Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec 2024

OE00061 Solar Energy & its Utilization

Programme: B.Tech. Branch/Secialisation: All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	CO	PO	PSO
Q.1	i.	The value of solar constant is- (a) 1367 W/m^2 (b) 1377 W/m^2 (c) 1397 W/m^2 (d) 1357 W/m^2	**1**	1	1	1	1
	ii.	The power from the sun intercepted by the earth is approximately- (a) 1.8 x 10^8 MW (b) 1.8 x 10^{11} MW (c) 1.8 x 10^{14} MW (d) 1.8 x 10^{17} MW	**1**	1	1	1	1
	iii.	Characteristic of glazing material is- (a) Reflectivity (b) Absorptivity (c) Transmissivity (d) All of these	**1**	1	1	1	1
	iv.	An evacuated tube collector can collect- (a) Only direct solar radiation (b) Only diffuse solar radiation (c) Global solar radiation (d) None of these	**1**	1	1	1	
	v.	The region where the electrons and holes diffused across the junction is called _____. (a) Depletion junction (b) Depletion region (c) Depletion space (d) Depletion boundary	**1**	2	2	2	
	vi.	The amount of photogenerated current increases slightly with the increase in _____. (a) Temperature (b) Photons (c) Diode current (d) Shunt current	**1**	2	2	2	

P.T.O.

	vii.	What is the smallest unit of solar photovoltaic system? (a) Panel (b) Array (c) Cell (d) Module	**1**	1	1	1
	viii.	Which type of batteries are used for electrical energy storage? (a) Edison cell (b) Lead acid cell (c) Laclanche cell (d) None of these	**1**	1	1	1
	ix.	The objective of UNFCCC is to stabilize- (a) CO_2 emission (b) NO_2 emission (c) Greenhouse gas emission (d) SO_2 emission	**1**	2	2	2
	x.	A single solar cell produces- (a) 1 V (b) 0.5 V (c) 0.01 V (d) None of these	**1**	1	1	1
Q.2	i.	Define global, beam and diffuse radiation.	**3**	1	1	1
	ii.	Explain the solar spectrum.	**7**	2	2	2
OR	iii.	Explain the solar radiation measurement instruments in detail.	**7**	2	2	2
Q.3	i.	Write a short note on the heat transfer mechanism.	**3**	2	2	2
	ii.	Write down notes on solar water heating systems and industrial process heating.	**7**	2	2	2
OR	iii.	Explain the working of any one solar collector.	**7**	2	2	2
Q.4	i.	Write down the principle of photovoltaic conversion.	**3**	2	2	2
	ii.	Explain the components of photovoltaic system.	**7**	3	3	1
OR	iii.	Explain the fabrication of photovoltaic devices.	**7**	3	3	1
Q.5	i.	What are the advantages of solar energy?	**3**	2	2	2
	ii.	Explain the off-grid and grid-connected power systems.	**7**	2	2	2
OR	iii.	Write down the applications of solar photovoltaic system.	**7**	2	2	2

Q.6	i.	Define carbon credit.	**3**	2	2	2
	ii.	Explain the life cycle analysis of solar energy systems.	**7**	4	4	1
OR	iii.	Evaluate the carbon credit of solar energy systems.	**7**	4	4	1

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Marking Scheme

OE00061 Solar Energy and its Utilization

Q.1	i)	A . 1367 W/M^2	**1**
	ii)	A .1.8*10^8 MW	**1**
	iii)	D . All of the above	**1**
	iv)	C . Global Solar Radiation	**1**
	v)	B . Depletion Region	**1**
	vi)	A . Temperature	**1**
	vii)	C . Cell	**1**
	viii)	B . Lead acid cell	**1**
	ix)	C . Greenhouse gas emission	**1**
	x)	B . 0.5V	**1**
Q.2	i	Define Global, Beam and Diffuse Radiation. Global Radiation – 1 mark Beam radiation – 1 mark Diffuse radiation- 1 mark	**3**
	Ii	Explain the solar spectrum. Diagram – 3.5 marks Explaination 3.5 marks	**7**
OR	iii	Explain the solar radiation measurement instruments in detail. Indroduction of radiation measurement instrument- 3 marks Types – 2 marks Diagram- 2 marks	**7**
Q.3	i.	Write a short note on the heat transfer mechanism. Mechanism- 3 marks	**3**
	ii.	Write down notes on solar water heating systems and industrial process heating. Water heating- 3.5 marks Industrial process heating- 3.5 marks	**7**
OR	iii.	Explain the working of any one solar collector. Diagram- 3 marks Working- 4 marks	**7**
Q.4	i.	Write down the principle of photovoltaic conversion. Principle- 2 marks Equation 1 mark	**3**
	ii.	Explain the components of PV system. Diagram- 3 marks Explanation – 4 marks	**7**
OR	iii.	Explain the fabrication of PV devices. Fabrication diagram- 3 marks Process- 4 marks	**7**
Q.5	i.	What are the advantages of solar energy? Any 3 advantage- 1 mark each	**3**
	ii.	Explain the Off-grid and Grid-connected power systems. Off grid- 3.5 marks Grid connected- 3.5 marks	**7**
OR	iii.	Write down the applications of solar photovoltaic system. 7 applications- 1 mark each application	**7**
Q.6	i.	Define carbon credit. Definition- 3marks	**3**
	ii.	Explain the Life cycle analysis of Solar Energy Systems. Lifecycle diagram- 3 marks Explanation- 4 marks	**7**
OR	iii.	Evaluate the Carbon Credit of Solar Energy Systems. Importance of carbon credit- 2 marks Evaluation- 5 marks	**7**

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