Koyana Education Society's

Balasaheb Desai College ,Patan

Monthly Teaching Plan

2023-2024

Subject – Mathematics **Class** –B.Sc.-III

Paper – Metric Space **Month** – December

Name of the teacher: Miss N. G. Nalawade

Date	Unit / Subunit	Teaching Plan
18/12/2023	UNIT –1 LIMITS AND CONTINUOUS FUNCTIONS ON METRIC SPACES Revision: Limits of a function on the real line. Metric space: Definition of Metric space and Examples R_1, R_d, R^n , l^∞ and l^2 .	Revision and Lecture
19/12/2023	#Limits in metric spaces . Definition of lim x→a f (x) = L, If lim x→a f (x) = L and lim x→a g(x) = N then (i) lim x→a [f (x)+g(x)¿]¿ = L+N; (ii) lim x→a [f (x)−g(x)¿]¿ = L- N ; (iii) lim x→a [f (x)∗g(x)¿]¿ = L*N; (iv) lim x→a [f (x)/g(x)¿]¿ = L / N; (N≠0)	Lecture
20/12/2023	Definition: Sequences and their convergence in metric space, Cauchy sequence in metric space. Theorems with statement and proof.	Lecture
21/12/2023	#Functions continuous at a point on the real line. Definition: Continuity of a function . Theorem: If real valued functions f and g are continuous at a∈ R_1 , then so are f +g, f − g, f*g, f / g, f o g, cf , | f | where, c∈ R at a .	Lecture
23/12/2023	#Reformulation - Theorem: The real valued function f is continuous at a ∈ R_1 if and only if given ∈ > 0 there exists δ > 0 such that lf (x) − f (a) | < ∈ when | x − a |< δ. Definition: The open ball of radius r about a. Theorem : The real valued function f is continuous at a∈ R_1 if and only if the inverse image under f of any open ball B[f (a); ∈] about f (a) contains an open ball B[a;δ] about a.	Lecture

26/12/2023	Theorem: A function f is continuous at a , iff if lim $n \to \infty$ xn = a $\Longrightarrow$ lim $n \to \infty$ f ¿ ¿ ¿) = f(a) .# Functions continuous on a metric space . Definition: The open ball of radius r about a in a metric space. Definition: Continuity of function defined on a metric space	Lecture
27/12/2023	Theorem : The function f is continuous at a $\in M_1$ if and only if any one of the following conditions hold (i) Given $\in > 0$, there exists $\delta > 0$ such that $\rho 2$ (f (x), f (a)) < $\in$ when $\rho 1$ (x, a) < δ. (ii) The inverse image under f of any open ball B[f (a); $\in$] about f (a) contains an open ball B[a;δ] about a. (iii) Whenever $\{xn\}^{\infty}_{n=1}$ is a sequence of points in M_1 converging to a ,then the sequence $\{f(xn)\}^{\infty}_{n=1}$ of points in M_2 converging to f (a) .	Lecture
28/12/2023	Theorem: If f is continuous at a$\in M_1$ an g is continuous at f (a)$\in M_2$,then g o f is continuous at a .Theorem: Let M be a metric space, an Let f and g be real valued functions which are continuous at a $\in$M , then so are f + g, f − g, fg, f / g, | f | at a.	Lecture
29/12/2023	Definition of continuity of a function f : $M_1 \to M_2$. Theorem : If f and g be continuous functions from a metric space M_1 into a metric space M_2 , then so are f + g, f − g, fg, f / g, | f | on M_1 . Open sets. Definition: Open set and examples	Lecture and problem solving
30/12/2023	Theorem: Any open ball in a metric space is an open set. Theorem : In any metric space < M, ρ > , both M and Ø are open sets. Theorem : Arbitrary union of open sets is open. Theorem : Every subset of Rd is open. Theorem : Finite intersection open sets is open.	Lecture

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