INTRODUCTION TO ALGEBRAIC TOPOLOGY (PART-I)

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TYPE OF COURSE : New | Both | PG
COURSE DURATION : 12 Weeks (18 Jan' 21 - 09 Apr' 21)
EXAM DATE : 25 Apr 2021

PRE-REQUISITES : Point Set Topology is pre-requisite. Exposure to Basics of Linear algebra and Group theory is preferred.

INTENDED AUDIENCE : Anybody who would like to get trained in Algebraic Topology such as Computer scientists, Electrical , Aerospace engineers and mathematicians, and physicists.

INDUSTRIES APPLICABLE TO : All IITs, IISERs, TIFR and Universities in India.

COURSE OUTLINE :
This course is central to many areas in modern mathematics. The subject itself saw tremendous growth during 1950 and currently has attained a matured status. The syllabus he have chosen is common to MA5102 at IIT Bombay and AFS-III program of National Centre for Mathematics. It has enough material common to the syllabi followed by several Universities and IITs in the country and goes beyond. Nevertheless it has different flavour liked by variety of students.

ABOUT INSTRUCTOR :
Prof. Anant R. Shastri is a retired Emeritus Fellow of Department of Mathematics I.I.T. Bombay. After serving in School of Mathematics T.I.F.R. for 16 years. He joined I.I.T. Bombay as a full professor in 1988. Apart from several research papers, in Algebraic and Differential Topology, Algebraic Geometry, Relativity theory, Group theory, etc., He have published three books. Since 2004, He have constantly involved in the activities of ATM schools, The chief activity of these schools is to impart advanced training in Mathematics to Ph. D. students in various universities and research institutions in the country. These activities were initially funded by NBHM and currently adapted by National Centre for Mathematics, I.I.T. Bombay.

COURSE PLAN :

Week 1**:** What is Algebraic Topology? -An experiment with Mobius band

Week 2**:** Path homotopy, Fundamental group and computation for a circle applications.

Week 3**:** Background from Pointset topology; Quotient spaces, compact open topology

Week 4**:** Relative homotopy, Typical constructions

Week 5**:** Convex Geometry: Simplicial Complexes

Week 6**:** Subdivision and Simplicial Approximation

Week 7**:** Applications

Week 8**:** Covering spaces: Lifting problem

Week 9**:** Relation with Fundamental groups

Week 10**:** Seifert-Van Kampen Theorem; Free products and Free groups

Week 11**:** G-coverings and Applications

Week 12**:** Classification of Triangulated Compact Surfaces.