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ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF NATURAL SCIENCES

Final Semester Examination

Summer Semester: 2023 - 2024

Course Code: Chem 4215

Full Marks: 120

Course Title: Chemistry of Engineering Materials

Time: 2 Hours

There are 4 (four) questions. Answer all questions. Marks of each question and corresponding CO and PO are written in the brackets. Programmable calculators are not allowed. Do not write on this question paper. The Symbols have their usual meaning.

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|---|---|----|------------|
| 1 | a) Define zeolite. Discuss the principle of softening of hard water using zeolite. | 7 | CO1
PO1 |
| | b) Distinguish between sludge and scale. Discuss the reasons for the formation of sludge and scale. Explain the prevention of scale formation in the boiler. | 8 | CO1
PO1 |
| | c) Explain the following terms:
(1) Priming and foaming (2) Hardness of water. | 8 | CO1
PO1 |
| | d) Discuss the effect of impurities on the physical and chemical properties of water. | 7 | CO1
PO1 |
| 2 | a) Discuss the following terms:
(1) Chemical composition of rubber (2) Vulcanization of rubber (3) Neoprene rubber. | 15 | CO2
PO1 |
| | b) Define compounding of rubber. Illustrate the substances that are used in compounding process of rubber with their specific functions. | 15 | CO2
PO1 |
| 3 | a) Define clay and describe its classification. | 7 | CO1
PO1 |
| | b) Define refractories and discuss the characteristics of good refractory material. | 8 | CO1
PO1 |
| | c) State the detrimental effect of friction with its definition. Explain the process of minimizing the impact of friction. | 8 | CO1
PO1 |
| | d) Explain the importance and functions of glazing in ceramic production. | 7 | CO1
PO1 |
| 4 | a) SEM image of a super-ceramic—containing 3 mol% Y_2O_3 -stabilized zirconia (3Y-TZP) sintered at 1650°C—shows its polished microstructure at high magnification. Interpret the microstructural feature of the image and explain the reason to be super-ceramic. | 15 | CO2
PO1 |
| | b) What are the steps involved in ceramic production? Write various shaping processes of ceramic and demonstrate the slip casting method with stepwise figure. | 15 | CO2
PO1 |

