

No. of Printed Pages : 03

Roll No.

CC-184

M. Tech. EXAMINATION, May 2017

(Third Semester)

(Re-appear Only)

(CHE)

CHE-653-B

FUEL CELL TECHNOLOGIES

Time : 3 Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. Scientific Calculator is allowed.

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P.T.O.

Unit I

1. What is activation over-voltage ? Discuss the simplification of activation kinetics by tafel equation. **15**
2. Derive Butler-Volmer equation to get an expression for relation between Current and Voltage in electrochemical systems. **15**

Unit II

3. A 10 cm^2 PEMFC employs an electrolyte membrane with conductivity of $0.10 \Omega^{-1} \cdot \text{cm}^{-1}$. R_{elec} is 0.005Ω . Assuming the only other contribution to cell resistance comes from electrolyte membrane, determine the ohmic voltage loss at current density of 1 A/cm^2 if :
(a) Electrolyte membrane is $100 \mu\text{m}$ thick
(b) Electrolyte membrane is $50 \mu\text{m}$ thick. **15**
4. Define Flux. Discuss the forces for charge transport in detail. **15**

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Unit III

5. What are the forces that derive diffusion transport ? Discuss losses in fuel cell. **15**
6. What is flow structure design ? Write the criteria for material selection for the use in flow structures. Discuss flow structure patterns in detail. **15**

Unit IV

7. What are the types of fuel cell characterisation ? Discuss fundamental variables used in different characteristics techniques. **15**
8. Write notes on the following characterisations : **15**
(a) Gas permeability
(b) Structure determination
(c) Chemical Determination.

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