	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Bachelor of Technology**	Year of Regulation	**2019-20**
Department	**Physics**	Semester	**V**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
PH 371	**Solar Energy**	**2**	**0**	**0**	**2**	**50**	**50**	**100**	**200**

Course Objectives	To understand basic concepts of solar energy.	Course Outcomes	CO1	Able to understand all the physical fundamentals that are required for solar cell in general and different technologies in particular
	To understand the device structure, fabrication and latest technologies.		CO2	Able to identify the different type of semiconductor junctions
			CO3	Able to acquire the knowledge to characterize the solar cell by introducing the most important parameters and efficiency limit of photovoltaic devices.
			CO4	Able to understand some general design rules of photovoltaic technologies *i.e.* crystalline silicon technology and thin film technologies.

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	CO2	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
3	CO3	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4	CO4	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SYLLABUS

No.	Content	Hours	COs
I	**Solar Radiation:** The Sun, Radiometric properties, Blackbody radiation, Wave particle duality, Solar Spectra	**03**	**CO1**
II	**Semiconductor Junctions:** p-n Homojunctions, Heterojunctions, Metal-semiconductor junctions	**03**	**CO2**
III	**Solar Cell Parameters and Losses and Efficiency:** External solar cell parameters, The external quantum efficiency, The equivalent circuit, The thermodynamics limit, The Shockley Queisser limit, Additional losses, Design rules for solar cells	**07**	**CO3**
IV	**Crystalline Silicon Solar Cells:** Crystalline Silicon, Production of Silicon Wafers, Designing c- Si solar cells, Fabricating c- Si solar cells, High efficiency concepts	**05**	**CO3**
V	**Thin Film Solar Cells:** Transparent conducting oxides, The III-V photovoltaic technology, Thin film silicon technology, Chalcogenide solar cells, Organic photovoltaics, Hybrid organic- inorganic solar cells	**06**	**CO4**
	Total Hours	**24**	

Essential Readings

1. A. Smets, K. Jager, O. Isabella, R. V. Swaaij and M. Zeman, “Solar Energy: The Physics and Engineering of Photovoltaic Conversion, Technologies and Systems”, UIT Cambridge, 2016
2. Chetan Singh Solanki., Solar Photovoltaic: “Fundamentals, Technologies and Application”, PHI Learning Pvt., Ltd. 2009.

Supplementary Readings

1. L.D. Partain, L.M. Fraas, “Solar Cells and Their Applications”, Wiley, 2010.
2. P. Wurfel, Physics of Solar Cells, Wiley, 2013.
3. Stephen J. Fonash, Solar Cell Device Physics, 2E, Academic Press, 2010.