	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

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

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
PH 272	**Laser and Plasma Technology**	**2**	**0**	**0**	**2**	**50**	**50**	**100**	**200**

Course Objectives	To introduce the building blocks of lasers , its working principle and various types.	Course Outcomes	CO1	Able to acquire knowledge about lasers
	To develop an ability to apply laser for material processing and data communication.		CO2	Able to imply lasers in core applications
	To introduce about basics of plasma and its properties		CO3	Able to acquire knowledge about plasma
	To develop an ability and skill to apply plasma for environmental sustainability		CO4	Able to plasma for application in environmental sustainability

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**	**1**	**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**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SYLLABUS

No.	Content	Hours	COs
I	**Laser Basics:** Stimulated Emission, Absorption, Sponatneous Emission, Laser Rate Equations, Population Inversion, Optical Pumping, Optical Resonator, Two-, Three- and Four Level Laser Systems, Types of Lasers.	**10**	**CO1**
II	**Laser Applications:** Material Processing, Cutting, Drilling, Welding, Micromachining, Laser Forming, Optical Communication, Data Storage, Printing, Holography, Satellite ranging, High speed imaging, soil characterisation from laser induced spectroscopy.	**6**	**CO2**
III	**Plasma:** Classification and properties of plasma, Kinetic theory and thermodynamics of Plasma, Plasma radiation and Plasma spectroscopy.	**6**	**CO3**
IV	**Plasma Applications:** Power plant development, Tokamak, Nuclear Fusion, Air Pollution control, solid waste and water treatment.	**4**	**CO4**
	Total Hours	**26**	

Essential Readings

1. O. Svelto, “Principles of Laser”, Plenum, 4th Edition, 1998.

2. W. T. Silfvast, “ Laser and Fundamentals ”, Cambridge ,2nd Edition, 1996.

3. Y. Kawai, H. Ikegami, N. Sato, A. Matsuda, K. Uchino, M. Kuzuya & A. Mizuno, “Industrial Plasma Technology : Applications from environmental to energy technologies”, Wiley-VCH, 1st Edition, 2010.

4. F. F. Chen, Introduction to Plasma Physics and Controlled Fusion, 3rd Edition Springer, 2016.

5. P. Schaaf, “Laser Processing of Materials: Fundamentals, Applications and Developments”, 1st Edition, Springer, 2010.

Supplementary Readings

1. S. Eliezer & K. Mima, “ Applications of Laser-Plasma Interactions”, CRC Press, 1st Edition, 2009.

2. C. E. Webb & J. D. C. Jones, “Handbook of Laser Technology & Applications”, Institute of Physics Publications, 1st Edition, 2004.