Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

Syllabus for B. Tech in Electrical Engineering

(Applicable from the academic session 2018-2019)

Name of the course		**ENGINEERING MECHANICS**	
Course Code: ES-ME 301		**Semester: 3rd**	
Duration: 6 months		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3 hrs/week		Mid Semester Exam: 15 Marks	
Tutorial: 0 hr/week		Assignment & Quiz: 10 Marks	
Practical: 0 hrs/week		Attendance: 05 Marks	
Credit Points: 3		End Semester Exam: 70 Marks	
Objective:			
1.	To understand basic mathematical tools to deal with the physical bodies.		
2.	To learn different mathematical techniques to analyze physical bodies.		
2.	To learn analysis techniques of rigid bodies.		
2.	To acquire problem solving skills of general motion.		
Pre-Requisite			
1.	Physics (BS-PH-101)		
2.	Mathematics (BS-M-102, Bs-M202)		
Unit	Content	Hrs	Marks
1	**Introduction to vectors and tensors and co-ordinate systems** Introduction to vectors and tensors and coordinate systems; Vector and tensor algebra; Indical notation; Symmetric and anti-symmetric tensors; Eigenvalues and Principal axes.	5	
2	**Three-dimensional Rotation** Three-dimensional rotation: Euler's theorem, Axis-angle formulation and Euler angles; Coordinate transformation of vectors and tensors.	4	
3	**Kinematics of Rigid Body** Kinematics of rigid bodies: Dentition and motion of a rigid body; Rigid bodies as coordinate systems; Angular velocity of a rigid body, and its rate of change; Distinction between two- and three dimensional rotational motion; Integration of angular velocity to find orientation; Motion relative to a rotating rigid body: Five term acceleration formula.	6	
4	**Kinetics of Rigid Bodies** Kinetics of rigid bodies: Angular momentum about a point; Inertia tensor: Dentition and computation, Principal moments and axes of inertia, Parallel and perpendicular axes theorems; Mass moment of inertia of symmetrical bodies, cylinder, sphere, cone etc., Area moment of inertia and Polar moment of inertia, Forces and moments; Newton-Euler's laws of rigid	5	

	body motion.		
5	**Free Body Diagram (1 hour)** Free body diagrams; Examples on modelling of typical supports and joints and discussion on the kinematic and kinetic constraints that they impose.	1	
6	**General Motion** Examples and problems. General planar motions. General 3-D motions. Free precession, Gyroscopes, Rolling coin.	9	
7	**Bending Moment** Transverse loading on beams, shear force and bending moment in beams, analysis of cantilevers, simply supported beams and overhanging beams, relationships between loading, shear force and bending moment, shear force and bending moment diagrams.	5	
8	**Torsional Motion** Torsion of circular shafts, derivation of torsion equation, stress and deformation in circular and hollow shafts.	2	
9	**Friction** Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.	3	