Q. Code: 608144

Reg. No. | | | | | | | | | | | | | |

B.E./ B. TECH.DEGREE EXAMINATIONS, MAY 2023

Sixth Semester

OC18002 - FUEL CELL CHEMISTRY

(Common to CHE, ECE, INT& ME)

(Regulation2018/2018A)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	To foundational knowledge of the fuel cell.	**2**
CO 2	Understand the way to Fuel system design &optimization.	**3**
CO 3	Apply their learned knowledge to develop conventional technologies.	**3**
CO 4	Understand the importance of fuel cell applications.	**3**
CO 5	The students will acquire knowledge on various fuel cell techniques and their mechanism.	**4**

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	What adjustments can be made to a fuel cell's kinetic performance?	**1**	**4**
2.	Clarify the differences between batteries and fuel cells.	**1**	**3**
3.	State Kelvin's second law of thermodynamics.	**2**	**2**
4.	Differentiate an open system from a closed system.	**2**	**2**
5.	Can absolute electrode potential of an electrode be measured?	**3**	**3**
6.	What is electrode potential?	**3**	**2**
7.	List the four components of a PEM fuel cell.	**4**	**4**
8.	Examine how bipolar plates function in fuel cells.	**4**	**5**
9.	Establish a distinction between stationary and distributed power.	**5**	**3**
10.	List the uses for a PEM fuel cell-based uninterrupted power supply (UPS) system.	**5**	**2**

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Explain the PEM fuel cell's operation.	**(14)**	**1**	**2**
	(OR)			
(b)	Analyze the criteria for fuel cell Performance.	**(14)**	**1**	**2**

12. (a)	Derive the Gibbs-Helmholtz equation and its applications.	**(14)**	**2**	**3**
	(OR)			
(b)	Compare the reversible process with the irreversible process	**(14)**	**2**	**3**
13. (a)	Derive the Nernst equation from Gibbs free energy.	**(14)**	**3**	**3**
	(OR)			
(b)	Demonstrate how to use a Calomel electrode to determine single-electrode potential.	**(14)**	**3**	**3**
14. (a)	In a single fuel cell stack with a proton exchange membrane (PEM), describe the channel geometry analysis.	**(14)**	**4**	**4**
	(OR)			
(b)	Compare and contrast the current collection with the mass transport and concentration losses.	**(14)**	**4**	**4**
15. (a)	Regarding stationary power applications, write about fuel cells.	**(14)**	**5**	**2**
	(OR)			
(b)	Give an explanation of the hydrogen PEMFC system used in automotive applications.	**(14)**	**5**	**2**

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Write about the drawbacks and remedies to fuel cell problems, as well as their longevity and reliability.	**(10)**	**5**	**5**

****