Semester	JAN 2022
Open to semester	22
Course code	**MT6284**
Course title	**Topology I**
Credits	/4
Course Coordinator & participating faculty (if any)	Tejas Kalelkar
Nature of Course	Lectures
Pre-requisites	A course in Point-Set Topology and Calculus on Manifolds.
Objectives (goals, type of students for whom useful, outcome etc)	This course is aimed at first-year PhD students and is the first half of the preparatory courses leading to the Topology Comprehensive exam. The primary focus of the course will be on differential forms on Smooth manifolds and Fundamental groups.
Course contents (details of topics /sections with no. of lectures for each)	• Smooth structures, Smooth maps, Bump functions • Partitions of Unity, Extension Lemma, Tangent Vectors, Pushforwards • Tangent Bundles, Vector fields, Vector Bundles, Bundle Maps, Sections, Cotangent Bundles • Inverse/Implicit Function Theorem, Submanifolds, Submersions, Level sets, Statement of Sard's Theorem • Differential Forms, Wedge product, Exterior Derivative, Definition only of De Rham Cohomology groups • Orientation, Riemannian Volume form • Integration on Manifolds using differential forms, Stoke's Theorem • Fundamental groups and its properties, Fundamental group of the circle, Brouwer's fixed point for 2-disks. • Van Kampen Theorem, Fundamental group of CW-complexes • Higher homotopy groups, Commutativity of higher homotopy groups, Higher homotopy groups of covers • (Time permitting) Covering spaces, Lifting properties • (Time permitting) Classification of covering spaces, deck transformations
Evaluation /assessment	End-Sem Examination-50% Mid-Sem Examination-30%

	Others-Homework Assignments: 20%%
Suggested readings (with full list of authors, publisher, year, edn etc.)	• A. Hatcher, "Algebraic Topology" • J. Lee, "Introduction to Smooth Manifolds" • G. Bredon, "Topology and Geometry"