



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION JAN- 2023

Date: 30-Jan-2023

Time: 01:00 PM to 4:00 PM

Max Marks: 100

Weightage: 50%

Course Code: PET 2027

Course Name: Petroleum Corrosion Technology

Program: B.Tech

Instructions:

- (i) Read all the questions carefully and answer accordingly.*
- (ii) Question paper consists of three parts: Part A, Part B and Part C. Some questions contain multiple parts. Read carefully.*
- (iii) Attempting all the questions is mandatory*

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10QX 2M= 20M)

1. Choose the single best option among the multiple options for the questions (i-x).

i. Corrosion occurring due to high fluid velocities or turbulence

- a) Pitting Corrosion
- b) Galvanized Corrosion
- c) Erosion Corrosion
- d) Microbial Corrosion

ii. What is an Anode in a corrosion cell?

- a) Surface of the metal that corrodes
- b) Surface of the metal that does not dissolve
- c) Surface of the metal where reduction happens
- d) None

iii. Cavitation is a phenomena which occurs

- a) due to pressure changes in fluids
- b) due to formation and collapse of vapor bubbles
- c) due to wearing away of metal from bubble collapse
- d) All of the above

iv . The coatings which can be cured/dried in the presence of air only is called

- a) Air dried
- b) Force Cured
- c) Baked Coatings
- d) Fusion Bonded

- v. 18-8 stainless steel is an example of
- a) Alloy
b) Homogeneous alloy
c) Steel containing 18% chromium, 8% nickel, carbon and iron
d) All of the Above
- vi. Following is the sequence adopted in usual coating application for protecting surfaces
- a) Surface Preparation, Inspection and Coating
b) Surface Preparation, Coating and Inspection
c) Inspection, Coating, Inspection
d) Inspection, Surface Preparation, Coating
- vii. Sweet corrosion occurs due to the following chemical:
- a) H₂S
b) Carbonic acid
c) CO₂
d) None
- viii. Hydrogen Induced Failures occurs due to
- a) Trapping of hydrogen atoms into metal surface
b) Hydrogen Embrittlement
c) Hydrogen Blistering
d) All of the above
- ix. Carbon Steel is an example of
- a) Alloy
b) Heterogeneous alloy
c) Both of the above
d) None of the above
- x. Intergranular Corrosion is preferential attack on
- a) metal grain boundaries
b) metal grains
c) whole metal body
d) None of the above

Part B [Thought Provoking Questions]

Answer all Questions. Each question carries TEN marks. (4Q x 10M = 40M)

2. Illustrate the general schematic of protective coating systems on a metal surface with clear markings. List any two important functions of individual coats

(C.O. No. 2) [Comprehension]

3. Give your understanding of the Impressed current cathodic protection system. What is the role of impressed current anode. Give details of this method with a clear diagram considering impressed current system on a underground buried pipeline segment and proper marking of every component.

What precautions needs to be taken for effective working of this type of cathodic protection system.

(C.O. No. 4) [Comprehension]

4. Passivation of a metal/alloy helps it protect from corrosion process. Give your views on this phenomenon and how it protects the metal/alloy with an example.

(C.O.No. 1) [Comprehension]

5. Rusting of iron in saline water is faster than in ordinary water. What is the reason behind this phenomenon?

(C.O.No. 3) [Comprehension]

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries TWENTY marks. (2Q x 20M = 40M)

6. Suppose you are a corrosion engineer involved in selection of a specific inhibitor formulation for a specific program requires matching the inhibitor properties with the system's fluids, its environment, and application technique to provide optimum economical corrosion control, while at the same time avoiding introducing other operating problems. The need for different properties is the reason each oilfield chemical supplier has so many different formulations available. As a corrosion engineer your role is to give your insights about the following given desirable properties and characteristics to be considered when selecting a corrosion inhibitor for a particular corrosive environment. (C.O. No. 3) [Comprehension]

- (a) Inhibits Corrosion
- (b) Solubility/dispersability
- (c) Foaming properties
- (d) Compatibility with other chemicals
- (e) Emulsification Properties
- (f) Pour Point
- (g) Free-Thaw Stability
- (h) Thermal Stability
- (i) Corrosiveness
- (j) Mobility of individual components

7. Provide your understanding on how the coating process is completed in the following given oilfield installations. Detail the coating technique in any 3 out of 6 below given different installations.

(C.O. No. 2) [Comprehension]

- (a) Vessels,
- (b) Tanks,
- (c) Tubular goods,
- (d) Flow lines, gathering systems, injection lines and piping,
- (e) Offshore platforms,
- (f) Pipeline Coatings