Register Number:……..

KUMARAGURU
college of technology
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B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Seventh Semester

AUTOMOBILE ENGINEERING

U18AUE0011: Fuel Cell Technology

COURSE OUTCOMES

CO1: Identify the different components and materials used in a fuel cell
CO2: Familiarize with the safety aspects and the recent advancements in field of fuel cells
CO3: Apply the knowledge of thermodynamics and material science to understand the thermodynamic equations and electrochemical kinetics of the fuel cell
CO4: Compare the different types of fuel cells and choose an appropriate fuel cell suitable for specific application
CO5: Develop a single cell of PEM fuel cell / Microbial fuel cell on their own
CO6 Estimate the performance of the fuel cell

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Explain why fuel cells have not gained commercial importance in the Energy sector?	CO1	[K_2]
2.	Identify the components used to build a fuel cell.	CO5	[K_2]
3.	List the systems involved in the fuel cell powered vehicle stating the purpose of the systems.	CO4	[K_2]
4.	Specify the safety aspects given by NHERM while fuel cell-based vehicles are adopted.	CO2	[K_2]
5.	Identify the purpose of different controllers used in a fuel cell driven vehicle.	CO3	[K_2]
6.	In which fuel cell is the Cathode poisoning predominant? Analyze the performance of fuel cell based on this effect.	CO6	[K_4]
7.	Apply the concept of methanization and cracking to fuel cells and explain how hydrogen is extracted?	CO1	[K_3]
8.	Apply the concept of thermodynamic voltage to fuel cells and suggest what happens if there is an increase in the thermodynamic voltage?	CO3	[K_3]
9.	With the help of the polarization curve as a performance parameter, explain how the cell voltage could be increased?	CO6	[K_2]
10.	Suggest suitable fuel sources for the different reformers and justify why they are applicable to that reformer.	CO3	[K_3]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	Explain the process to build a Proton Exchange Membrane Fuel cell based the materials used to build the components of the PEM fuel cell.	16	CO5	[K_2]
12.	Elaborately explain different methods of hydrogen storage.	16	CO2	[K_2]
13.	Explain the working of the phosphoric acid fuel cell driven vehicle with necessary circuit diagram and various stages of contaminants removal applied to it.	16	CO4	[K_3]
14.	Give the road map of fuel cell initiative launched by the Government of India to make it commercially available in the market. Evaluate the initiatives launched by Government with respect to safety aspect.	16	CO2	[K_4]
15.	Analyze the concept of Life Cycle Analysis of fuel cell and construct a fuel cell based electric vehicle system.	16	CO4	[K_4]
16.	Elaborate on the role of carbon fibre in fuel cells. Discuss on the technology development of bi-polar plates and flow field.	16	CO3	[K_3]

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