Semester 7

Core Course (Major)

Course Code: 7MTMMJC2 (Credit: 4, Hours: 60; Full Marks: 100)

Course Name: Topology 2 and Complex Analysis 2

Marks and Credit distribution:

Theory: 3 Credits, Tutorial: 1 Credit

End Semester exam: 50 Marks, Continuous Assessment: 20 Marks, Attendance: 5 Marks, Tutorial: 25 Marks

Course Outcome: Students will learn about product topology in this course. In Complex analysis course a student will familiarize the concept of sequence and series of complex valued functions and complex integrations, Taylor series, Laurent series, Residue theory, different kinds of isolated singularity, bilinear transformation and conformal map. This course is required for further topology course and advanced course in complex analysis.

Course Content:

Group A: Topology 2 (Marks assigned for end semester 12, 15 Hours)

Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps. Separation axioms and product spaces. Connectedness and product spaces. Tychonoff's theorem. Embedding lemma and Tychonoff embedding.

References

1. James R. Munkres, Topology, A First Course, Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. J. Dugundji, Topology, Allyn and Bacon, 1966 (reprinted in India by Prentice Hall of India Pvt. Ltd.)
3. George F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill Book Company, 1963
4. J.L. Kelley, General topology, Van Nostrand, Reinhold Co., New York, 1995.
5. L. Steen and J. Seebach, Counter examples in Topology , Holt, Rinehart and Winston, New York, 1970.
6. S. Willard, General Topology, Addison-Wesley, Reading, 1970.

Group B: Complex Analysis 2 (Marks assigned for end semester 38, 45 Hours)

1. Sequence and series of complex valued functions, uniform convergence, Cauchy's condition for uniform convergence for sequence and series, Weierstrass theorem for sequence and series.
2. Power series in C, determination of radius of convergence and circle of convergence, absolute and uniform convergence of power series strictly within the circle of convergence.
3. Definite integrals of complex valued functions, contours, contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy's integral formula, extended Cauchy's integral formula, Morera's theorem, Liouville's theorem, generalized Liouville's theorem, fundamental theorem of algebra (using Liouville's theorem).
4. Taylor's series and Laurent series.
5. Residue, Cauchy residue theorem, Different kinds of isolated singularity and their properties, Zeros of analytic function, Schwarz's lemma, Application of residue for calculating definite integrals (simple problems).
6. Bilinear transformation, Conformal mapping

References:

[1] Functions of one Complex Variable – J. B. Conway.
[2] Complex Analysis – L. V. Ahlfors.
[3] Complex Variables and Applications-James Ward Brown and Ruel V. Churchill
[4] Complex Variables for Scientists and Engineers-John D. Paliouras and Douglas S. Meadows.
[5] Complex Analysis- Joseph Bak and Donald J. Newman
[6] Complex Analysis - E. M. Stein and R. Shakrachi
[7] Complex Variables with Applications- S. Ponnusamy and Herb Silverman