

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2020

Programme Name: B.Tech (CE+RP)

Course Name : Corrosion Engineering

Course Code : MTEG364

Semester : VIII

Time : 03 hrs

Max. Marks : 100

Nos. of page(s) : 2

Instructions: The question paper consists of three sections. Answer the questions section wise.

Note: Assume suitable data wherever necessary

SECTION A

(This section includes multiple choice questions and fill in the blanks)

(Answer all questions)

S. No.		Marks	CO
Q1	(i) What is the most common method to measure soil electrolyte resistivity a. 4 pin Wenner method b. 8 pin Wenner method c. Resistivity meter d. 4 pin Wendy method (ii) Ferritic stainless steel immunity to a. Crevice corrosion b. Stress corrosion cracking c. Pitting corrosion d. Erosion corrosion	(2.5 + 2.5)	CO4
Q2	(i) A galvanic cell is formed a. When two metals are immersed in solutions differencing in concentration b. When two different metals are immersed in one electrolyte c. When two different metals are exposed to dry air d. When two metals are brought close together and electrically insulated from one another (ii) Select the right common anode material for impressed current cathodic protection a. Graphite b. Gold c. Wood d. glass	(2.5 + 2.5)	CO3
Q3	(i) Choose the correct answer for sacrificial anode system a. The metal to be protected is made anode b. Only the more active metal will be corroded, protecting the parent metal c. Since the anodic metal is sacrificed, the method is also called galvanic	(2.5 + 2.5)	CO2

	<p>cathodic protection</p> <p>d. Usually Platinum and Silver are used as sacrificial anodes</p> <p>(ii) In Cathodic Protection system, the structure (pipe) to be protected should become as</p> <p>a. Anode</p> <p>b. Cathode</p> <p>c. Electrolyte</p> <p>d. Copper Sulphate</p>		
Q4	<p>Corrosion cell must have these in order to complete the corrosion reaction (fill the blanks)</p> <p>A). _____ and _____</p> <p>B). _____ between _____ and _____</p> <p>C). _____ connecting _____ and _____</p>	(1 + 2 + 2)	CO1
Q5	<p>A). Uniform corrosion defined as _____ and its preventions are _____</p> <p>B). Crevice corrosion defined as _____ and its preventions are _____</p>	(2.5 + 2.5)	CO1
Q6	<p>Iron electrode is cathodically polarized in an aqueous medium and the iron potential is -0.716 V vs. SCE and -0.75 V vs. SHE for the hydrogen reaction</p> $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2, e_{\text{H}^+/\text{H}_2}^0 = 0.00 \text{ V vs. SHE or } -0.241 \text{ V vs. SCE.}$ <p>A). The hydrogen overpotential at pH = 3 against SCE _____</p> <p>B). The hydrogen overpotential at pH = 3 against SHE _____</p>	(2.5 + 2.5)	CO3
<p>SECTION B</p> <p>(Answer all questions)</p>			
Q7	If the concentration of H^+ decreases from 0.8 to 10^{-7} M, estimate how much the oxidizing power of the ($\text{MnO}_4^-/\text{Mn}^{2+}$) couple will be reduced.	10	CO3
Q8	Discuss in detail about cash flow and capital budget techniques in corrosion engineering projects.	10	CO5
Q9	<p>a. Demonstrate cathodic and anodic protection methods.</p> <p style="text-align: center;">(OR)</p> <p>b. Summarize corrosion coatings</p>	10	CO2
Q10	Criticize biologically influenced corrosion.	10	CO4
Q11	Discuss in detail about corrosion and explain with proper examples how the corrosion rate varies with different environments.	10	CO3
<p>SECTION-C</p>			
Q12	<p>a. Analyse the selection of proper metal or alloy for specific environment to prevent corrosion.</p> <p>b. Illustrate titanium alloys and its corrosion behaviour in specific environment</p>	(7+13)	CO4