



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

Semester Final Examination
Course No.: Chem 4215
Course Title: Chemistry of Engineering Materials

Summer Semester: A. Y. 2022-2023
Time: 3 hours
Full Marks: 150

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 brackets.

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|-------|--|----|-----|
| 1. a) | Define hardness of water. Explain the Clark method and lime-soda process of softening of hard water. | 7 | |
| | | | CO1 |
| | | | PO1 |
| b) | Discuss temporary and permanent hardness of water. Describe the alkali mixture method of determining permanent hardness of water. | 8 | |
| | | | CO1 |
| | | | PO1 |
| c) | Discuss the effect of rocks and minerals as the source of impurities of under-ground water. | 10 | |
| | | | CO2 |
| | | | PO2 |
| 2. a) | Define LDPE and HDPE polymer. Describe the manufacturing process of LDPE. | 7 | |
| | | | CO1 |
| | | | PO1 |
| b) | Discuss the reaction mechanism of free radical polymerization and ionic polymerization. | 8 | |
| | | | CO1 |
| | | | PO1 |
| c) | Discuss the following terms.
(i) Condensation polymerization (ii) Ring opening polymerization and (iii) Oxidative polymerization. | 10 | |
| | | | CO2 |
| | | | PO2 |
| 3. a) | Describe the raw materials of glass. | 7 | |
| | | | CO1 |
| | | | PO1 |
| b) | What do you understand by compounding of rubber? Describe the substances used in compounding of rubber with their functions. | 8 | |
| | | | CO1 |
| | | | PO1 |
| c) | Write short notes on the following.
(i) Neoprene rubber (ii) Vulcanization of rubber and (iii) Chemical composition of rubber. | 10 | |
| | | | CO1 |
| | | | PO2 |

4. a) Write down the chemical conversion involves during firing of ceramics. 7
CO1
PO1
- b) Discuss the manufacturing process of refractory materials. 8
CO1
PO1
- c) Explain the following terms 10
i) Grease ii) spalling iii) Porosity iv) Decoration of ceramics
CO1
PO2
5. a) Define lubricant. Discuss function and classification of lubricant. 7
CO1
PO1
- b) Describe rotatory kiln for firing of ceramics and indicate the chemical reaction during firing of ceramics. 8
CO1
PO1
- c) Discuss different theories for setting and hardening of cement. 10
CO1
PO2
6. a) Define paint. Discuss different ingredients of paints and their function. 7
CO1
PO1
- b) Explain the following terms 8
i) Differential aeration corrosion ii) Corrosion fatigue iii) Cavitation – erosion
CO1
PO1
- c) Describe electrochemical process for prevention of corrosion. 10
CO1
PO2