

Part A: Introduction			
Program: Bachelor in Science (Degree/Honors)	Class: B.Sc. Sem. VI	Year: 2024	Session:2024-2025
1	Course Code	MSC-6	
2	Course Title	Metric Space	
3	Course Type	Discipline Specific Course (DSC)	
4	Course Learning Outcome (CLO)	<p><b>This Course will enable the students to-</b></p> <ul style="list-style-type: none"> <li>➤ Understand concepts of metric, distance, convergence, completeness, compactness, connectedness, Bolzano-Weierstrass property.</li> <li>➤ Apply these concepts to key classes of spaces.</li> <li>➤ Learn to analyze mapping between spaces.</li> <li>➤ Identify the continuity of a function defined on metric spaces homeomorphism.</li> <li>➤ Attain background for advanced courses in real analysis, functional analysis and topology.</li> </ul>	
5	Credit Value	Theory & Tutorial:4	
6	Total Marks	Maximum Marks : 100 ( Ext. 80 + Int. 20)	Minimum Passing Marks : 40

Part B: Content of the Course		
UNIT	Topics	No. of Hours
I	<b>Introductory concepts:</b> Definition and examples of metric spaces. Open sets, Interior points, Limit points and isolated points, Closed sets, Closure of a set, Boundary points, Distance between sets and diameter of set, Subspace of a metric space, Neighbourhoods and bases, Completeness, convergent sequences, Cauchy sequences, complete spaces,	15
II	Dense sets and separable spaces, Nowhere dense set, Baire's category theorem, Completion. Cantor's intersection theorem. Contraction principle. <b>Continuous Functions:</b> Definition and characterization, extension theorem, Uniform continuity, Homeomorphism, Equivalent metrics.	15
III	<b>Compactness:</b> Compact space and sets, Sequential compactness, Totally boundedness, equivalence of compactness and sequential compactness, Compactness and finite intersection property, Continuous function and compact space.	15
IV	<b>Connectedness:</b> Separated sets, Disconnected and connected sets, Components, Connected subset of $\mathbb{R}$ , Continuous function and connected sets. <b>Fixed Point theorems and their Applications:</b> Fixed point theorems, Applications to integral equations, Application to implicit theorem and inverse theorem.	15
Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
1. Metric Spaces, P K Jain and Khalil Ahmad, New Age International, New Delhi. 2. An Introduction to Metric Spaces, D gopal, A deshमुख, A S Randive and S Yadav, CRC Press, London.		

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

**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 Comprehensive Evaluation (CCE):** 20 Marks

**Semester End Exam (SEE):** 80 Marks

<b>Internal Assessment:</b> Continuous Comprehensive Evaluation (CCE)	Internal Test -02 of 10 Marks each Assignment/Seminar-01 Of 10 Marks	Better marks out of two test + obtained marks in Assignment shall be considered against 20 marks
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<b>Semester End Exam (SEE)</b>	Paper-Two Section-A&B Section-A: Objective and short answer type question-1x10+3x10= 40 Marks Section-B: Descriptive answer type question Module wise- 10x4 =40 Marks
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Amendment or Modification shall may be made by course coordinator as per situation or directed by the department/Examination cell/NEP-20 Scheme coordinator

**Name and signature of convener & member of BOS:**

