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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **16NT3011** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PHOTOVOLTAICS: ADVANCED MATERIALS AND DEVICES** | **Max. Marks :** | **100** |

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

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| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the J-V characteristics of a solar cell in dark and under illumination. | CO1 | 10 |
| b. | Demonstrate the equivalent circuit of a solar cell and discuss the role of each components. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Define the total power input in a solar cell and explain its importance in deciding the efficiency of a solar cell. | CO1 | 10 |
| b. | Explain in detail, the various loss that occurs in a solar cell and discuss its impact on the efficiency of a solar cell. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Differentiate crystalline silicon solar cells and thin film solar cells with suitable sketch. | CO2 | 10 |
| b. | Describe the design and working of CdTe thin film solar cell with a neat sketch. Also write their limitations. | CO2 | 10 |
| **(OR)** | | | | |
| 4. |  | Differentiate single crystalline, semicrystalline and amorphous silicon solar cells with respect to the structure of base material and design of solar cell. Mention the drawbacks and advantages of each. | CO2 | 20 |
|  |  |  |  |  |
| 5. |  | Describe the role of quantum dots in metal-semiconductor junction, polymer-semiconductor and semiconductor-semiconductor systems based solar cells. | CO2 | 20 |
| **(OR)** | | | | |
| 6. |  | Describe the materials, design and working principle of organic solar cell. | CO2 | 20 |
|  |  |  |  |  |
| 7. |  | With a neat sketch, describe Czochralski and float zone technique used in the manufacture of Si wafers. Discuss the advantages and disadvantages of each method. | CO2 | 20 |
| **(OR)** | | | | |
| 8. |  | Describe the different thin film deposition methods used in the fabrication of Copper Indium Gallium diselenide based solar cell. | CO2 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Describe the effect of ambient conditions on the efficiency of solar cell. | CO2 | 15 |
| b. | Briefly discuss the solar water pumps. | CO2 | 5 |