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

MID SEMESTER EXAMINATION

SUMMER SEMESTER: 2023-2024

COURSE NO.: Chem 4253

TIME: 1.5 Hours


COURSE TITLE: Chemistry II

FULL MARKS: 75

There are 4 (Four) questions. Answer any 3 (Three) questions. The figures in the right margin indicate full marks and corresponding CO and PO in the brackets. Symbols convey their usual meanings. Assume reasonable values for any missing data.

1. (a) Define corrosion. Write the reactions involved in the formation of rust. Discuss the economic aspects of corrosion including loss due to corrosion. (8.66)  
(CO1)  
(PO1)
- (b) Giving examples discuss the spontaneity of corrosion reaction. Using the information given below, show by calculation that in an electrochemical cell made by coupling copper electrode and nickel electrode the metal of Cu-electrode is being corroded not the metal of Ni-electrode: (8.00)  
(CO1)  
(PO1)  
[ $E_{ox}^0$  of Ni-electrode = 0.25 Volt and  $E_{ox}^0$  of Cu-electrode = 0.344 Volt]
- (c) Illustrate the unique chemical properties of water with chemical equations. Water is an excellent solvent, justify this statement giving examples. (8.33)  
(CO2)  
(PO1)
2. (a) Classify polymer into different classes. Distinguish between thermoplastic polymer and thermosetting polymer. (8.66)  
(CO1)  
(PO1)  
With the help of chemical reactions discuss the mechanism of free radical addition polymerization.
- (b) Discuss the thermodynamics of addition polymerization. With suitable chemical reactions discuss condensation polymerization. (8.00)  
(CO1)  
(PO1)
- (c) Among the four different sources of water which source do you consider is the most suitable one for the boiler? Justify your answer. Distinguish between temporary hardness and permanent hardness of water. (8.33)  
(CO2)  
(PO1)
3. (a) Write the symbols and names of different units of rate of corrosion. With the help of a diagram illustrate the effects of different factors on the rate of atmospheric corrosion. (8.33)  
(CO1)  
(PO1)
- (b) With suitable examples describe oxidative and ring opening polymerization. Discuss the thermodynamics of ring opening polymerization. (8.33)  
(CO1)  
(PO1)

- (c) Briefly describe the detrimental effects friction. Illustrate the terms lubricant and lubrication. Classify lubricants into different classes giving examples. (8.0)  
(CO2)  
(PO1)
4. (a) Describe microbiological corrosion with the reactions involved therein. (8.66)  
Distinguish between uniform corrosion and localized corrosion. Pitting is localized and dangerous type of corrosion, illustrate the statement. (CO1)  
(PO1)
- (b) Classify materials used as protective coatings into different classes. Define paint and discuss the functions of a good pigment on the paint film. (8)  
(CO1)  
(PO1)
- (c) Discuss with suitable reactions the Lime-soda process for the treatment of boiler feed water. (8.33)  
(CO2)  
Describe the following processes of refining lubricating oil:  
(i) Degreasing and (ii) Acid refining. (PO1)

 22.02.2024