Name:

Enrolment No:

UPES

End Semester Examination, December 2023

Course: Solar Harnessing Technologies **Semester: 1st**

Program: M. Tech Renewable Energy **Time : 03 hrs.**

Course Code: EPEC 7072 **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	How does the widespread adoption of solar energy impact the environment, and what are some of the key environmental benefits and challenges associated with solar power generation?	**4**	**CO1**
Q 2	Discuss the types of inverters used in solar applications and their functions.	**4**	**CO1**
Q 3	Discuss strategies and technologies that can mitigate the effects of intermittent shading caused by clouds.	**4**	**CO1**
Q 4	What features of Solar Energy make it attractive for use in irrigation water pumps?	**4**	**CO2**
Q 5	Describe the basic features required in an ideal pyranometer.	**4**	**CO2**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	How does the heat transfer process occur in a flat plate solar collector? Explain with energy balance equation.	**10**	**CO2**
Q 7	Explain the types and principles of Solar cookers with a diagram.	**10**	**CO3**
Q 8	Define: (a) Latitude (Angle of Latitude), (b) Angle of Incidence, (c) Surface Azimuth Angle, (d) Solar Azimuth Angle, (e) Hour Angle	**10**	**CO3**
Q 9	Conduct a brief lifecycle analysis of solar panels, considering raw material extraction, manufacturing, installation, and end-of-life disposal. Discuss the environmental implications and potential improvements in the sustainability of solar panel production. Or, You are a renewable energy consultant tasked with evaluating and optimizing solar harnessing technologies for a region aiming to transition to sustainable energy solutions. The region has abundant sunlight, but the existing solar infrastructure needs enhancement to maximize energy output. Your goal is to conduct a comprehensive analysis and propose strategies for implementing	**10**	**CO3**

	advanced solar harnessing technologies. Conduct a case study based on ISO 50001 by Optimizing Solar Harnessing Technologies for Sustainable Energy Solutions.		
SECTION-C (2Qx20M=40 Marks)			
Q 10	Compare thin-film and crystalline silicon solar cells in terms of cost, efficiency, and applications. Discuss the trade-offs associated with each technology and potential scenarios where one might be preferred over the other. Analyze the role of solar harnessing technologies in the integration of renewable energy into smart grids.	**10+10**	**CO4**
Q 11	Calculate the angle of incidence of beam radiation on a plane surface, tilted by 45^0 from Horizontal plane and pointing 30^0 west of south located at Mumbai at 1: 30 PM (IST) on 15th November. The longitude and latitude of Mumbai are $72^0$49' E and 18^0 54' N respectively. The standard longitude for IST is 81^0 44' E. Or, Calculate the angle made by beam radiation with normal to a flat plate collector, tilted by 300 from horizontal, pointing due south, located at Delhi, at 11:00 hrs (IST), ON June 1. The latitude and Delhi are 280 35'N and 770 12' E respectively. The standard IST longitude is 810 44'E.	**20**	**CO4**