**Seat No.: _____** **Enrolment No._____**

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2016**

**Subject Code:2162108** **Date:13/05/2016**

**Subject Name: Material Degradation and Prevention**

**Time: 10:30 AM to 01:00 PM** **Total Marks: 70**

**Instructions:**

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

| | | | |
|---|---|---|---|
| **Q.1** | **(a)** | Explain electrochemical theory of wet corrosion with example of zinc in hydrochloric acid solution. | **07** |
| | **(b)** | What is e.m.f. series? Discuss its applicability and limitations in corrosion studies. Compare it with galvanic series. | **07** |
| **Q.2** | **(a)** | Explain mechanism of inter granular corrosion in stainless steel. Describe methods to prevent it in stainless steel. | **07** |
| | **(b)** | Derive Nernst equation for electrode potential. Mention applications of Nernst's equation in corrosion study. | **07** |
| | | **OR** | |
| | **(b)** | Discuss the Pourbaix diagram for Fe-$H_2O$ system and show that how it is useful in corrosion study. | **07** |
| **Q.3** | **(a)** | What is selective leaching? Discuss its causes and possible remedial measures. | **07** |
| | **(b)** | Discuss the significance of high temperature corrosion study. Write Piling-Bedworth ratio and its applications. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | "Pitting is most dengerous form of corrosion" Discuss. | **07** |
| | **(b)** | Define Wear. Describe Pin on Disc type method to measure wear rate. | **07** |
| **Q.4** | **(a)** | Justify the role of proper material selection and design aspects in corrosion protection with suitable examples of each. | **07** |
| | **(b)** | Discuss principle of Electroplating & explain setup used for it with a neat sketch. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Differentiate between sacrificial anode cathodic protection method and impressed current cathodic protection method. | **07** |
| | **(b)** | Define Galvanizing. Explain Galvanizing Process. Give advantage & application of Galvanizing. | **07** |
| **Q.5** | **(a)** | Define vapour deposition and Explain physical vapour deposition technique for corrosion protection. | **07** |
| | **(b)** | Write a note on Surface modification by Friction stir processing. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Define vapor deposition and Explain Chemical vapor deposition technique. | **07** |
| | **(b)** | Write a note on Use of Laser and plasma in surface engineering. | **07** |

**********