PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
Autonomous
Siddhartha Nagar, Vijayawada–520010
Re-accredited at 'A+' by the NAAC

Paper – 6:OPTICAL MATERIALS PRODUCTION AND TESTING

Offered to : M.Sc.(PHYSICS)	Course Code : 22PH4D6
Course Type : Domain specific elective (DSE)	Course : OpticalMaterialsProductionandTesting
Year of Introduction : 2022	Year of offering : 2022
Year of Revision : 2022	Percentage of Revision : Nil
Semester : IV	Credits : 4
Hours Taught : 60 hrs. per Semester	Max.Time : 3 Hours

CourseDescription:

Optical Material Production and Testing course provides a familiarity with precisionoptical manufacturing and metrology; and an introduction to the materials, machinery, tooling, methods,processes, metrology, and production flow used to fabricate precision optical elements.

CourseObjectives:

1.To make the students learn different properties of optical glasses
2.To make the students identify different IRmaterials
3.To learn the different production processes of IR materials
4.To learn about different tools and fixtures
5. To learn optical fabrication and shape TESTING

Course Outcomes: Attheendofthiscoursethestudentsshouldbeableto:

CO1:UnderstandtypesofIRmaterials,opticalcrystals,opticalplastics,metalstheirpropertiesandapplications

CO2: Identify different IR materials

CO3:Selectproductionmethodsforopticalglass, opticalcrystals,IRmaterialsandopticalplastics

CO4:Identifytheshop supplies formakingopticalcomponents

CO5:Analysetheopticalcomponentsbyinterferometry,spherometry,autocollimatorandsurfaceanalyserdesignopticalsystems

CO-POMATRIX								
22PH4D6	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
	CO1	H					L	M
	CO2		H				M	M
	CO3		H					M
	CO4	H					M	M
	CO5		M					M

Syllabus		
Unit	**Learning Units**	**Lecture Hours**
I	**OpticalGlass** Types,composition,chemicalbehavior,mechanicalandthermal properties,lowexpansionmaterials,fusedquartz,crystalquartz,mirrormaterials	12
II	**IRmaterials:** Ge-Si-Gallium arsenide, Zinc selenide, sincsulphide optical crystals, alkali earth fluorides, alkali halides,KDPandhomologsopticalplastics,metaloptics,ceramicmaterials.	12
III	**MaterialProduction** Glassmakingdryandcontinuoustankmethods,limitations,inspectionforflaws. IRmaterialmanufacturing, chemical vapor deposition, CZ method float zone refining, casting of silicon horizontalbridgeman liquid encapsulated Czochralski. Growth methods for optical crystals, hydrothermal process,heatexchangermethod,solutiongrowthcrystals.	12
IV	**OpticalShopSupplies&Toolsand Fixtures** Abrasives,Polishingcompounds,pitch,cements,coolantsandsolvants.Sphericalandplanotools,spotblocks,diamondtools	12
V	**Optical FabricationandShoptesting** Shaping,milling,grindingandpolishing,centeringandcementing,thinfilmCoatingInterferometrictesting,spherometers,autocollimator,surfaceanalysis,testingafterassembly	12

TextBooks:

1. HankKCarrow,“Fabricationmethodsforprecisionoptics”, JohnWileysons,NewYork, 1993
2. DavidMalacara,OpticalShoptesting,JohnWileyandSons,NewYork,1992.
3. MarvinJ.Weber,HandbookofOpticalMaterials