**UNIVERSITY**

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(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **12CH322** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Nanotechnology in Fuel Cells and Energy Storage** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | | **Questions** | **Marks** |
| 1. | a. | | Explain the working principle of a fuel cell with a neat diagram. | 10 |
| b. | | Types of fuel cells. | 3 |
| c. | | Write a note on hydrogen oxidation. | 7 |
| (OR) | | | | |
| 2. | Discuss in detail the different types of catalyst preparation methods with a neat diagrams. | | | 20 |
| 3. | Diagrammatically explain the working principle and various materials involved in DSSC. | | | 20 |
| (OR) | | | | |
| 4. | a. | What are the major issues in operation of DSSC? | | 10 |
|  | b. | Write a short note on back transport of electrons from oxide to absorbing semiconductor in SSSC. | | 10 |
| 5. | Schematically explain various steps involved in assembling three component ETA SSSC. | | | 20 |
| (OR) | | | | |
| 6. | Schematically explain various steps involved in assembling two component ETA SSSC. | | | 20 |
| 7. | a. | | How hydrogen is stored in complex hydrides? | 10 |
|  | b. | | Tabulate the various parameters of hydrogen storage materials and their determination. | 10 |
| (OR) | | | | |
| 8. | Discuss the storage mechanism of hydrogen in metal organic frame work and activated carbon. | | | 20 |
|  | | | **Compulsory:** |  |
| 9. | a. | | What are zeolites? | 2 |
|  | b. | | Discuss few properties and applications of zeolites. | 8 |
|  | c. | | How are energy stored in super capacitors and batteries? | 10 |

ALL THE BEST