

GANPAT UNIVERSITY								
FACULTY OF ENGINEERING & TECHNOLOGY								
Programme	Master of Technology				Branch/Spec.	Biomedical Engineering		
Semester	I				Version	1.0.0.0		
Effective from Academic Year		2018-19			Effective for the batch Admitted in		August 2018	
Subject code	3BM105	Subject Name			Advanced Rehabilitation Engineering			
Teaching scheme					Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total
	L	TU	P	TW				
Credit	3	-	1	-	4	Theory	40	60
Hours	3	-	2	-	5	Practical	30	20
Pre-requisites:								
<p>Learning Outcome: The educational objectives of the course are to educate students to attain the following:</p> <ul style="list-style-type: none"> • Select the appropriate rehabilitation concept for various disabilities. • Compare the different methods of orthopaedic prosthetics and orthotics for rehabilitation. • Design supporting devices as per the need of the patient. • Repair and maintain power wheel chair. • Design and develop orthotic and prosthetic. • Select proper sensory augmentation and substitution. • Understand and instruct various safety measures while using powered devices. • Understand to what extend robotic devices are useful in manufacturing artificial devices 								
Theory syllabus								
Unit	Content							Hrs
	<p>INTRODUCTION TO THE OVERVIEW AND IMPORTANCE OF THE COURSE: Rehabilitation engineers design and build devices and systems to meet a wide range of needs that can assist individuals with mobility, communication, hearing, vision, and cognition. These tools help people with day-to-day activities and tasks related to employment, independent living, and education. This course is important and emerging field in biomedical engineering.</p>							
1	<p>INTRODUCTION: Introduction to Rehabilitation Engineering. Engineering concepts in sensory rehabilitation, Engineering concepts in motor rehabilitation, Future of engineering in Rehabilitation Qualitative and quantitative description of the action of muscle in relation to the human movement, Gait cycle and Analysis , Various types of joint movements, Prehension Patterns, Sliding Filament Theory, Forward and Inverse dynamics of multi joint muscle driven system. Introduction to blood rheology ,flow in circulatory system.</p>							10
2	<p>PROSTHETICS, ORTHOTICS AND REHABILITATION ROBOTICS: Prosthetics: Introduction, upper, lower and external, internal prosthetics- Orthotics: Functional electrical stimulation (FES), ambulatory aids, aids for daily living, prosthetics using Myo-electric signal control- Rehabilitation robotics: Introduction, configuration and its components, control and sensor. Computer aided engineering in component design, Intelligent prosthetic knee, Hierchically controlled prosthetic hand, myoelectric hand, Orthotic knee joint, Externally powered and controlled orthoses and prosthesis, HAS-hybrid assistive system for walking.</p>							10
3	<p>MOBILITY AIDS: Types of Mobility Aids, Walking frames, Parallel bars, Rollators, Quadripods, Tripods & walking sticks, Crutches, Wheel chairs: Manual and Powered Wheel Chairs, Design and selection of components, Wheel chair safety.</p>							06
4	<p>BASICS OF MECHANICS: Stress strain curve, constitutive equation and field equation encountered in fluids, Viscoelasticity. Models of material behaviour, measurement and characteristics of muscle, bone tendons, ligaments and skin.</p>							07
5	<p>SENSORIAL PROSTHESIS AND ARTIFICIAL ORGANS: Sensory rehabilitation Engineering, Retinal rehabilitation, Rehabilitation of Brain and Spinal cord.</p>							07
6	<p>KINESIOLOGY: Kinesiology and muscle function application of mechanics to describe the material properties of living tissues, Levers, Free body diagram.</p>							05
Practical content: Term Work and Practical shall be based on the above syllabus.								
Text Books:								
1	Rehabilitation Medicine – Dr. S. Sunder Jaypee Medical publications New Delhi							
Reference Books								
1	Physical rehabilitation – Susan D. O’Sullivan, Thomas J Smitz. 5 th edition							
2	Rory. A. Cooper- Rehabilitation Engineering Applied to Mobility and Manipulation, First Edition, CRC Press, 2010							
3	Textbook of Rehabilitation Sunder S. Jaypee,2012							

Note:

Version 2.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme,Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)

L=Lecture, TU=Tutorial, P= Practical/Lab., TW= Term work, DT= Direct Teaching, Lab.= Laboratory work

CE= Continuous Evaluation, SEE= Semester End Examination