(10)

B.Sc. Eng. CEE/2nd Sem. **Date: May 28, 2024**

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF NATURAL SCIENCES

Semester Final Examination | Summer Semester: 2022-2023
Course Number: CHEM 4253 | Full Marks: 150
Course Title: Chemistry II | Time: 3 Hours

Answer all the **6 (Six)** questions. The symbols have their usual meanings. Marks of each question and the corresponding CO and PO are written in the brackets. Assume reasonable value for any missing data.

1.a)	Classify under water corrosion into different classes. Write the reactions involved there in.	(05) (CO1) (PO1)
b)	Discuss the effects of rocks and mineral on the quality of under-ground water and describe the ion-exchange method for the purification of boiler feed water	(12.5) (CO2) (PO1)
c)	Illustrate the needs of polymer processing. Describe the functions of different additives used in polymer processing.	(7.5) (CO1) (PO1)
2. a)	Write the chemical formula of natural rubber. Identify the structure of natural rubber using its characteristic reactions.	(05) (CO1) (PO1)
b)	Explain the necessity of refining mineral based lubricants. Describe the process of refining mineral based lubricants. Specify where sand is used as a lubricant.	(12.5) (CO2) (PO1)
c)	Describe the following terms: (i) smoked rubber & Pale crepe rubber and (ii) vulcanization & compounding of crude rubber.	(3.5+04) (CO1) (PO1)
3. a)	Distinguish between thermoplastic polymer and thermosetting polymer. Classify the followings into thermoplastic and thermosetting polymer: (i) HDPE, (ii) melamine, (iii) PVC and (iv) Bakelite.	(06) (CO1) (PO1)
b)	Explain the causes of troubles that arise in the boiler due to use of untreated water in the boiler.	(12.5) (CO2) (PO1)
c)	Discuss the important properties of rubber those have distinguished it from other ordinary substances.	(6.5) (CO1) (PO1)
4. a)	Describe the processes by which crude rubber is obtained from rubber plants	(7.5) (CO1) (PO1)
b)	Define Portland cement. Write the names and chemical formula (with their abbreviations) of the essential components of Portland cement. Give the general composition of Portland cement.	(2+5.5+5) (CO2) (PO1)
c)	Distinguish between calcareous and argillaceous raw materials of Portland cement giving suitable examples.	(05) (CO2) (PO1)

5. a) Describe the synthesis of the following elastomers: (7.5) (CO1) (PO1)
(i) Neoprene rubber, (iii) Thiokol rubber and (iv) Silicon rubber

b) Sketch out the flow diagram of the manufacturing process of Portland cement. Describe the important steps of this diagram. (12.5) (CO2) (PO1)

c) Describe the setting and hardening process of cement / cement mortar / cement concrete with relevant chemical reactions. (05) (CO2) (PO1)

6. a) Define glass and discuss the chemical changes that occur during the manufacturing of glass. (05) (CO1) (PO1)

b) Mention the characteristic properties of refractory materials. Give a flow diagram of manufacturing white ceramic wares with brief description of each step. (03 +9.5) (CO2) (PO1)

c) Write notes on the following: (7.5) (CO1) (PO1)
(i) safety glass, (ii) borosilicate glass and (iii) soda-lime glass