes with it's structure, **3 marks** (analysis - 1.5 marks + structure - 1.5 marks properties **2 marks** (at least four applications properties) and applications. **2 marks** (at least four applications)	**7**
Q.5	i.	Write a detailed note on the types of molecular vibrations with diagram. ~~**1 mark each**~~ (all stretching + all bending vibrations)	**4**
	ii.	Discuss the assessment of Gas chromatography. with instrumentation 3 **marks** (1 mark - assessment + 2 mark Instrumentation) and applications with diagram **3 marks**	**6**
OR	iii.	Discuss the assessment of UV -Visible spectroscopy with principle **2 marks** (1 - assessment + 1 principle) and instrumentation with diagram. **2 marks** Applications **2 marks** (at least four applications)	**6**
Q.6	i	Explain the following terms by giving examples and its significance. ~~(i) System~~ (ii) ~~Surrounding~~ (iii) ~~Internal energy~~ (iv) Enthalpy (v) Entropy ~~**1mark each**~~ (2.5 marks each)	**5**
	ii	What do you understand by corrosion? **1 mark** Give a brief account of how the iron open to atmosphere gets rusted? **1 marks** Explain with complete reactions and preventive methods. **3 marks** (1 mark - rusting reaction 2 marks - preventive method at least four)	**5**
OR	iii	Define EMF. **1 mark** Write in detail four applications of EMF. **4 marks**	**5**