

18EEP02	BIOLOGY FOR ELECTRICAL ENGINEERS	L	T	P	C	
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Course Objectives:						
The purpose of this course is to provide a basic and easy understanding of modern biology to engineers as it is a multi – disciplinary field. It emphasis on the basic engineering principles of bimedical equipments. In addition, the course is expected to encourage the engineering students to think about solving biological problems with engineering tools. These will be gained by the following:						
1.	An understanding of biological mechanisms of living organisms from the perspective of engineers.					
2.	To Understand the principles of Biomedical Equipments.					
3.	An understanding of the function and regulation of human system and acquire knowledge about biological problems that requires engineering expertise to solve them.					
4.	An Understanding of the basics of molecular biology and genetics.					
5.	To know about the radiation safety instruments and X Ray examinations.					
6.	To evaluate the kinetics and thermodynamics of enzymatic process.					
Unit I						
BIOMOLECULES AND METABOLISM				9	+	0
Carbohydrates- classification - Glycolysis- definition- flow chart- steps involved in glycolysis- preparatory phase and pay off phase- kinds of reactions in glycolysis. Photosynthesis- definition- significance photosynthetic-pigments types- structure of pigments factors affecting photosynthesis- external and internal factors.						
Unit II						
BASICS OF ENZYMES, MACROMOLECULES AND NUCLEIC ACIDS				9	+	0
Introduction - Enzymes – Proteases and amylases. Proteins- classification- structure of proteins- primary, secondary, tertiary and quaternary structure- properties of proteins- physical and chemical properties: protein synthesis. Types-Structural components of nucleic acids- acid, pentose sugar and nitrogenous base- nucleoside – nucleotide and its functions - single and double helical structure of DNA-comparison between DNA and RNA- types of RNA -mRNA, tRNA and rRNA and their function.						
Unit III						
X RAY EXAMINATIONS				9	+	0
Blood cell counter – Electron microscope – radiation detectors – photo meters and colorimeters – digital thermometer – audio meters – X-ray tube – X-ray machine – Radiography and fluoroscopy – image intensifiers – angiography – applications of X-ray examination.						
Unit IV						
HUMAN PHYSIOLOGY				9	+	0
Cells and their structure – Transport of ions through the cell membrane – resting and action potential – bio-electric potential. Physiology of Human body- Brain, heart, lungs - Cardiovascular system - Respiratory system - nervous system. Design of medical instruments components of biomedical instrument systems – electrodes – micro, needle, surface electrode - transducers.						
Unit V						
BIOMEDICAL EQUIPMENTS AND RADIATION SAFETY INSTRUMENTS				9	+	0
Pacemakers – Pacemaker batteries – Defibrillators – heart lung machine. Surgical diathermy – short wave diathermy – microwave diathermy – ultrasonic diathermy – therapeutic effect of heat – range and area of irritation of different diathermy techniques – Ventilators – oxymeters. Radiation safety instrumentation – physiological effects due to 50 Hz current passage – Micro shock and macro shock – electrical accidents in hospitals – Devices to protect against electrical hazards. Nuclear imaging techniques – computer tomography – thermography – ultrasonic imaging system – Magnetic resonance imaging – Positron emission tomography – digital subs traction angiography.						
Total (45+0)= 45 Periods						
Course Outcomes:						
Upon completion of this course, the students will be able to:						
CO1	:	Be aware that all types of life have the identical structural units.				
CO2	:	Explain, analyze, diagnose, and develop new therapies to treat disease and heal damaged tissues and organ systems.				
CO3	:	To teach the working principles of biomedical equipments.				

CO4	:	Explain human physiological systems.
CO5	:	Share knowledge in genetics and molecular biology.
CO6	:	Know about the applications and implementation of medical equipments as it is a challenging interdisciplinary process

Text Books:

1.	F.J.L.Jain, Sanjay jain and Nitin jain- "Fundamentals of Biochemistry" - Sixth edition, S.Chand and company Ltd., Ram nagar, 2005.
2.	Dr.A.V.S.S.Rama Rao-" Text book of Biochemistry"- Text book of Biochemistry- First edition- UBS Publishers' Distributors Pvt. Ltd., 2019
3.	U. Satyanarayana – " Biochemistry"-5th edition – Sri Padmavathi Publications Ltd.,2017.
4.	N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2014.
5.	Dr.M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2012.
6.	Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, 'Bio-Medical Instrumentation andMeasurements', II edition, Pearson Education, 2011 / PHI.

Reference Books:

1.	Stent, G. S.; and Calender-" Molecular Genetics"- Second edition - R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
2.	By Nelson, D. L.; and Cox- "Principles of Biochemistry"- V Edition- M. M.W.H. Freeman and Company
3.	Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H-" Outlines of Biochemistry"- John Wiley and Sons
4.	Quillin, Allison Scott Freeman, Kim Quillin and Lizabeth Allison, 'Biological Science', Pearson Education India, 2016.
5.	Reinhard Renneberg, Viola Berkling and Vanya Loroeh, 'Biotechnology for Beginner's', Academic Press, 2017.
6.	S Balaji, S Lakshminarayanan, "Conceptual comparison of metabolic pathways with electronic circuits", Journal of Bionics Engineering, Vol 1, Issue 3, pg 175-182, 2004
7.	R.S.Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co Ltd.,2012.
8.	L.A. Geddes and L.E.Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley &Sons, 2011.
9.	C.Rajaroo, 'Medical Instrumentation', John Wiley & Sons,2013.
10.	C.Rajaroo and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation',Universities press (India) Ltd, Orient Longman Ltd, 2012.

E-Reference:

1	www.onlinecourses.nptel.ac.in/
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CO/PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	2	1	1	1	1	1	1	1
CO2	3	1	1	3	1	1	1	1	1	1	1	1
CO3	1	2	2	1	1	1	1	1	1	1	1	1
CO4	3	1	1	3	2	1	1	1	1	1	1	1
CO5	2	1	1	2	1	1	2	1	1	1	1	1
CO6	2	2	1	1	1	1	1	1	1	1	1	1