



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Alternate Energy Resources
Program: B. Tech Electrical Engineering
Course Code: EPEG4013

Semester : VIIth
Duration : 03 hrs.
Max. Marks: 100

Instructions:

SECTION A		(5Qx 4M = 20 Marks)	
		Marks	COs
Q 1	Explain the basic Principle of MHD generation system	4	CO1
Q 2	How does a fuel cell differ from traditional methods of energy generation?	4	CO3
Q 3	Explain the current status of the R&D activities to fuel cell development in India.	4	CO3
Q 4	Illustrate the primary reasons for high efficiency in a MHD based power generating system.	4	CO1
Q 5	Explain the importance of Environmental Benefits if Hydrogen Energy.	4	CO2
SECTION B		(4Qx10M = 40 Marks)	
Q 6	Enlist the advantages and disadvantages of MHD. Explain with a neat diagram about MHD open and closed systems.	10	CO1
Q 7	Explain the benefits of fuel cells and how a fuel cell is different from a battery? Enlist the types of fuel cells are available and the details of different types of PEM fuel cells.	10	CO3
Q 8	<ol style="list-style-type: none"> 1. How much of the known universe mass is made up of hydrogen? <ol style="list-style-type: none"> a. 99%; b. 75%; c. 25%; d. 50% 2. Which state has the most hydrogen fueling stations? <ol style="list-style-type: none"> a. California b. Texas c. Florida d. Iowa 3. How do you refuel a fuel cell electric vehicle? <ol style="list-style-type: none"> a. Fill the tank with water b. Plug the vehicle into a charging station c. Pump hydrogen gas directly into the tank d. Pump gasoline into the tank 	10	CO2

	<p>4. What are the two most common ways to produce hydrogen gas used in fuel cells?</p> <p>a. Electromagnetism and quantum mechanics b. Steam reforming and electrolysis c. Electrolysis and absorption d. Thermal conductivity and refraction</p> <p>5. When were fuel cells first used in space?</p> <p>a. Apollo Program b. Space Shuttle Program c. Project Mercury d. Gemini Program</p> <p>6. How do you boost the amount of electricity a fuel cell system produces?</p> <p>a. Adding oxygen b. Adding hydrogen c. Adding cells d. Adding protons</p> <p>7. When was the first fuel cell invented?</p> <p>a. 1701 b. 1901 c. 1839 d. 1879</p> <p>8. How do fuel cells generate electricity?</p> <p>a. Combustion b. Fusion c. Electrochemical reaction d. Organic reaction</p> <p>9. What do fuel cells emit?</p> <p>a. Oxygen b. Hydrogen c. Nothing d. Water</p> <p>10. What type of reaction takes place in a chemical cell?</p> <p>a. Endothermic b. Exothermic c. No Reaction Occurs d. None of these</p>		
Q 9	<p>What are the Different Types of Fuel Cells? Explain any two of them with proper schematic diagram.</p> <p style="text-align: center;">Or,</p> <p>Explain the Following: Tidal Energy, Wave Energy, Ocean Currents and Salinity Gradients.</p>	10	CO3
SECTION-C		(2Qx 20M= 40 Marks)	
Q 10	<p>Explain the following:</p> <p>a. Properties of Hydrogen and Sources of Hydrogen. b. Hydrogen Production Methods and Storage Methods c. Environmental Benefit and purification of Hydrogen.</p>		CO2

	<p>d. Hydrogen Production Units in India.</p> <p>e. Hydrogen Management, Transportation and Limitations.</p>		
Q 11	<p>How is Cummins involved in hydrogen fuel cell technology? Give an overview on research activities on fuel cells in world. Explain the term Open and Closed OTEC cycles</p> <p style="text-align: center;">Or,</p> <p>Explain 'India's National Hydrogen Mission and Prospects for Cooperation with GCC'. Explain Bio Photolysis and Wave Power Devices.</p>		CO4