

PROFORMA FOR NEW COURSE

1.	Title of the Course	Continuum Mechanics
2.	Course Number	MA6025
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Mathematics and Statistics
8.	To take effect from	July 2020
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	Course Objective: To introduce the basic properties of tensors. To relate the laws of physics to the conservation equations of transport phenomena. To solve boundary value problems for fluid, hyper and viscoelastic materials.	
12.	Course Content: Algebra of Cartesian tensors, index notation, isotropic tensors, invariants of a tensor; Continuum hypothesis, Lagrange strain, Eulerian strain, Cauchy Green strain, polar decomposition theorem, rotation tensor, Reynolds transport theorem, vorticity; Kinematics of deformation, compatibility conditions, balance principles; Cauchy stress, stress invariants, Piola-Kirchhoff stresses; Euler's laws of motion, field equation, conservation laws, first and second laws of thermodynamics, stress-laws of thermodynamics, energy balance; Constitutive equations of fluids, viscoelastic and hyperelastic materials, principles of material objectivity; Solutions to simple boundary value problems, linearized field equations, examples of linear elastic solutions.	
13.	Text book(s): 1. Rudnicki J W, <i>Fundamentals of Continuum Mechanics</i> , 1st Edition, Wiley (2014). 2. Tadmor E B, Miller R E and Elliot R S, <i>Continuum Mechanics and Thermodynamics: From Fundamental Concepts to Governing Equations</i> , 1st Edition, Cambridge University Press (2012)	
14.	Reference(s): 1. Gurtin M E, <i>An Introduction to Continuum Mechanics</i> , 1st Edition, Academic Press (1981). 2. Lai W M, Rubin D and Krempf E, <i>Introduction to Continuum Mechanics</i> , 4th Edition, Elsevier (2009) 3. Marsden J E and Hughes T J R, <i>Mathematical Foundations of Elasticity</i> , 1st Edition, Dover Publications (1994). 4. Segel L A, <i>Mathematics Applied to Continuum Mechanics</i> , 1st Edition, Dover Publications (1987).	