

M.E. METALLURGICAL & MATERIAL ENGINEERING 1st YEAR 2nd SEMESTER EXAM 2024

Subject: Environmental Degradation of Materials

Time: Three Hours

Full Marks: 100

1. Short Notes (Answer any five) -

5x5=25 Marks

- 1) Nernst Equation and its applications
- 2) Pourbaix diagram with Fe-water system
- 3) Surface preparation methods for painting
- 4) Atmospheric corrosion and factors responsible
- 5) Cathodic protection and its application
- 6) Functions of organic paint and intumescent paint
- 7) Corrosion inhibitors and types
- 8) Pitting Resistance Equivalent Number (PREN)

Answer any five questions.

5x15=75 Marks

2. Factors influencing corrosion of metals. List the various forms of corrosion causes damage. Explain the electrochemical reaction of iron corrosion in water.
3. Why does stainless steel resist corrosion? Name two important types of corrosion that affect stainless steel most. Remedies to prevent both types of corrosion in stainless steel.
4. What are the major components of paints and their specific purposes? How does paint coating function? Name a few types of paints used to protect steel in different environments.
5. What types of corrosion are observed in automobiles? Why does corrosion occur in reinforced concrete construction (RCC)? Explain the means to mitigate the corrosion of reinforcement bars used in RCC.
6. Briefly explain Electrochemical Impedance Spectroscopy (EIS). What information is obtained from Bode plot and Nyquist plot? Draw a typical equivalent circuit.
7. What is the difference between metal coating and organic coating? Name the different types of metal coatings used to mitigate corrosion. Explain thermal spraying and when it is applied to prevent corrosion.
8. Explain electroless Ni plating and electroplating. Discuss the corrosion of non-ferrous metals and alloys. Describe the corrosion behaviour of nickel and aluminium.