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

PRINCIPLES OFANALYTICALINSTRUMENTS(Openelective)

Offered to : M.Sc.(PHYSICS)	Course Code : 22OE3PH1
Course Type : openelective (OE)	Course : PrinciplesofAnalyticalInstruments
Year of Introduction : 2022	Year of offering : 2022
Year of Revision : 2022	Percentage of Revision : Nil
Semester : III	Credits : 3
Hours Taught: 60 hrs. per Semester	Max.Time : 3 Hours

Course Description:

The Principles Analytical Instruments course is aimed to give fundamentals of selective instruments and their applications in chemical, pharmaceutical, clinical, food-processing laboratories, and oil refineries. They are employed to obtain qualitative and quantitative information about the presence or absence of one or more components of the sample.

CourseObjectives:

1. Tounderstandtheworkingofdifferentspectroscopictechniques
2. Tounderstandthebasicprinciplesofchromatography
3. Tolearnthe workingofdifferentlaserssystemsandtheprocessofholography
4. ToUnderstandthebasicprinciplesofnuclearmagneticresonance
5. TolearnthebasicprincipleofX-Raydiffractionanditsapplicationsincryptography

CourseOutcomes: Attheendofthiscourse,studentsshouldbeableto:

CO1: Remember the concepts of spectroscopy
CO2: Understand the importance of chromatography
CO3: Analyze the process involved in the generation of different lasers
CO4: Understand the importance of mass spectrometry
CO5: Understand the microscopic techniques involved in determing the strucure of materials.

CO-POMATRIX								
	CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
22OE3PH1	**CO1**	H					M	M
	CO2	H					M	M
	CO3	H					M	M
	CO4	H					M	M
	CO5	H					M	M

Syllabus		
Unit	**LearningUnits**	**Lecture Hours**
I	**SPECTROPHOTOMETRY** **Spectrophotometry** Introduction-Beer-Lambertlaw–UV-Visiblespectroscopy–Instrumentation,Essentialpartsofspectrophotometer- Gratings and prisms – Radiant energy sources – filters – Photosensitive detectors-Photomultiplier tubes -Atomic absorption spectrophotometry – Flame emission and atomic emissionphotometry–Construction,workingprinciple,instrumentationandapplications.	8
II	**CHROMATOGRAPHY** General principles –classification –chromatographic behavior of solutes–quantitative determination –Gas chromatography– Liquidchromatography–High-pressureliquidchromatography– Applications.	8
III	**LASERSANDHOLOGRAPHY** Basic principles of lasers - Spontaneous and stimulated emission – Laser beam properties Typesof lasers- Ruby laser-He-Ne laser - GaAs laser - Dye laser – Applications of Lasers. IntroductiontoHolography–RecordingandreconstructionofHologram–ApplicationsofHolography	8
IV	**NUCLEARMAGNETICRESONANCEANDMASSSPECTROMETRY** NMR–Basicprinciples–ContinuousandPulsedFourierTransformNMRspectrometer–MassSpectrometry–Samplesystem–Ionization methods– Massanalyzers–Types ofmassspectrometry.	8
V	**STRUCTUREANDMICROSCOPICTECHNIQUES** X- ray diffraction, Bragg's law, Powder X-ray Diffractometer - Basic principles, Instrumentation andapplicationsofScanningelectronmicroscopy,Transmissionelectronmicroscopy,Atomicforcemicroscopy,DifferentialscanningcalorimetryandThermogravimetric analysis	8

ReferenceBooks:

1. Willard,H.H.,Merritt,L.L.,Dean,J.A., Settle, Instrumentalmethodsofanalysis, ,7thEdition,2012.
2. RobertE.Sherman.,"AnalyticalInstrumentation",
3. GUPTAand KUMAR,Solid StatePhysics,K. Nath&Co.,2000
4. Khandpur,R.S.,"HandbookofAnalyticalInstruments",TataMcGraw-Hill,2ndEdition2007
5. NPTELlecturenoteson, "ModernInstrumentalmethodsofAnalysis"byDr.J.R.Mudakavi,IISC, Bangalore.