FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction

Program: Bachelor in Science (Degree/Honors)	Semester - VI	Session:2024-2025	
1	Course Code	MASC-06	
2	Course Title	Metric Spaces	
3	Course Type	Discipline Specific Course (DSC)	
4	Pre-requisite(if any)	Knowledge of basic real analysis	
5	Course Learning Outcome (CLO)	**This Course will enable the students to-** ➢ Understand concepts of metric, distance, convergence, completeness, compactness, connectedness, Bolzano-Weierstrass property. ➢ Apply these concepts to key classes of spaces. ➢ Learn to analyze mapping between spaces. ➢ Identify the continuity of a function defined on metric spaces homeomorphism. ➢ Attain background for advanced courses in real analysis, functional analysis and topology.	
6	Credit Value	4 C	1Credit = 15 hours- Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course

Total no of teaching – learning period =60 Periods (60 Hours)

UNIT	Topics	No of Periods
I	**Concepts in metric spaces:** Definition and examples of metric spaces, Open spheres and closed spheres, Neighborhoods, Open sets, Interior, exterior and boundary points, Closed sets, Limit points and isolated points, Interior and closure of a set, Boundary of a set, Bounded sets, Distance between two sets, Diameter of a set, Subspace of a metric space	15
II	**Complete Metric Spaces and Continuous Functions:** Cauchy and Convergent sequences, Completeness of metric spaces, Cantor's intersection theorem, Dense sets and separable spaces, Nowhere dense sets and Baire's category theorem, Continuous and uniformly continuous functions, Homeomorphism, Banach contraction principle.	15
III	**Compactness:** Compact spaces, Sequential compactness, Bolzano-Weierstrass property, Compactness and finite intersection property, Heine-Borel theorem, Totally bounded sets, Equivalence of compactness and sequential compactness, Continuous functions on compact spaces.	15
IV	**Connectedness:** Separated sets, Disconnected and connected sets, Components, Connected subsets of ℝ, Continuous functions on connected sets.	15

Dr.S.Dashpude

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Part C - Learning Resource	
Text Books, Reference Books, Other Resources	

Text Books Recommended-

. 1. Mathematical Analysis II- Metric Spaces, J N Sharma, Krishna Prakashan Mandir, Meerut

Reference Books Recommended-

2. Metric Spaces, P K Jain and Khalil Ahmad, New Age International, NewDelhi.
3. An Introduction to Metric Spaces, D Gopal, A Deshmukh, A S Randive and S Yadav, CRC Press, London.
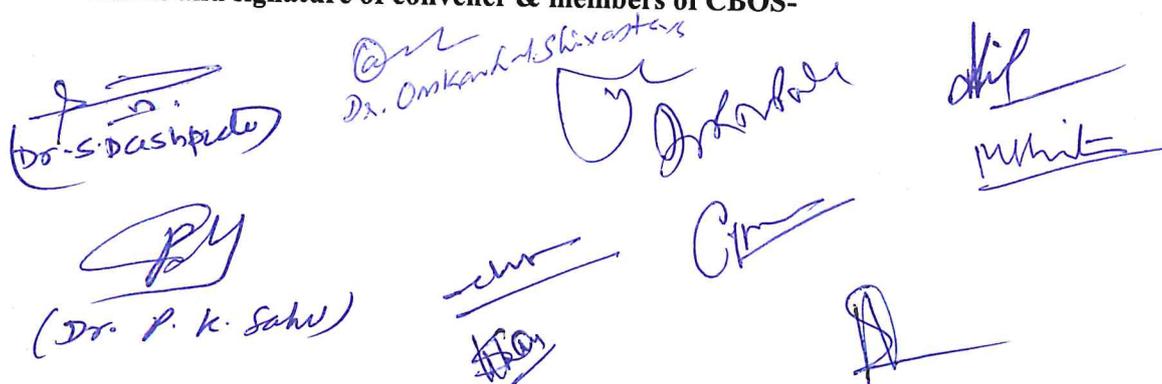
E-resources:

https://onlinecourses.nptel.ac.in
https://epqp.inflibnet.aci.in
https://swayam.gov.in
https://www.mooc.org

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Examination (ESE):	**70 Marks**

Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
End Semester Examination (ESE)	**Two Section-A&B** Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

Name and signature of convener & members of CBOS-

(Dr-S.Deshpande)

Dr. Omkanth A.Shrivastav

(Dr. P. K. Sahu)

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