SEMESTER S7

ASSISTIVE MEDICAL DEVICES

Course Code	PEBMT744	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs.30 Min.
Prerequisites (if any)	PCBMT205, PBBMT304	Course Type	PE

Course Objectives:

1. To equip students with a thorough understanding of the principles, design, and application of assistive medical devices, enabling them to address the needs of individuals with disabilities through innovative engineering solutions.
2. To foster practical skills and innovative thinking in students, preparing them to design, develop, and implement effective assistive devices in real-world clinical settings.

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SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction:** Definition and scope of assistive technologies- **Regulatory and Ethical Considerations - O**verview of FDA, CE Mark, and other regulatory frameworks - Ethical considerations in the development and use of assistive devices - Standards and guidelines for accessibility and usability;**Human Factors and Ergonomics -** Principles of human-cantered design and ergonomics - Techniques for improving user experience and usability.	**9**
2	**Design and Development of Assistive Devices: Materials and Manufacturing- p**roperties of materials used in assistive devices - Manufacturing processes: traditional vs. advanced methods (e.g., 3D printing) - Selection criteria for materials and manufacturing techniques-	**9**

	Biomechanics and Movement Analysis:fundamentals of biomechanics relevant to assistive devices - techniques for gait analysis and movement modelling - Integration of biomechanical data in device design- Integration of sensors into assistive devices for data acquisition and feedback - Data processing and signal interpretation.	
3	**Types of Assistive Devices:** Mobility aids: Wheelchairs, scooters, walkers, prosthetics, and orthotics; Sensory aids: Hearing aids, cochlear implants, visual aids, and Braille devices; Cognitive aids: Augmentative and alternative communication (AAC) devices, memory aids, and software tools : **Neural Prosthetics and Brain-Computer Interface:** Basics of neural prosthetics and their applications - Introduction to brain-computer interfaces (BCIs): technology, mechanisms, and applications - Future trends in neural and BCIs for assistive technology.	**9**
4	**Smart Assistive Technologies -** types of assistive robots: exoskeletons, rehabilitation robots, service robots - Key components and technologies in assistive robotics: sensors, actuators, AI - Challenges and advancements in assistive robotics; Role of the Internet of Things (IoT) in assistive devices - Overview of wearable technology and smart home integration - Developing smart, connected assistive devices.	**9**

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Course Assessment Method

(CIE: 40 marks , ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Understand the significance of assistive devices and ethical considerations in the development and use of assistive devices.	Understand
CO2	Ability to select appropriate materials and techniques based on device requirements.	Understand
CO3	Evaluate and select appropriate assistive devices for different disabilities and integrate advanced technologies in device design.	Evaluate
CO4	Understand the potential and future trends of smart assistive technologies	Understand

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		2		2	2	2				3
CO2	3			3		2	2	2				3
CO3	3	3	1	2	2	2	2	2				3
CO4	3	2	2	2	3	2	2	2				3

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

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Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Assistive Technologies: Principles and Practice	Albert M. Cook and Janice M. Polgar	Elsevier	2015
2	Assistive Technologies and Applications for Assisted Living Challenges and Solution	Martina Ziefle and Carsten Rcker	IGI Global snippet	2010
3	Rehabilitation Engineering: Principles and practice	Alex Mihalidis and Roger Smith	CBC Press	
4	Assistive Technology: Principles and applications	Albert M. Cook and Janice M. Polgar	Elsevier	2015

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Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	KEEP IT SIMPLE: A Guide to Assistive Technologies	Ravonne A. Green and Vera Blair	Libraries Unlimited	2011
2	Aural Rehabilitation for People with Disabilities	John M. A. Oyiborhoro	Elsevier, Academic Press,	2005
3	Assistive Technology for People with Disabilities	Diane Pedrotty Bryant, Brian R Bryant	Pearson	2012
4	Choosing Assistive Devices A guide for users and professionals	Helen Pain Lindsay McLellan Sally Gore	Jessica Kingsley Publishers	2003

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	Development of Assistive technology for persons with Disabilities - Course (swayam2.ac.in)
3	Introduction to Assistive Devices for Mobility NPTEL-NOC IITM

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