MANIPAL
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**DEPARTMENT OF SCIENCES, I/III SEMESTER M.Sc (P/C/M/G)**
**END SEMESTER EXAMINATIONS, NOVEMBER 2021**

Applied Electrochemistry and Industrial Catalysis [CHM 6005]
**(REVISED CREDIT SYSTEM-2017)**

Time: 3 Hours Date: MAX. MARKS: 50

Note: (i) Answer **ALL** questions
(ii) Draw diagrams, and write equations wherever necessary

**1.A** Explain the following with appropriate reasoning:
(i)Trace amount of sodium carbonate is enough to accelerate caustic embrittlement in boilers.
(ii) Rate of hygrogen damage increases with increase in acid concentration
(iii) Continuous supply of current is required for anodic protection of metals
(iv) Velocity of free-flowing liquid has profound influence on erosion corrosion.

**1.B** List any two limitations of corrosion rate measurement by classical method. With a neat diagram explain electrochemical impedance spectroscopy method for corrosion rate measurement.

[4+ 6]

**2.A** What are the causes for erosion corrosion? Explain in detail any two factors affecting erosion corrosion.

**2.B** Formulate Tafel equation, using Butler Volmer equation. Draw Tafel plot and explain how it is used for corrosion rate calculation.

[4+6]

**3.A** Explain four limitations of electrosynthesis. Suggest suitable methods to overcome them.

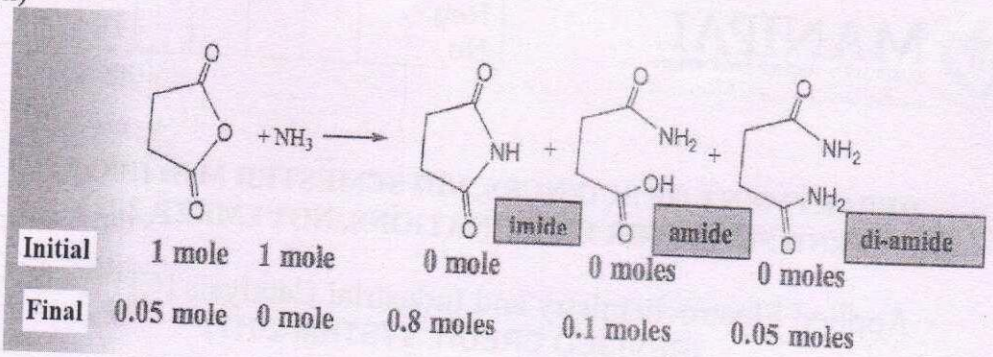
**3.B** Explain mechanism of (i) Electroreduction of mono halogenated aromatic hydrocarbon (ii) Electrosynthesis of ozone.

[4+6]

**4.A** Explain the role of anodic and cathodic inhibitors in corrosion control.

**4.B** (i)Explain mechanism of (a) Poisoning (b) Fouling in catalytic deactivation method.

(ii)




In the above reaction based on conversion of ammonia, calculate ammonia conversion, yield and selectivity of di-imide and imide. **[4+6]**

**5. A.** (i) Explain Turnover Frequency (TOF) and Turnonver Number (TON) in catalyst.
(ii) Write requirements and characteristics of catalytic supporter.
(iii) Write the reaction involved in preparation of alumina ($Al_2O_3$).

**5. B.** (i)With neat diagram explain the fractional distillation of petroleum.
(ii)With neat diagram, explain the Fischer-Tropsch Process. **[4+6]**

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