BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani-K K Birla Goa Campus

FIRST/SECOND SEMESTER

Course Handout (Part II)

Date:…….

In addition to the part I (General Handout for all courses appended to the time table), this portion gives further specific details regarding the course.

Course No. : **MATH G516**
Course Title : Topics in Topology
Instructor-in-charge :
Instructors :

1. **Course Description:** In this course, students will learn topological spaces and associated concepts, including box topology, product topology, connectedness, path connectedness, local compactness, limit and sequential compactness, para compactness, countability and separation axioms, metrizability, nets and filters, and fundamental groups. Arbitrary product of compact spaces through the Tychonoff theorem.

2. **Scope and Objective of the Course:** This course is essentially meant for PhD scholars before they embark on research in a specific area, and also to motivated undergraduate students of mathematics who have thorough knowledge in the subjects of Real Analysis and basic theory of topology. The purpose of this course is to introduce some fundamental topics in topology with a scope to learn advanced topics like metrization with para compactness, and the notions of nets and filters. The depth and rigor of the course are much higher than the undergraduate course on Topology.

3. **Text Books:**
   (T1) James R. Munkres, Topology, Prentice-Hall of India Pvt.Ltd, 2nd edition, 2000.
   (T2) N. Bourbaki, General Topology, Springer Science and Business Media, 1995.

4. **Reference Books:**
   (1) John L. Kelley, General Topology, Springer Science and Business Media, 1989.
   (2) G. F. Simmons, Introduction to Topology & Modern Analysis, McGraw Hill Education, 2017.
   (3) K. D. Joshi, Introduction to general topology, New Age International, 1983.
   (4) J. Dugundji, Topology, Prentice-Hall of India Pvt.Ltd, 1978.

5. **Lecture Plan:**

Lecture Nos	Module	Topics to be covered
1-8 T1, Chapter-2	1. Review of basics in topology	Topological spaces, Basis, subspaces, Hausdorff spaces Continuity and homeomorphism, Hausdorff spaces, metric topology, product topology, quotient topology, weak topology, box topology, Zariski topology.
9-16 T1, Chapter-3	2. Connectedness, compactness	Basic notions and properties of connectedness, path connectedness and its local version, limit point compactness, sequential

		compactness and local compactness, one point compactification. Compact subspaces of the real line.
17-25 T1, Chapter 4	3. Countability and separation axioms	First and second countability axioms, Lindelof space, separation axioms, normal spaces, Urysohn lemma, completely regular spaces, Urysohn metrization theorem, Tietze extension theorem, partition of unity on a topological space, imbedding of manifolds.
26-27 T1, Chapter 5	4. Arbitrary product of compact spaces	Finite intersection property, The Tychonoff theorem, countable intersection property
28-31 T1, Chapter 6	5. Metrization theorems and paracompactnes s	Local finiteness, paracompactness, Nagata Smirnov Metrization theorem, Smirnov metrization theorem
32-35 T1, Chapter 3 and T2, Chapter 6	6. Nets and filters	Directed sets, nets, subnets and their accumulation points, introduction to filters, concept of convergence in nets and filters.
36-40 T1, Chapter 9	7. Fundamental groups	Homotopy of paths, fundamental groups, covering spaces.

6. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time	Remarks
1	Midsem	90 Min.	30	***	***
2	Tutorial Test/Quiz/ Assignments/Attendance	***	30	***	***
3	Comprehensive Exam	3 Hours	40	***	***

***** To be announced later.**

7. Problems: Students are strongly advised to workout the problems in the textbook and do similar problems from the reference books.

8. Chamber Consultation Hour:

9. Notices:

10. Make-up Policy:

Instructor-In-Charge
MATH G516