DEPARTMENT OF BIOTECHNOLOGY
SCHOOL OF BIOENGINEERING

Subject: BIOANALYTICAL TECHNIQUES **Semester: VII**
Subject code: BT 0305 **Year: 2014**

LECTURE SCHEDULE

S.No.	Lecture Hours	Topic / Content	Pages	Books	Learning outcomes
		UNIT I SPECTROSCOPY-1			
1	**1**	The Electromagnetic Radiation & Spectrum – Interaction of Radiation with Matter- Laws Relating to Absorption of Radiation- Lamberts' Law-The Beer-Lambert Law	1- 68	B.K. Sharma	To understand the radiation absorption Techniques and its application in Biology.
2	1	Principles of Absorption Spectroscopy – Instruments for Absorption Measurments in the UV, Visible, NIR-Fluroscence & Phosphorescence	1- 68	B.K. Sharma	
3	1	Ultraviolet and Visible Absorption Spectroscopy (UV- Visible) – Presentation of spectra – What to look for in an UV Spectrum and Visible Spectrum	68-191	B.K. Sharma	
5	1	Types of Spectrophotometer- Single & Double beam – working principle.	68-191	B.K. Sharma	
6	1	Theory of Fluorescence and Phosphorescence	68-191	B.K. Sharma	
7	1	Instruments for Measuring Fluorescence and Phosphorescence	68-191	B.K. Sharma	
8	1	Applications of Fluorescences	68-191	B.K. Sharma	
9	1	Fluorescence compounds	68-191	B.K. Sharma	
10	1	Spectral analysis	68-191	B.K. Sharma	
		UNIT II: SPECTROSCOPY-II			
11	1	Theory of Infrared Absorption & Instrumentations	193-332	B.K. Sharma	To understand the Radiation Scattering and Radiation Diffraction methods and its applications in Biology.
12	1	Infrared sources – Monochromators-Detectors- Cells & Sampling Techniques	,,	B.K. Sharma	

13	1	FTIR & Dispersive Infrared Spectrometer	,,	B.K. Sharma	
14	1	Correlation Charts and Tables	,,	B.K. Sharma	
15	1	Hydrocarbons : Alkanes-Alkenes& Alkynes; Aromatic Rings- Alcohols and Phenols- Ethers	,,	B.K. Sharma	
16	1	X-Ray Spectroscopy – Fundamental Principles- Instrument Components	,,	B.K. Sharma	
17	1	X- Ray Diffraction Methods- Principles	494-536	B.K. Sharma	
18	1	Bragg's Law – Miller Indices – Determination of Crystal Structure- Examples Sodium, Chloride, Zinc sulphate	"	B.K. Sharma	
19	1	X-Ray Fluorescence Methods	"	B.K. Sharma B.K. Sharma	
20	1	Applications of X-Ray techniques in Biology	"	B.K. Sharma B.K. Sharma	
		UNIT III NMR & MASS SPECTROMETRY			
21	1	Theory of Nuclear Maganetic Resonance-Nuclear spin and the splitting of energy levels in a magnetic field- calculating transition energy.	619-736	B.K. Sharma B.K. Sharma	To understand the Functions and Applications of NMR and MS in Life Sciences
22	1	Relaxation Processes : Spin-lattice relaxation – Spin- Spin rexalation- Chemical Shift- Factors affecting Chemical Shift- Spin Spin Coupling	,,	B.K. Sharma	
23	1	Applications of proton NMR in Biology – Carbon 13 NMR; other nuclei	,,	B.K. Sharma	
24	1	Mass Spectrometry - Introduction	844-938	B.K. Sharma	
25	1	Characteristics of Mass Spectra	,,	B.K. Sharma	
26	1	Isotopes	,,	B.K. Sharma B.K. Sharma	
27	1	Fragmentation Patterns	,,	B.K. Sharma	
28	1	How and What to look in Mass	,,	B.K.	

		Spectrum		Sharma	
29	1	Applications of MS in Life Sciences	”	B.K. Sharma	
		UNIT IV CHROMATOGRAPHY - GC			
30	1	Principles of Gas chromatography	579-605	Skoog	To understand the Functions and Applications of GC in Life Sciences
31	1	Instruments of Gas chromatography	,,	Skoog	
32	1	Gas chromatography column and stationary phase	,,	Skoog	
33	1	Migration rates of species;	,,	Skoog	
34	1	Band broadening and column efficency;	,,	Skoog	
35	1	Application of chromatography	,,	Skoog	
36	1	Types of Chromatography : Partition, Adsorption; Ion, size exclusion, thin layer	,,	Skoog	
37	1	Problems & Demo		Skoog	
38	1	Problems & Demo		Skoog	
39	1	Problems & Demo		Skoog	
		UNIT V CHROMATOGRAPHY - LC			
40	1	Types of Chromatography : Partition, Adsorption; Ion, size exclusion, thin layer	605-628	Skoog	To understand the Functions and Applications of LC in Life Sciences
41	1	Principles of Liquid chromatography	,,	Skoog	
42	1	Instruments of Liquid chromatography	,,	Skoog	
43	1	Functions of Preparatory & Analytical Columns	,,	Skoog	
44	1	Stationary & Mobile Phase	”	Skoog Skoog	
45	1	Band broadening and column efficency;	,,	Skoog	
46	1	Application of Liquid chromatography	,,	Skoog	
47	1	Problems & Demo		Skoog	
48	1	Problems & Demo		Skoog	
49	1	Problems & Demo		Skoog	

References

1	Principles of Instrumental Analysis	Skoog Leary
2	Introduction Spectroscopy	Pavia Lampman Kriz
3	Handbook of Analytical Instruments	R.S.Khandpur
4	Molecular Structure & Spectroscopy	G. Aruldhas
5	Spectroscopy	B.K. Sharma

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Members

1. Mr. Jayabrata Das