BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP2024)

CLASS: B.Tech **SEMESTER : VI**
BRANCH: EEE **SESSION : SP/2024**

SUBJECT: EE365 INTODUCTION 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**

			CO	BL
Q.1(a)	Discuss about the status of conventional and non-conventional energy sources in India, and what are their future prospects? Also, discuss about the international solar alliance scheme.	[2]	CO1	BL2
Q.1(b)	Discuss the distinctive features of the proposed ABT scheme in detail.	[3]	CO1	BL2
Q.2(a)	Describe with proper justification the equivalent circuit of a practical solar PV cell.	[2]	CO2	BL2
Q.2(b)	Demonstrate the effect of insolation and temperature on the PV cell characteristics such as short circuit current, open circuit voltage, peak power and Fill factor with proper derivation.	[3]	CO2	BL3
Q.3	A pn junction solar module consisting of 6*10 identical pieces polycrystalline solar cells **in series** (156 mm * 156 mm), illuminated uniformly with 1000 W/m^2 and the temperature of 25^0C gives the current of 0.85 A/cell and 0.55 V/cell at maximum power point. The individual cell gives 0.9 A short circuit current and 0.65 V open circuit voltage. The temperature coefficients for short circuit current, open circuit voltage and peak power are +0.045 %/K, -0.34%/K, and -0.47%/K respectively. Evaluate the maximum power that can be drawn from the solar module, fill factor and efficiency at the temperature of 40^0C and insolation level of 800 W/m^2?	[5]	CO2	BL5
Q.4(a)	Explain with proper justification how the light is turned into electricity?	[2]	CO2	BL2
Q.4(b)	Discuss and draw the i-v characteristics along with power curve for two non-identical PV cells connected in parallel without and with protection measures.	[3]	CO2	BL3
Q.5(a)	Design a PV emulator with the help of switched mode dc-dc converter.	[2]	CO2	BL6
Q.5(b)	Analyze the operation of Buck-Boost dc-dc power interface used for MPPT control of a PV module with suitable sketch and waveforms.	[3]	CO2	BL4

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