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

Enrollment No.....

Faculty of Engineering / Science
End Sem Examination May-2023
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. Lubricating oil having low aniline point results in- **1**
(a) Deterioration of metal
(b) Deterioration of rubber
(c) Deterioration of wall of jar
(d) Deterioration of iron

ii. Which of the following way of lubrication shows the lowest value of coefficient of friction? **1**
(a) Thick film lubrication
(b) Thin film lubrication
(c) No use of lubrication
(d) Same for thick and thin film lubrication

iii. Nylon 66 is an example of- **1**
(a) Homopolymer (b) Copolymer
(c) Addition Polymer (d) All of these

iv. A polymer with an amide linkage is known as- **1**
(a) Nylon 6, 6 (b) Teflon (c) Terylene (d) Bakelite

v. Central part of optical fiber is named as- **1**
(a) Core (b) Cladding (c) Buffer (d) None of these

vi. What is the name of an allotrope of carbon consisting a nanostructure of a single layer of atoms arranged in a two-dimensional, honeycomb lattice? **1**
(a) Optical Fiber (b) Nanowire
(c) Graphene (d) None of these

P.T.O.

vii. IR spectroscopy is related to transitions in- **1**
(a) Vibrational energy levels (b) Electronic energy levels
(c) Nuclear energy levels (d) None of these

viii. Which of the following can be used as a carrier gas in gas chromatography? **1**
(a) Nitrogen (b) Argon (c) Helium (d) All of these

ix. The ratio of amount of heat (emitted or absorbed) to the absolute temperature of a system is denoted as- **1**
(a) Enthalpy (b) Entropy (c) Energy (d) Work

x. Which of the following is a thermodynamically highest unstable state? **1**
(a) Pure metal (b) Corroded metal
(c) Ore of metal (d) None of these

Q.2 i. Define steam emulsification number and fire point. **2**

ii. What do you mean by viscosity index? A lubricating oil has a S.U.V. of 58 seconds at 210^0 F and 660 seconds at 100^0 F. The high viscosity standard oil has S.U.V. of 58 seconds at 210^0 F and 400 seconds at 100^0 F. The low viscosity standard oil has S.U.V. of 58 seconds at 210^0 F and 800 seconds at 100^0 F. Calculate the viscosity index of the oil. **3**

iii. Describe in brief about liquid lubricants. Discuss the thin mechanism of lubrication with suitable diagram and examples. **5**

OR iv. Write definition and importance of the following terms - iodine number, total acid number. **5**

Q.3 i. What do you mean by biodegradable polymer? List any four advantages of biodegradable polymer. **2**

ii. Describe the classification of polymer with suitable examples on the basis of following criteria: tacticity, heat effect, polymeric structure **3**

iii. What are biopolymers? Discuss properties and applications of natural rubber. **5**

OR iv. Write preparation, properties and applications of the following polymers: PVC, PTFE (Teflon) **5**

Q.4 Attempt any two:

i. Describe characteristic properties of optical fiber and superconductor. **5**

ii. Why is graphene considered as nanostructure? Describe applications of followings: graphene, carbon nanotube. **5**

iii. Describe properties and applications of fullerenes. **5**

Q.5 i. What do you mean by spectroscopy and electromagnetic spectrum? **2**

ii. Define the following terms: Chromophore, Bathochromic shift, Beer Lambert's law **3**

iii. Describe the principle and instrumentation of UV spectroscopy. **5**

OR iv. Discuss instrumentation and applications of gas chromatography. **5**

Q.6 Attempt any two:

i. Write any two statements to define the entropy. Describe internal energy and external energy. **5**

ii. What is EMF? Describe the method to determine solubility product with the help of emf measurement. **5**

iii. What is electrochemical corrosion? Explain the mechanism of electrochemical corrosion with suitable example. **5**

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Marking Scheme
EN3BS14 / BC3BS04 Engineering Chemistry

Q.1	i)	Lubricating oil having low aniline point results in- (b) Deterioration of rubber	**1**
	ii)	Which of the following way of lubrication shows the lowest value of coefficient of friction: **(a) Thick film lubrication**	**1**
	iii)	Nylon 66 is an example of: **(b) Copolymer**	**1**
	iv)	A polymer with an amide linkage is known as- (a) Nylon 6, 6	**1**
	v)	Central part of optical fiber is named as: **(a) Core**	**1**
	vi)	What is the name of an allotrope of carbon consisting a nanostructure of a single layer of atoms arranged in a two-dimensional, honeycomb lattice? **(c) Graphene**	**1**
	vii)	IR spectroscopy is related to transitions in: **(a) Vibrational energy levels**	**1**
	viii)	Which of the following can be used as a carrier gas in gas chromatography: **(d) All of the given options**	**1**
	ix)	The ratio of amount of heat (emitted or absorbed) to absolute temperature of a system is denoted as: **(b) Entropy**	**1**
	x)	Which of the following is a thermodynamically highest unstable state: **(a) Pure metal**	**1**
Q.2	i.	Define Steam emulsification number – **1 mark** and fire point. – **1 mark**	**2**
	ii.	What do you mean by viscosity index? – **0.5 mark** A lubricating oil has a S.U.V. of 58 seconds at 210^0 F and 660 seconds at 100^0 F. The high viscosity standard oil has S.U.V. of 58 seconds at 210^0 F and 400 seconds at 100^0 F. The low viscosity standard oil has S.U.V. of 58 seconds at 210^0 F and 800 seconds at 100^0 F. Calculate the viscosity index of the oil. – – **0.5 mark (formula) + 1.5 mark (solution and answer) (35-Answer)**	**3**

	iii.	Describe in brief about liquid lubricants. – 2 **marks** Discuss the thin mechanism of lubrication with suitable diagram and examples– 2 **marks + 1 mark (diagram)**	**5**
OR	iv.	Discuss the definition and importance of following: iodine number, – **1 mark** (definition) + **1.5 marks** (importance) total acid number – **1 mark** (definition) + **1.5 marks** (importance)	**5**
Q.3	i.	What do you mean by biodegradable polymer? – **1 mark** List any four advantages of biodegradable polymer. – **1 mark**	**2**
	ii.	Describe the classification of polymer with suitable examples on the basis of following criteria: tacticity, – **1 mark** heat effect, – **1 mark** polymeric structure – **1 mark**	**3**
	iii.	What are biopolymer? – **2 marks** Discuss properties **1.5 marks (3 properties)** and applications **1.5 marks** of natural rubber. (3 Application)	**5**
OR	iv.	Write preparation, properties and applications of the following polymers: PVC, **-2.5 marks(Preparation-1 marks, Properties- 0.5, Application-1 marks)** PTFE(Teflon) **-2.5 marks(Preparation-1 marks, Properties- 0.5, Application-1 marks)**	**5**
Q.4	i.	Describe characteristic properties of optical fiber **-2.5 marks** and superconductor. **-2.5 marks (Atleast 6 properties with details)**	**5**
	ii.	Why is graphene considered as nanostructure? , **-1 mark** Describe 4 applications of followings: graphene, , **-2 marks** carbon nanotube , **-2 marks**	**5**
OR	iii.	Describe 5 properties -, **-2.5 marks** and 5 applications of fullerenes. , **-2.5 marks**	**5**
Q.5	i.	What do you mean by spectroscopy, **-1 mark** and electromagnetic spectrum? **-1 mark**	**2**
	ii.	Define the following terms: Chromophore, **-1 mark** Bathochromic shift, **-1 mark** Beer Lambert's law **-1 mark**	**3**
	iii.	Describe the principle **-2.5 marks** and instrumentation of UV spectroscopy. - **2.5 marks**	**5**
OR	iv.	Discuss instrumentation **-3 marks** and applications of gas chromatography. **-2 marks**	**5**

Q.6 Attempt any two:

i. Write any two statements to define the entropy. -3 **marks** **5**
Describe internal energy and external energy. -2 **marks**

ii. What is EMF? -2 **mark** **5**
Describe the method to determine solubility product with the help of emf measurement, - 3 **marks**

iii. What is electrochemical corrosion?, - **3 mark (Definition/Types)** **5**
Explain mechanism of electrochemical corrosion with suitable example. - **2 marks** (mechanism-1 marks, example-1 marks)

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