



SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25))
Syllabus with effect from the Academic Year 2021-2022

(Master of Science) (Mathematics)
(M.Sc.) (Mathematics) Semester (I)

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| Course Code | PS01CMTH52 | Title of the Course | Topology I |
| Total Credits of the Course | 04 | Hours per Week | 04 |

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| Course Objectives: | <ol style="list-style-type: none">1. To provide knowledge of the point set topology and understand the significance of topology and metric spaces.2. To acquaint students with homeomorphism and some topological properties like connectedness, compactness, etc. |
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| Course Content | | |
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| Unit | Description | Weightage* (%) |
| 1. | Topological spaces, basis, subbasis, the product topology on $X \times Y$, the subspace topology, closed sets, closure and interior, limit points, boundary of a set. | 25 |
| 2. | Hausdorff spaces, convergent sequence, T_1 -space, Continuous functions, homeomorphisms, constructing continuous functions, pasting lemma, metric topology, metrizable space, diameter and bounded sets, bounded metric \bar{d} (excluding norm), continuity in metrizable spaces, the sequence lemma, first countability axiom. | 25 |
| 3. | Connected spaces, connected subspaces of the real line, connected components, compact spaces, finite intersection property, Heine-Borel theorem for real line, second countable spaces, separable spaces. | 25 |
| 4. | Regular spaces, Normal spaces, Urysohn's Lemma (statement only), Tietze's Extension Theorem (statement only), Complete metric spaces, Cantor's intersection theorem, Baire's category theorem for complete metric spaces. | 25 |

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| Teaching-Learning Methodology | Classroom teaching, problem solving, independent reading |
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| Evaluation Pattern | | |
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| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written / Practical Examination (As per CBCS R.6.8.3) | 15% |



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| 2. | Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3) | 15% |
| 3. | University Examination | 70% |

Course Outcomes: Having completed this course, the learner will be able to

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| 1. | Understand the concept of topological spaces, bases, sub-bases, open sets, closed sets, limit points, closure, interior, boundary. |
| 2. | Understand the separation axioms, metrizable spaces, first and second countability axioms among various spaces. |
| 3. | Classify certain topological spaces based on topological properties like connected and compactness. |
| 4. | Prepare for studying advanced course on algebraic topology and other research level courses on Topology. |

Suggested References:

| Sr. No. | References |
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| 1. | Munkres, J., Topology: A First Course, (Second Edition), Prentice Hall of India Pvt. Ltd. New Delhi, 2003. |
| 2. | Simmons G.F., Introduction to Topology and Modern Analysis, McGraw-Hill Co., Tokyo, 1963. |
| 3. | Willard S., General Topology, Dover Publication, 2004. |
| 4. | Kelley J., General Topology, Graduate Texts in Mathematics, Springer-Verlag, 1975. |

On-line resources to be used if available as reference material

Dinesh Karia, Point Set Topology An Experience of a Teacher, Open Mathematics Notes Series of the American Mathematical Society, November 2020.
<https://www.ams.org/open-math-notes/omn-view-listing?listingId=110864>

