Koyana Education Society's

Balasaheb Desai College, Patan

Monthly Teaching Plan

2023-2024

Subject Name: Mathematics **Class:** B. Sc-I

Paper Name: Multivariable Calculus **Month:** December

Date	Unit/Subunit	Teaching Method
03/12/23	Introduction to syllabus of Sem-II P-III	--
04/12/23	Introduction to syllabus of Sem-II P-IV	--
	Unit-I Partial Differentiation	
05/12/23	Introduction to functions of two variable	Lecture
06/12/23	Concepts of domain, nbd of point etc	Lecture
07/12/23	Limit & Continuity of functions of two variables	Lecture
08/12/23	Examples on limit and continuity of functions of two variables	Problem solving
09/12/23	First order partial derivatives	Lecture
10/12/23	Examples on first order partial derivatives	Problem solving
11/12/23	Partial derivatives of higher	Lecture
12/12/23	Examples on higher order partial derivatives	Problem solving
13/12/23	Geometrical interpretation of partial derivatives	Lecture
14/12/23	Definition of homogeneous function	Lecture
15/12/23	Euler's theorem on homogeneous function (two variables)	Deduction method
16/12/23	Euler's theorem on homogeneous function (three variables)	Deduction method
18/12/23	Examples on Euler's theorem	Problem solving
19/12/23	Examples on Euler's theorem	Problem solving
20/12/23	Concept of total differentiation	Lecture
21/12/23	Composite function	Lecture
22/12/23	Examples on composite function	Problem solving
23/12/23	Implicit function & examples	Lecture
26/12/23	Taylor's theorem for the function of two variables	Lecture
27/12/23	Examples on Taylor's theorem for function of two variables	Problem solving
	Unit-2 Extreme Values & Jacobians	
28/12/23	Maxima & minima of functions of two variables	Lecture
29/12/23	Concepts of stationary & extreme points	Lecture
30/12/23	Examples on Maxima & minima of functions of two variables	Problem solving

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2023-2024

Subject Name: Mathematics **Class:** B. Sc-II

Paper Name: Vector Calculus **Month:** December

Date	Unit/Subunit	Teaching Method
03/12/23	Introduction to syllabus of Sem-IV P-VII	--
04/12/23	Introduction to syllabus of Sem-IV P-VIII	--
	Unit-I Differential Operators	
05/12/23	Introduction to scalar & vector valued point functions	Lecture
06/12/23	Limit & continuity of scalar & vector valued point functions	Lecture
07/12/23	Directional derivatives of scalar & vector valued point functions & examples	Lecture
08/12/23	The operator Del	Lecture
09/12/23	Gradient of a scalar point function & examples	Lecture
10/12/23	Geometrical interpretation of grad ϕ , where ϕ is a scalar point function	Problem solving
11/12/23	Divergence & curl of a vector point function	Lecture
12/12/23	Definition of div f and curl f , where f is a vector point function	Problem solving
13/12/23	Expressions of div f ^ curl f in terms of component of f	Lecture
14/12/23	Characters of div f & curl f as a point function & example	Lecture
15/12/23	Gradient, Divergence and Curl of sums	Deduction method
16/12/23	Gradient, Divergence and Curl of sums & examples	Deduction method
18/12/23	Gradient, Divergence and Curl of products	Problem solving
19/12/23	Gradient, Divergence and Curl of products & examples	Problem solving
20/12/23	Second order differential operators	Lecture
21/12/23	Expressions for div grad ϕ , curl grad ϕ, grad div f & examples	Lecture
22/12/23	Expressions for div grad ϕ , curl grad ϕ, grad div f & examples	Problem solving
23/12/23	The Laplacian Operator ∇^2	Lecture
26/12/23	Examples on Laplacian operator	Lecture
27/12/23	Combined examples on above articles	Problem solving
	Unit-2 Integral Transformations	
28/12/23	Basic Concepts: Oriented & smooth curve, classification of regions	Lecture
29/12/23	Concept of line integral & examples	Lecture
30/12/23	Circulation, work done by a force & examples	Problem solving

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2023-2024

Subject Name: Mathematics **Class:** B. Sc-III

Paper Name: Complex Analysis **Month:** December

Date	Unit/Subunit	Teaching Method
03/12/23	Introduction to syllabus of Sem-VI P-XV	--
04/12/23	Introduction to syllabus of Sem-VI P-XVI	--
	Unit-I Analytic function & Complex integration	
05/12/23	Basic algebraic and geometric properties of complex numbers	Lecture
06/12/23	Functions of complex Variable	Lecture
07/12/23	Limit, continuity and differentiation of complex number	Lecture
08/12/23	Examples on limit, continuity and differentiation of complex number	Problem solving
09/12/23	Cauchy Riemann equations in cartesian form	Lecture
10/12/23	Examples on C-R equations in cartesian form	Problem solving
11/12/23	Analytic function and examples on analytic function	Problem solving
12/12/23	Cauchy Riemann equations in Polar form	Lecture
13/12/23	Examples on C-R equations in polar form	Problem solving
14/12/23	Exponential, Logarithmic & Trigonometric functions	Lecture
15/12/23	Examples exponential, logarithmic, trigonometric functions	Deduction method
16/12/23	Definite integrals of functions	Lecture
18/12/23	Contours, contour integrals and examples	Problem solving
19/12/23	Upper bounds for moduli of contour integrals	Problem solving
20/12/23	Cauchy-Goursat theorem	Lecture
21/12/23	Examples on Cauchy-Goursat theorem	Problem solving
22/12/23	Cauchy's integral formula & examples	Problem solving
23/12/23	Examples on Cauchy's integral formula	Lecture
26/12/23	Liouville's theorem	Lecture
27/12/23	Fundamental theorem of algebra	Lecture
	Unit-2 Sequence, Series and Residue Calculus	
28/12/23	Convergence of sequence and series of complex numbers	Lecture
29/12/23	Taylor's series	Lecture
30/12/23	Examples on Taylor's series	Problem solving

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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→∞ xn = a ⟹ lim n→∞ 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 ∈M_1 if and only if any one of the following conditions hold (i) Given ∈ > 0, there exists δ > 0 such that ρ2 (f (x), f (a)) < ∈ when ρ1 (x, a) < δ. (ii) The inverse image under f of any open ball B[f (a); ∈] 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	Lecture

	to a ,then the sequence $\{f(xn)\}^{\infty}_{n=1}$ of points in M_2 converging to f (a) .	
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 : $M_1 \rightarrow M_2$. 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 ∅ 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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