

COMMECS COLLEGE
Macro Plan (2025-2026)

Subject: Mathematics Teacher: S Naimat Ullah/ M.Sayem /Abdul Basit /Ayaz Alvi _

Class: XII(P/E & C/S)

Unit No.	Start Date	End Date	Working days	Teaching days	Topic/Chapter	Contents	Objectives By the end of the unit S.W.A.T.:
1	Fri, 01-Aug	Fri, 08-Aug	06	06	FUNCTIONS AND LIMITS	1. Function 2. Composition of Functions 3. Inverse of Composition of Functions	1. Identify through graph the domain and range of a function 2. Find the composition of two given functions 3. Describe the inverse of composition of two given functions
2	Mon, 11-Aug	Fri, 15-Aug	04	03	FUNCTIONS AND LIMITS	1. Transcendental Functions 2. Graphical Representation	1. Recognize algebraic, trigonometric exponential Hyperbolic explicit implicit functions 2. Display graphically <ul style="list-style-type: none"> the implicitly defined functions such as $x^2 + y^2 = a^2$ and $x^2 + y^2 = 1$, and distinguish between graph of a function and an equation. the parametric equations of functions such as $x = a \cos t, y = b \sin t$; $x = a \sec \theta, y = b \tan \theta$ discontinuous functions

							<p>of the type $y = x$ when $0 \leq x < 1$ $x - 1$ when $1 \leq x \leq 2$</p>
3	Mon, 18-Aug	Sat, 23-Aug	06	05	FUNCTIONS AND LIMITS	<p>1. Limit of a Function. 2. Important Limits 3. Continuous and Discontinuous Functions</p>	<p>a. closed interval, b. Half open and half closed intervals, on the number line. 2. Explain the meaning of phrase: a. x tends to zero ($x \rightarrow 0$), b. x tends to a ($x \rightarrow a$), c. x tends to infinity ($x \rightarrow \infty$). 3. Define limit of a sequence. 4. Find the limit of a sequence whose nth term is given. 7. State the theorems on limits of sum, difference, product and quotient of functions and demonstrate through examples. 7. 1. Continuous and Discontinuous Functions</p>
4	Mon, 25-Aug	Sat, 30-Aug	06	05	DIFFERENTIATION	<p>1. Derivative of a Function 2. Theorems on Differentiation</p>	<p>i. Distinguish between independent and dependent variables. ii. Estimate corresponding change in the dependent variable when independent variable is incremented (or decremented). iii. Differentiate $y = x^n$, where $n \in \mathbb{Z}$ (the set of integers), from first principles (the</p>

							<p>derivation of power rule). Prove the following theorems for differentiation.</p> <p>iv. The derivative of a constant is zero.</p> <p>v. The derivative of any constant multiple of a function is equal to the product of that constant</p> <p>vi. The derivative of a product of two functions is equal to (the first function) x (derivative of the second function) plus (derivative of the first function) x (the second function).</p> <p>$\frac{d}{dx} [f(x) \cdot g(x)] = f(x) \cdot \frac{d}{dx} g(x) + g(x) \cdot \frac{d}{dx} f(x)$</p>
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5	Mon, 01-Sep	Fri, 05-Sep	04	04	DIFFERENTIATION	<p>1. Application of Theorems on Differentiation</p> <p>2. Chain Rule</p>	<p>1. Differentiate:</p> <ul style="list-style-type: none"> • constant multiple of x^n, • sum (or difference) of functions, • polynomials, • product of functions, <p>quotient of two functions</p> <p>i.. Prove that: $\frac{dy}{dx} = \frac{d}{du} \cdot \frac{du}{dx}$ when $y = f(u)$ and $u = g(x)$ (Chain Rule)</p> <p>ii. Show that: $\frac{d}{dy} [f(x)]^n = n [f(x)]^{n-1} \frac{df(x)}{dx}$</p> <p>iii. Use chain rule to show that $\frac{d}{dx} [f(x)]^n = n [f(x)]^{n-1} f'(x)$</p> <p>and derivative of implicit function</p>
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6	Mon, 08-Sep	Sat, 13-Sep	06	05	DIFFERENTIATION	<ol style="list-style-type: none"> 1. Differentiation of Trigonometric and Inverse Trigonometric Functions 2. Differentiation of Exponential and Logarithmic Functions 3. Differentiation of Hyperbolic and Inverse Hyperbolic Functions 	<p>Differentiate:</p> <ol style="list-style-type: none"> 1. trigonometric functions ($\sin x$, $\cos x$, $\tan x$, $\operatorname{cosec} x$, $\sec x$, and $\cot x$) from first principles. 2. Inverse trigonometric functions ($\arcsin x$, $\arccos x$, $\arctan x$, $\operatorname{arccosec} x$, $\operatorname{arcsec} x$, and $\operatorname{arccot} x$) using differentiation formulae. 3. Find the derivative of e^x and a^x from first principles. 4. Find the derivative of $\ln x$ and $\log_a x$ from first principles <p>inverse hyperbolic functions ($\sinh^{-1} x$, $\cosh^{-1} x$, $\tanh^{-1} x$, $\operatorname{cosech}^{-1} x$, $\operatorname{sech}^{-1} x$, and $\operatorname{coth}^{-1} x$).</p>
7	Mon, 15-Sep	Fri, 19-Sep	05	04	HIGHER ORDER DERIVATIVES AND APPLICATIONS	<ol style="list-style-type: none"> 1. Higher Order Derivatives. 	<ol style="list-style-type: none"> i. Find higher order derivatives of algebraic, trigonometric, exponential and logarithmic functions. ii. Find the second derivative of implicit, inverse trigonometric and parametric functions. iii) Use MAPLE command diff repeatedly to find higher order derivative of a function

8	Mon, 22-Sep	Sat, 27-Sep	06	05	Differentiability continues.	1. Maclaurin's and Taylor's Expansions 2. Application of Derivatives	<p>i.1. State Maclaurin's and Taylor's theorems (without remainder terms). Use these theorems to expand $\sin x$, $\cos x$, $\tan x$, a^x, e^x, $\log_a(1+x)$ and $\ln(1+x)$. Use MAPLE command taylor to find Taylor's expansion for a given function.</p> <p>i. Give geometrical interpretation of derivative.</p> <p>i. Find the equation of tangent and normal to the curve at a given point.</p> <p>i. Find the angle of intersection of the two curves.</p>
9	Mon, 29-Sep	Fri, 03-Oct	05	05	Application of differentiation	1. Maxima and Minima	<p>i.1 Define increasing and decreasing functions. Prove that if $f(x)$ is a differentiable function on the open interval (a, b)</p>
10	Mon, 06-Oct	Sat, 11-Oct	06	05	DIFFERENTIATION OF VECTOR FUNCTIONS	Scalar and Vector Functions	<p>1. Define scalar and vector function. 2. Explain domain and range of a vector function</p>
11	Mon, 13-Oct	Fri, 17-Oct	05	05	DIFFERENTIATION OF VECTOR FUNCTIONS	Limit and Continuity	<p>1. Define limit of a vector function and employ the usual technique for algebra of limits of scalar function to demonstrate the following properties of limits of a vector function.</p> <p>a. The limit of the sum (difference) of two vector functions is the sum (difference) of their limits.</p>

							<ul style="list-style-type: none"> b. The limit of the dot product of two vector functions is the dot product of their limits. c. The limit of the cross product of two vector functions is the cross product of their limits. d. The limit of the product of a scalar function and a vector function is the product of their limits. <p>2. Define continuity of a vector function and demonstrate through examples</p>
12	Mon, 20-Oct	Sat, 25-Oct	06	05	DIFFERENTIATION OF VECTOR FUNCTIONS	Derivative of Vector Function	<p>Define derivative of a vector function of a single variable and elaborate the result: If $f(t) = f_1(t)\mathbf{i} + f_2(t)\mathbf{j} + f_3(t)\mathbf{k}$, where $f_1(t), f_2(t), f_3(t)$ are differentiable</p> <p>i. Prove the following formulae of differentiation: $\frac{d}{dt} = 0$</p> $d[f \pm g] = df \pm dg$

13	Mon, 27-Oct	Fri,31-Oct	05	05	INTRODUCTION TO SYMBOLIC PACKAGE: MAPLE.	1. Introduction	<ul style="list-style-type: none"> i.1. Recognize MAPLE environment. i. Recognize basic MAPLE commands. i. Use MAPLE as a calculator. Use online MAPLE help
14	Mon, 03-Nov	Sat, 08-Nov	06	05	INTRODUCTION TO SYMBOLIC PACKAGE: MAPL	<ul style="list-style-type: none"> 1. Polynomials. 2. Graphics 3. Matrices 	<ul style="list-style-type: none"> 1. Use MAPLE commands for <ul style="list-style-type: none"> • factoring a polynomial, • expanding an expression, • simplifying an expression, • simplifying a rational expression, Substituting into an expression. i. Plot a two-dimensional graph. i. Demonstrate domain and range of a plot. i. Sketch parametric equations. v. Know plotting options v.1 Recognize matrix and vector entry arrangement. i. Apply matrix operations. compute inverse and transpose of a matrix
15	Mon, 10-Nov	Fri, 14-Nov	05	05	CIRCLE	<ul style="list-style-type: none"> 1 Conics 2. Circle and its standard form of Equation 3. General Form of an Equation of a Circle 	<ul style="list-style-type: none"> Define conics and demonstrate members Define circle and derive its equation in standard form i.e. $(x - h)^2 + (y - k)^2 = r^2$ Recognize general equation of a circle $x^2 + y^2 + 2gx + 2fy + c = 0$ and find its centre and radius.
16	Mon, 17-Nov	Sat, 22-Nov	06	05	CIRCLE	1. Equation of Circle determined by a given condition	<ul style="list-style-type: none"> • Find the equation of a circle passing through • Find the condition when a line

						<p>2. Tangent and Normal 3. Properties of Circle</p>	<p>intersects the circle Prove analytically the following properties of a circle.</p> <ul style="list-style-type: none"> • Perpendicular from the centre of a circle on a chord bisects the chord. • Perpendicular bisector of any chord of a circle passes through the centre of the circle. • Line joining the centre of a circle to the midpoint of a chord is perpendicular to the chord. • Congruent chords of a circle are equidistant from its centre and its converse. • Measure of the central angle of a minor arc is double the measure of the angle subtended by the corresponding major arc. • An angle in a semi-circle is a right angle. • The perpendicular at the outer end of a radial segment is tangent to the circle. • The tangent to a circle at any point of the circle is perpendicular to the radial segment at that point
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17	Mon, 24-Nov	Sat, 29-Nov	06	05	INTEGRATION	<ol style="list-style-type: none"> 1. Introduction. 2. Rules of Integration 3. Integration by Substitution 4. Integration by Parts 	<ol style="list-style-type: none"> 1. Demonstrate the concept of the integral as an accumulator. 2. Know integration as inverse process of differentiation. 3. Explain constant of integration. <p>i. Use standard differentiation formulae to prove the results for the following integrals</p> <p>i.2. Explain the method of integration by substitution.</p> <p>i. Apply method of substitution to evaluate indefinite integrals. Apply method of substitution to evaluate integrals of the following types</p>
18	Mon, 01-Dec	Fri, 05-Dec	05	00	Mid-Term Exams		
19	Mon, 08-Dec	Sat, 13-Dec	06	00	Mid-Term Exams		
20	Mon, 15-Dec	Fri, 19-Dec	05	00	Mid-Term Exams / Sports Gala		
21	Mon, 22-Dec	Sat, 27-Dec	00	00	Winter Break		

Mid-Term
Working Days - 110
Teaching Days - 82
Classes Conducted = 61.65%

22	Mon, 29-Dec	Sat, 03-Jan	03	02	INTEGRATION	<ol style="list-style-type: none"> 1. Integration using Partial Fractions 2. Definite Integrals 	<ol style="list-style-type: none"> i.1 Define definite integral as the limit of a sum. i. Describe the fundamental theorem of integral calculus and recognize the following basic properties: <ol style="list-style-type: none"> i. Apply definite integrals to calculate area under the curve v. Use MAPLE command <code>int</code> to evaluate definite and indefinite integrals v. Recognize the formula for integration by parts. i. Apply method of integration by parts to evaluate integrals of the following types: <ul style="list-style-type: none"> • $\int \sqrt{a^2 - x^2} dx, \int \sqrt{a^2 + x^2} dx, \int \sqrt{x^2 - a^2} dx$ vii. Evaluate integrals using integration by parts.
23	Mon, 05-Jan	Sat, 10- Jan	06	04	INTEGRATION	<ol style="list-style-type: none"> 1. Definite Integrals 	Area Under the curves
24	Mon, 12-Jan	Fri, 16-Jan	05	05	PLANE ANALYTIC GEOMETRY-	<ol style="list-style-type: none"> 1. Division of a Line Segment 2. Slope (Gradient) of a 	2.To solve problems based on condition of tangency

					STRAIGHT LINE	Straight Line 3. Equation of a Straight Line Parallel to Co-ordinate Axes	
25	Mon, 19-Jan	Fri, 23-Jan	05	05	1. PLANE ANALYTIC GEOMETRY-STRAIGHT LINE	Distance of a Point From a Line	<ol style="list-style-type: none"> 1. Find the angle between two coplanar intersecting straight lines. 2. Find the equation of family of lines passing through the point of intersection of two given lines. 3. Recognize a point with respect to position of a line.
26	Mon, 26-Jan	Sat, 31-Jan	06	05	1. PLANE ANALYTIC GEOMETRY-STRAIGHT LINE	Angle Between Lines	<ol style="list-style-type: none"> 1. Find the perpendicular distance from a point to the given straight line. 2. Find the distance between two parallel lines
27	Mon, 02-Feb	Fri, 06-Feb	03	03	PARABOLA, ELLIPSE AND HYPERBOLA	<p>Parabola</p> <p>General Form of Equation of a Parabola</p> <p>Equations of Tangent and Normal of Parabola</p> <p>Define parabola and its elements (i.e. focus, directrix, eccentricity, vertex, is, focal chord and latus rectum)</p>	<p>Define parabola and its elements (i.e. focus, directrix, eccentricity, vertex, is, focal chord and latus rectum).</p> <p>Derive the general form of an equation of a parabola</p> <p>Define parabola and its elements (i.e. focus, directrix, eccentricity, vertex, is, focal chord and latus rectum).</p> <p>Define parabola and its elements (i.e. focus, directrix, eccentricity, vertex, is, focal chord and latus rectum).</p> <p>Find the condition when a line is</p>

							<p>tangent to a parabola at a point and hence write the equation of a tangent line in slope form.</p> <p>Find the equation of a tangent and a normal to a parabola at a point.</p>
28	Mon, 09-Feb	Sat, 14-Feb	06	05	<p>PARABOLA, ELLIPSE AND HYPERBOLA</p>	<ol style="list-style-type: none"> 1. 1 Application of Parabola 2. Ellipse 3. Standard Form of Equation of an Ellipse 4. Equations of Tangent and Normal of an Ellipse 	<ol style="list-style-type: none"> i. Define hyperbola i. Define elements of hyperbola (i.e. centre, foci, vertices, directrices, transverse and conjugate axes, eccentricity, focal chord and latera recta). i. Recognize tangent and normal to a hyperbola. v. Find: <ul style="list-style-type: none"> • points of intersection of a hyperbola with a line including the condition of tangency, • the equation of a tangent in slope form. v. Find the equation of a tangent and a normal to a hyperbola at a point. i. Define translation and rotation of axes and demonstrate through examples. i. Find the equations of transformation for <ul style="list-style-type: none"> • translation of axes, • rotation of axes. i. Find the transformed equation by using translation or rotation of axes. c. Find new origin and new axes referred to old origin and old axes. c. Find the angle through which the axes be rotated about the origin so that the product term xy is removed from the

							transformed equation. • ,
29	Mon, 16-Feb	Fri, 20-Feb	05	05	PARABOLA, ELLIPSE AND HYPERBOLA	5. Equations of Tangent and Normal of an Ellipse 6. Hyperbola 7. Standard Form of Equation of Hyperbola 8. Translation and Rotation of Axes 9.	i. Define hyperbola i. Define elements of hyperbola (i.e. centre, foci, vertices, directrices, transverse and conjugate axes, eccentricity, focal chord and latera recta). i. Recognize tangent and normal to a hyperbola. v. Find: <ul style="list-style-type: none"> • points of intersection of a hyperbola with a line including the condition of tangency, • the equation of a tangent in slope form. v. Find the equation of a tangent and a normal to a hyperbola at a point. i. Define translation and rotation of axes and demonstrate through examples. i. Find the equations of transformation for <ul style="list-style-type: none"> • translation of axes, • rotation of axes. i. Find the transformed equation by using translation or rotation of axes. c. Find new origin and new axes referred to old origin and old axes. c. Find the angle through which the axes be rotated about the origin so that the product term xy is removed from the

							transformed equation. • ,
30	Mon, 23-Feb	Sat, 28-Feb	06	05	DIFFERENTIAL EQUATIONS	1.Introduction 2.Formation Differential of Equations 3.Solution Differential of Equation 4.Orthogonal Trajectories	Define ordinary differential equation (DE), order of a DE, degree of a DE, solution of a DE – general solution and particular solution. Demonstrate the concept of formation of a differential equation Solve differential equations of first order and first degree of the form: Solve real life problems related to differential equations Define and find orthogonal trajectories (rectangular coordinates) of the given family of curves. Use MAPLE graphic commands to view the graphs of given family of curves and its orthogonal trajectories
31	Mon, 02-Mar	Fri, 06-Mar	05	05	PARTIAL DIFFERENTIATION	.1.Differentiation of Function of Two Variables 2.Euler's Theorem	i.. Define a function of two variables. ii.Define partial derivative. Find partial derivatives of a function of two variables i.Define a homogeneous function of degree n. ii. State and prove Euler's theorem on homogeneous functions. Verify Euler's theorem for homogeneous functions of different

							degrees (simple cases).
32	Mon, 09-Mar	Sat, 14-Mar	05	04	INTRODUCTION TO NUMERICAL METHODS	1.Numerical Solution of Non-linear Equations	<p>i.. Describe importance of numerical methods.</p> <p>ii.Explain the basic principles of solving a non-linear equation in one variable.</p> <p>iii.Calculate real roots of a non-linear equation in one variable by</p> <ul style="list-style-type: none"> • bisection method, • regula-falsi method, • Newton-Raphson method. <p>Use MAPLE command fsolve to find numerical solution of an equation and demonstrate through examples</p>
33	Mon, 16-Mar	Fri, 20-Mar	03	03	INTRODUCTION TO NUMERICAL METHODS	2.Numerical Quadrature	<p>i.Define numerical quadrature. Use</p> <ul style="list-style-type: none"> • Trapezoidal rule, • Simpson's rule, <p>to compute the approximate value of definite integrals without error terms.</p> <p>Use MAPLE command trapezoid for trapezoidal rule and simpson for Simpson's rule and demonstrate through examples</p>
34	Mon, 23-Mar	Sat, 28-Mar	05	00	P.Exam		
35	Mon, 30-Mar	Fri, 03-Apr	05	00	P.Exam		
36	Mon, 06 Apr	Sat, 11-Apr	06	00	P.Exam		

Preliminary Exams Total Working Days: $110 + 74 = 184$ Total Teaching Days: $82 + 51 = 133$ Classes Conducted = 100%							

Checked By HOD: _____