Integrated Bachelor and Master Programmes in Biomedical Science
IBMP (Biomedical Science) Semester (II)

Paper Code	IS02CBMC51	Periods per week	04
Title of the paper	Biophysics	Exam Duration	3 hrs
Total Credit of the Paper	04	Total Marks	100

Course Objectives:	1. To give students an introduction to the discipline of physics and its relevance toBiological processes. 2. To make the students understand fundamental concepts of waves and classical optics with application to interference and diffraction. They will be introduced to various optical instruments and their resolvingpower. 3. To provide an exposure to various properties of Laser, productiontechniques of Laser and its applications. 4. To allow the students to understand concepts of X-ray production and IR and UVspectroscopy.

Course Description		
Unit	Description	Weightage*
1.	OPTICS: Introduction to Electromagnetic Spectrum, Superposition forElectromagnetic waves, Interference by division of wavefront-Fresnel's biprismexperiment, Interference by division of amplitude-Newton's rings, Michelson'sinterferometer, Fresnel and Fraunhofer class of diffraction, Resolution &Resolving power, Rayleigh's criterion, Resolving power of Prism andplanediffraction grating, Polarization oflight waves, Production of polarized light - Brewster's law, Malu's law,Double refraction, Huygen's theory of double refraction.	25%
2.	LENS SYSTEMS: Refraction through lens, Refraction through thin lens, Deviation produced by athin lens, Power of lenses, Cardinal points of an optical system, Principal fociand focal planes, Principal point and Principle planes, Nodal points,Aberrations, Spherical aberration in lenses, Coma, Astigmatism, ChromaticAberration, Achromatic lenses, Huygens eyepiece, Ramsden eyepiece,Comparison of eyepieces	25%
3.	LASER AND FIBRE OPTICAL COMMUNICATION: Absorption, Spontaneous and Stimulated (Induced) Emission of Radiation,Basic principle and operation of a laser, Pumping and Population Inversion,Ruby laser- its construction and working, He-Ne laser- its construction andworking, Applications of Laser, Basic	25%

	principle of Holography, Theory ofHolography- Construction of Hologram and Reconstruction of image from it,Applications of Holography, Principle of Optical Fibre, Structure of OpticalFibre, Types of Optical Fibre - Step index and Graded index Fibre, Numerical Aperture, Fibre optics communication System (Network), Applications of Fibreoptics communication System (Network).	
4.	MODERN PHYSICS AND SPECTROSCOPY: Introduction of Photon, Photoelectric effect, X-rays – Discovery & Production,Diffraction of X-rays- Bragg's law, Properties & Applications of X-rays,Compton effect, Matter waves, DeBroglie's Hypothesis, Heisenberg'sUncertainty Principle, Statistical distribution-Maxwell-Boltzmann Statistics,Planck Radiation Law. Introduction to Rutherford and Bohr Model and their limitations, Production ofspectra, Types of spectra- Emission and absorption spectrum, The quantumcondition, Quantum numbers, Spin-orbit splitting or interaction, L-S and J-Jcoupling, Pauli's exclusion principle, Introduction, Range, Principle, workingand applications of IR and UV-VIS spectroscopy.	25%

* Units will have the same weightage in the evaluation as suggested in the course outline

Teaching-Learning Methodology	Regular class room teaching will be done with following tools: • Conventional black board and chalk. • ICT tools such as projectors, smart boards, etc will also be used for better explanation of scientific components. Appropriate reference materials will also provide to the students as and when required from departmental library resources.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, student will be able to	
1.	Learn basic concept of optical phenomena and its applications in various interferometry apparatus.
2.	Study the important feature of lens systems like Power of lenses, Cardinal points of an

	optical system, Aberrationsin lenses, Coma, Astigmatism, eyepiece, Ramsden eyepiece,
3.	Understand working principle, properties and applications of laser as well as optical fiber.
4.	Describe atomic spectra and thespectroscopic methods for qualitative and quantitativeanalysis.

Suggested References: Include reference material from where a student is expected to study the said content in APA style. Reference websites can also be included.

Sr. No.	Reference
1.	Optics (3rd Ed.) by AjoyGhatak Tata Mc-Graw-Hill Publishing Company Ltd., New Delhi
2.	Fundamentals of Optics (4th Ed.) by Francis A. Jenkins and Harvey E. White,Mc Graw-Hill Book Company,
3.	Concepts of Modern Physics (6th Ed.) by Arthur Beiser, Tata Mc-Graw-Hill Publishing CompanyLtd. New Delhi,
4.	Fundamentals of Physics (6th Ed.) by Halliday/Resnick/Walker John Wiley & Sons,Inc., New York
5.	Engineering Physics by R. K. Gaur and S. L. Gupta Dhanpat Rai Publications (P) Ltd., New Delhi
6.	Fundamentals of Solid State Physics by B. S. Saxena, R. C. Gupta and P. N. Saxena PragatiPrakashan, Meerut,
7.	Elements of Spectroscopy by S. L. Gupta, V. Kumar and R. C. Sharma

On-line resources available that can be used as reference material (As per Guidelines –V)

Sr. No.	On-line Resources
1.	https://nptel.ac.in/courses/122/107/122107035/
2.	https://nptel.ac.in/courses/115/107/115107095/
3.	https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cy13/
4.	https://nptel.ac.in/courses/122/101/122101002/