Marks : 100	PART – II (CLASS-XII)	Time: 3 Hours

UNIT-1 FUNCTIONS AND LIMITS

Introduction

Concept of Function, Definition (Function – Domain – Range), Notation and Value of a Function, Graphs of Algebraic Functions, Graph of Functions Defined Piece–wise.

Types of Functions

Algebraic Functions,Trigonometric Function, Inverse Trigonometric Functions, Exponential Function, Logarithimic Function, Hyperbolic Functions, Inverse Hyperbolic Functions, Explicit Function, Implicit Function, Even Function, Odd Function

Composition of Functions and Iverse of a Function

Composition of Functions, Inverse of a Function, Algebraic Method to find the Inverse Function

Limit of a Function and Theorems on Limits

Meaning of the Phrase "x approaches zero", Meaning of the Phrase "x approaches infinity", Meaning of the Phrase "x approaches a", Concept of Limit of a Function, Limit of a Function, Theorems on Limits of Function

Limits of Imprtant Functions

$\lim_{x\to a}\frac{x^n-a^n}{x-a}=na^{n-1}$ where n is an integer and $a>0$, $\lim_{x\to 0}\frac{\sqrt{x+a}-\sqrt{a}}{x}=\frac{1}{2\sqrt{a}}$ Limit at Infinity, Method for Evaluating the Limits at Infinity, $\lim_{x\to+\infty}\left[1+\frac{1}{n}\right]=e$, $\lim_{x\to 0}\frac{a^x-1}{x}=\log_e a$ The Sandwitch Theorem, If θ is measured in radian, then $\lim_{0\to 0}\frac{\sin\theta}{\theta}=1$.

Continuous and Discontinous Functions

One-Sided Limits, Criterion for Existence of Limit of a Function, Continuity of a function at a number

Graphs

Graph of the Exponential Function $f(x) = a^x$, Graph of the Exponential Functon $f(x) = e^x$, Graph of Common. Logarithmic Function f(x) = lgx, Graphs of Natural Logarithmic Function f(x) = lnx, Graphs of Implicit Functions, Graph of Parametric Equations, Graphs of Discontinuous Functions, Graphical Solution of the Equation

UNIT-2 DIFFERENTIATION : Introduction

Average Rate of Change, Derivative of a Function

Finding f′(x) from definition of derivative

Derivation of x^n where nϵ Z, Differentiation of Expressions of the Types

Theorems on Diffrentiation
The chain rule
Derivatives of inverse functions
Derivative of a Function given in the form of parametric equatins
Differentiation of Implicit Relations
Derivatives of Trigonometric Functions
Derivatives of inverse Trigonometric functions
Derivative of exponential functions
Derivative of the logarithmic function
Logarithmic differentiation
Derivative of Hyperbolic functions
Derivatives of the inverse hyperbolic functions
Successive Differntiation (or Higher derivatives)
Series expansions of functions
Tailor series expansions of functions
Geometrical interpretation of a derivative
Increasing and decreasing functions
Relative extrema
Critical values and critical points

UNIT-3 INTEGRATION: Introduction

Differentials of Variables, Distinguishing between dy and δ ,

Finding $\frac{dy}{dx}$ by using differentials, Simple application of differentials

Integration as anti-derivative (Inverse of derivative)
Some Standard Formulae for Anti-Derivatives, Theorems on Anti-Derivatives, Anti-Derivatives of $[f(x)]^n f'(x)$ and $[f(x)]^{-1} f'(x)$.
Integration by method of substitution
Some useful substitutions
Integration by parts
Integration involving partial fractions
The definite integrals
The area Under the curve, Fundamental theorem and properties of Definite Integrals
Application of definite integrals
Differential equations
Solution of a differential equation of first order, Intial conditions

UNIT-4 INTRODUCTION TO ANALYTIC GEOMETRY: Introduction
The Distance Formula, Point dividing the join of two points in a given ratio
Translation and rotation of axes
Equations of straight lines
Slope or gradient of a straight line joining two points, Equation of a straight line parallel to the x-axis (or perpendicular to the y-axis), Equation of a straight line parallel to the y-axis (or perpendicular to the x-axis), Derivation of standard forms of equations of straight lines, A linear equation in two variables represents a straight line, To transform the general linear equation to standard forms, Position of a point with respect to a line
Two and three straight lines
The Point of intersection of two Straight Lines, Condition of concurrency of three Straight Lines, Equation of Lines through the Point of Intersection of Two Lines, Distance of a Point from a Line, Distance between two Parallel Lines, Area of a Triangular region whose vertices are given
Angle between two lines
Equation of a straight line in Matrix form
Homogeneous equation of the second degree in two variables
Homogeneous Equation, To find measure of the Angle between the Lines represented by $ax^2 + 2hxy + by^2 = 0$

UNIT-5 LINEAR INEQUALITIES AND LINEAR PROGRAMMING: Introduction
Linear Inequalities
Graphing of a linear inequality in two variables
Region bounded by 2 or 3 simultaneous Inequalities
Problem Constraints
Feasible solution set
Linear Programming
Linear Programming Problems

UNIT-6 CONIC SECTION: Introduction
Equation of a Circle, General form of an Equation of a Circle, Equations of Circles determined by given conditions
Tangents and Normals
Length of the Tangent to a Circle (Tangential Distance)
Analytic proofs of important Properties of a Circle
Parabola
General form of an Equation of a Parabola, Other standard Parabolas, Graph of the Parabola
Ellipse and its Elements
Standard form of an Ellipse, Graph of an Ellipse
Hyperbola and its Elements
Standard equation of Hyperbola, Graph of the Hyperbola
Tangents and normals
Translation and Rotation of Axes
The General Equation of Second Degree
Calssification of conics by the discriminant

UNIT-7 VECTORS: Introduction

Geometric interpretation of Vector, Multiplication of Vector by a Scalar, Addition and Subtraction of two Vectors, Position Vector, Vectors in a plane, Properties of magnitude of a Vector, Another notation for representing vector in plane. A unit Vector in the direction of another given Vector, The ratio formula, Vector Geometry

Introduction of Vector in Space

Concept of a vector in space, properties of Vectors, Another notation for representing Vectors in space, Distance between two points in space, Direction Angles and Direction Cosines of a Vector

The Scalar product of two Vectors

Deductions of the important results, Perpendicular (Orthogonal) Vectors, Properties of dot product, Anaytical expression of dot product $\underline{u}.\ \underline{v}$, Angle between two Vectors, Projection of one Vector upon another Vector

The cross product or vector product of two vectors

Derivation of useful results of cross products, Properties of cross product, Analytical Expression of $\underline{u} \times \underline{v}$), Parallel Vectors, Area of Parallelogram, Area of Triangle

Scalar Triple product of Vectors

Analytical expression of $\underline{u}.(\underline{v} \times \underline{w})$, The volume of the Parallelepiped, The volume of the Tetrahedron, Application of Vectors in Physics and engineering.

TOPIC-WISE WEIGHTAGE & TIME (XII)

UNIT	TOPIC		WEIGHT AGE	PERIODS (45 minutes each)
I	Functions & limits		6%	11
II	Differentiation of Functions	Polynomial & Algebraic Trigonometry and Inverse Trigonometric Logarithmic & Exponential	15%	07 07 07
	Successive differentiation and theorems and Maximum/Minimum		5%	07
III	Integration (Indefinite) Integrals) Definite Integrals	Standard forms By partial fractions By Substitution By parts Area under the curve Differential Equations	29%	07 07 05 07 07 07
IV	Introduction to Analytic Geometry		8%	13
V	Linear in-Equalities Linear Programming		7%	07 05
VI	Conic Sections	Circle Parabola Ellipse Hyperbola General Equation	17%	12 04 04 04 04
VII	Vectors	Introduction to vector & Scalar Product Vector product Scalar triple Product	13%	07 07 04
			100%	150 (6 periods a week)

Recommended Book:"MATHEMATICS Part-II"

Author : **1.** Prof. Muhammad Amin Chaudhary **2.** Prof. Muhammad Sharif Ghaury
3. Prof. Muhammad Khalid Saleem **4.** Mr. Mazhar Hayat

Published by : Ch. Ghulam Rasul & Sons, Lahore. (for: Punjab Textbook Board, Lahore)

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