**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**
**(MID SEMESTER EXAMINATION SP2025)**

**CLASS: B.Tech.** **SEMESTER : VI**
**BRANCH: Electrical and Electronics Engg.** **SESSION : SP/2025**

**SUBJECT: EE365 INTRODUCTION TO SUSTAINABLE ENERGY**

**TIME: 02 Hours** **FULL MARKS: 25**

**INSTRUCTIONS:**
**1. The question paper contains 5 questions each of 5 marks and total 25 marks.**
**2. Attempt all questions.**
**3. The missing data, if any, may be assumed suitably.**
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

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|---|---|---|---|---|
| Q.1(a) | Define Renewable and Non-Renewable sources. State some challenges of higher dependency on Renewable Sources for power generation. | [2] | 1 | 1 |
| Q.1(b) | What are the reasons for shifting the focus from Non-Renewable Sources to Renewable sources for Power Generation? | [3] | 1 | 1 |
| Q.2(a) | Explain how photovoltaic source generates DC voltage. | [2] | 2 | 2 |
| Q.2(b) | Explain the nature of IV characteristics of a solar cell. How is it different from the characteristics of a diode under the dark? | [3] | 2 | 2 |
| Q.3(a) | A Solar cell has the following parameters: | [2] | 2 | 3 |

| Open circuit voltage (Voc) | Short circuit current (Isc) | Fill Factor (FF) |
|---|---|---|
| 0.6 V | 35 mA/cm2 | 78% |

What will be its efficiency?

| | | | | |
|---|---|---|---|---|
| Q.3(b) | What are the different types of losses in solar cells? Draw and explain the two-diode model of the solar cell. | [3] | 2 | 3 |
| Q.4(a) | Why boost converter is used instead of a buck converter with the solar photovoltaic panel? | [2] | 2 | 3 |
| Q.4(b) | Explain either the perturb and observe method or incremental conductance method for maximum power point tracking in solar PV systems. | [3] | 2 | 3 |
| Q.5(a) | Write a short note on power generation from wind turbine. | [1] | 1 | 1 |
| Q.5(b) | Explain how to realise any desired power from a solar photovoltaic panel with proper equations. Explain the necessity of voltage and current controllers. | [4] | 5 | 4 |

**:::::03/03/2025 E:::::**