INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Advanced Mechanics	Course Code	PHY5XXX			
Dept./ Specialization	Science and Humanities - Physics	Structure (LTPC)	3	1	0	4
To be offered for	All branches of UG/PG	Status	Core ☐		Elective ◼	
Faculty Proposing the course	Dr. Tapas Sil	Type	New ◼		Modification ◼	
Recommendation from the DAC		Date of DAC	04/03/2021			
External Expert(s)	Prof. S. Narayanan and Prof. S.P. Venkateshan					
Pre-requisite	CoT	Submitted for approval			45th Senate	
Learning Objectives	• The objective of this course is to give an idea how the mechanical system/particle behaves under certain forces. This course provides an understanding of theories involved in for following topics and develop the problem-solving skill related to the topics.					
Learning Outcomes	• Completing this course, the student should show clear understanding of concepts and improved problem-solving skills, in the following parts of mechanics. They should be able use this knowledge in their higher level engineering courses. Students should be able to analyze physical phenomena applying the knowledge and skill gained from this course.					
Contents of the course (With approximate break-up of hours for L/T/P)	Review of Newtonian mechanics, constraints, principle of virtual work, D'Alembert's principle, Lagrange's equations of motion, symmetry and conservation. (L12hrs+T4hrs) Coordinate systems and transformations, Non-inertial frames, rotating coordinate systems, centripetal and Coriolis accelerations and applications: air-dropping, weather forecast, Foucault pendulum. (L8hrs+T2hrs) Two-body central force problem: Motion under central forces, conservation laws, Kepler's law and applications. (L6hrs+T2hrs) Basics of Special Theory of Relativity: Galilean and Lorentz transformations, Time dilation and length contraction, relativistic kinematics and mass-energy equivalence. (L8hrs+T3hrs) Nonlinear dynamics: Nonlinear differential equations, trajectories of different systems. Limit cycles, Attractors, Introduction to chaos. (L7hrs+T3hrs)					
Text Book	1. N. C. Rana and P. S. Joag, "Classical Mechanics" McGraw Hill Education, 2017 2. Steven H. Strogatz, "Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry, and Engineering", CRC Press, (2014)					
Reference Books	1. Herbert Goldstein, Charles P. Poole & John Safko, "Classical Mechanics", Pearson Education, 2011. 2. C. Kittle, "Mechanics-- Berkley Physics Course", Vol. 01, Tata McGraw Hill (2008)					