


| Name: | |  | |
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| Enrolment No: | | | |
| UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, May 2022 | | | |
| Course: Renewable Energy Technologies Program: M.Tech. – ES & SE Course Code: EPEC 7030 | | Semester: II Time : 03 hrs. Max. Marks: 100 | |
| Instructions: Attempt all questions | | | |
| SECTION A | | | |
| S. No. | | Marks | CO |
| Q 1 | Briefly explain the reasons for variation in solar radiation reaching the Earth received at the outside of the atmosphere. | 4 | CO1 |
| Q 2 | Explain the working of ‘two-pass air heater with porous medium’ with help of diagram. | 4 | CO2 |
| Q 3 | . Discuss solid substances for sensible heat storage with their temperature range. | 4 | CO2 |
| Q 4 | Comment on the possibilities of hydrogen as potential energy carrier in future. | 4 | CO3 |
| Q 5 | Comment on environmental effect of fuel cells. | 4 | CO4 |
| SECTION B | | | |
| Q 6 | Explain biophotolysis method of production of hydrogen. | 10 | CO3 |
| Q 7 | Discuss various conversion technologies of hydrogen to useful applications | 10 | CO3 |
| Q 8 | Explain the principle of operation Solid oxide fuel cell with help of diagram. <p style="text-align: center;">OR</p> Explain the principle of operation Alkaline fuel cell with help of diagram. | 10 | CO4 |

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| Q 9 | Draw a conceptual block diagram of a fuel cell power plant and explain the details of each block. | 10 | CO4 |
| SECTION-C | | | |
| Q 10 | <p>a) Draw and explain an equivalent circuit of a practical solar PV cell.</p> <p>b) Calculate the monthly average hourly radiation falling on a flat-plate collector facing south ($\gamma = 0^\circ$) with a slope of 15°, given the following data Location:</p> <p style="padding-left: 40px;">Chennai ($13^\circ 00' N$),</p> <p style="padding-left: 40px;">Month: October,</p> <p style="padding-left: 40px;">Time: 1100 - 1200 h (LAT),</p> <p style="padding-left: 40px;">I_g: 2408 kJ/m²-h,</p> <p style="padding-left: 40px;">I_d: 1073 kJ/m²-h</p> <p style="padding-left: 40px;">Assume ground reflectivity to be 0.2.</p> | 10+10 | CO1 |
| Q 11 | <p>Describe followings for a thermochemical storage for a solar application</p> <p>c) Criteria used for judging the suitability of a thermochemical reaction</p> <p>d) Schematic representation of a thermochemical reaction</p> <p>e) Thermochemical storage reactions, temperatures of forward and reverse reaction and energy stored</p> <p style="text-align: center;">OR</p> <p>As per IS 12933 of testing procedure of liquid solar flat plate collector, explain:</p> <p>a) Testing setup with help of diagram</p> <p>b) Principle measurement</p> <p>c) Consideration of steady state conditions</p> | 6+7+7 | CO2 |