Macro Plan (2024-2025) Commecs College

Subject: ***Mathematics*** **Teacher:** ***S Naimat Ullah /Aftab Ahmed / Khalid Javed / Ayyaz Alvi/M.Aamir Zia***

Class: XII *(P.E/Comp.Sci*)

Week No.	Start Date	End Date	Teaching Days	Topic/Chapter	Contents	Objectives By the end of the unit S.W.A.T.:
1	Thu, 01,Aug	Fri, 02-Aug	2	FUNCTIONS AND LIMITS	1 Function 2. Composition of Functions 3 Inverse of Composition ofFunctions	1. Identify through graph the domain and range of afunction 2. Find the composition of two given functions 3. Describe the inverse of composition of two givenfunctions
2	Mon, 05-Aug	Sat, 10-Aug	5	FUNCTIONS AND LIMITS	1.Transcendental Functions 2.Graphical Representations	1. Recognize algebraic, trigonometric exponential Hyperbolic explicit implicit functions 2.Display graphically • the implicitly defined functions such as $x^2 + y^2 = a^2$ and $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, and distinguish between graph of a function and an equation. • the parametric equations of functions such as $x = at^2,\ y = 2at;\ x = a\sec\theta,\ y = b\tan\theta$ • discontinuous functions of the type $y = \begin{cases} x \text{ when } 0 \le x < 1 \\ x - 1 \text{ when } 1 \le x \le 2 \end{cases}$
3	Mon, 12-Aug	Fri, 16-Aug	4	1. LIMITS	1. Limit of a Function. 2. Important Limits 3. . Continuous and	2. Identify a real number by a point on the number line. 3. Define and represent a. open interval,

					Discontinuous Functions .	b. closed interval, c. half open and half closed intervals, on thenumber line. 4. Explain the meaning of phrase: a. x tends to zero ($x \to 0$), b. x tends to a ($x \to$ a), c. x tends to infinity ($x \to \infty$). 5. Define limit of a sequence. 6. Find the limit of a sequence whose nth term isgiven. 7.State the theorems on limits of sum, difference, product and quotient of functions and demonstrate through examples. 7. 1. Continuous and Discontinuous Functions
4	Mon, 19-Aug	Fri, 23-Aug	5	DIFFERENTIATION	1.Derivative of a Function 2. Theorems on Differentiation	i) . Distinguish between independent and dependentvariables. ii) Estimate corresponding change in the dependent variable when independent variable is incremented(or decremented). iii) Differentiate $y = x^n$, where $n \in Z$ (the set of integers), from first principles (the derivation ofpower rule). Prove the following theorems for differentiation. iv) The derivative of a constant is zero. v) The derivative of any constant multiple of a function is equal to the product of that constant 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).

						$\frac{d}{dx}[f(x).g(x)] = f(x).\frac{d}{dx}g(x) - g(x).\frac{d}{dx}f(x)$
5	Mon, 26-Aug	Sat, 31-Aug	5	DIFFERENTIATION	1. Application of Theorems on Differentiation 2. Chain Rule	1. Differentiate: • constant multiple of x^n, • sum (or difference) of functions, • polynomials, • product of functions, quotient of two functions i) . Prove that: $\frac{dy}{dx} = \frac{dy}{du}.\frac{du}{dx}$ when y = f (u) u = g (x) (Chain Rule) ii) Show that: $\frac{dy}{dx} = \frac{1}{\frac{dy}{dx}}$ iii) Use chain rule to show that $\frac{d}{dx}[f(x)]^n = n[f(x)]^{n-1} f'(x)$ Find derivative of implicit function
6	Mon, 02-Sep	Fri, 06-Sep	5	DIFFERENTIATION	1. Differentiation of Trigonometric and Inverse Trigonometric Functions 2. Differentiation of Exponential and Logarithmic Functions 3. Differentiation of Hyperbolic and Inverse Hyperbolic Functions	Differentiate: 1. trigonometric functions (sin x, cosx, tanx,cosecx, sec x, and cot x) from first principles. 2. Inverse trigonometric functions (arcsinx, arccosx, arctanx, arccosecx, arcsecx, and arccotx) using differentiation formulae. 3. Find the derivative of $e^x$and a^x from first principles. 4. Find the derivative of lnx and $\log_a x$ from firstprinciples 5. inverse hyperbolic functions ($\sinh^{-1}x$, $\cosh^{-1}x$,$\tanh^{-1}x$, $\text{cosech}^{-1}x$, $\text{sech}^{-1}x$, and $\coth^{-1}x$).

7	Mon, 09-Sep	Sat, 14-Sep	5	HIGHER ORDER DERIVATIVES AND APPLICATIONS	1. Higher Order Derivatives. 2.	i) Find higher order derivatives of algebraic, trigonometric, exponential and logarithmic functions. ii) Find the second derivative of implicit, inversetrigonometric and parametric functions. iii)Use MAPLE command diff repeatedly to find higher order derivative of a function .
8	Mon, 16- Sep	Fri, 20-Sep	5	Differentiability continues.	1. Maclaurin's and Taylor's Expansions 2. Application of Derivatives	i) 1. State Maclaurin's and Taylor's theorems (withoutremainder terms). Use these theorems to expand sinx, cosx, tanx, 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. i) Give geometrical interpretation of derivative. ii) Find the equation of tangent and normal to thecurve at a given point. iii) Find the angle of intersection of the two curves.
9	Mon, 23-Sep	Sat, 28-Sep	5	Application of differentiation	1. Maxima and Minima .	i) 1 Define increasing and decreasing functions. Prove that if $f(x)$ is a differentiable function on the open interval (a , b)
10	Mon, 30-Sep	Fri, 04-Oct	5	DIFFERENTIATION OF VECTOR FUNCTIONS	Scalar and Vector Functions	1.Define scalar and vector function. 2.Explain domain and range of a vector function

11	Mon, 07-Oct	Sat, 12-Oct	5	DIFFERENTIATION OF VECTOR FUNCTIONS	Limit and Continuity	2. 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. a. The limit of the sum (difference) of two vectorfunctions is the sum (difference) of their limits. b. The limit of the dot product of two vectorfunctions is the dot product of their limits. c. The limit of the cross product of two vectorfunctions is the cross product of their limits. d. The limit of the product of a scalar function anda vector function is the product of their limits. 3. Define continuity of a vector function and demonstrate through examples
12	Mon, 14- Oct	Fri, 18-Oct	**4**	DIFFERENTIATION OF VECTOR FUNCTIONS	Derivative of Vector Function	Define derivative of a vector function of a singlevariable and elaborate the result: If $f(t) = f_1(t)i + f_2(t)j + f_3(t)k$, where $f_1(t)$, $f_2(t)$, $f_3(t)$ are differentiable i) Prove the following formulae of differentiation: $\frac{dy/dt}{} = 0$ • $\frac{d}{}[f \pm g] = \frac{df}{} \pm \frac{dg}{}$
13	Mon, 21-Oct	Sat, 26-Oct	0	**First Term Examination**		
Term-I Teaching Days -55 Classes conducted 40.14%						

14	Mon, 28-Oct	Fri, 01-Nov	5	INTRODUCTION TO SYMBOLIC PACKAGE: MAPLE.	1. Introduction	i) 1. Recognize MAPLE environment. ii) Recognize basic MAPLE commands. iii) Use MAPLE as a calculator. Use online MAPLE help.
15	Mon, 04-Nov	Sat, 09-Nov	5	INTRODUCTION TO SYMBOLIC PACKAGE: MAPLE	1. Polynomials. 2.Graphics 3.Matrices	1. Use MAPLE commands for • factoring a polynomial, • expanding an expression, • simplifying an expression, • simplifying a rational expression, substituting into an expression. i) Plot a two-dimensional graph. ii) Demonstrate domain and range of a plot. iii) Sketch parametric equations. iv) Know plotting options v) 1 Recognize matrix and vector entry arrangement. vi) Apply matrix operations. Compute inverse and transpose of a matrix
16	Mon, 11-Nov	Fri, 15-Nov	5	CIRCLE	1 Conics 2.Circle and its standard form of Equation 3.General Form of an Equationof a Circle	. 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.
17	Mon, 18-Nov	Sat, 23-Nov	5	CIRCLE	1 Equation of Circle determinedby a given condition 2 Tangent and Normal .3 Properties of Circle	• Find the equation of a circle passing through • Find the condition when a line intersects the circle Prove analytically the following properties of acircle. • Perpendicular from the centre of a circle on achord 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 thechord. • Congruent chords of a circle are equidistantfrom 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 radialsegment is tangent to the circle. • The tangent to a circle at any point of the circle is perpendicular to the radial segmentat that point
18	Mon, 25-Nov	Sat, 30-Nov	5	INTEGRATION	1. Introduction. 2. Rules of Integration 3. Integration by Substitution 4. Integration by Parts	5. Demonstrate the concept of the integral as anaccumulator. 6. Know integration as inverse process ofdifferentiation. 7. Explain constant of integration. i) Use standard differentiation formulae to prove theresults for the following integrals ii) 2. Explain the method of integration by substitution. iii) Apply method of substitution to evaluate indefiniteintegrals. Apply method of substitution to evaluate integrals of the following types
19	Mon, 02-Dec	Fri, 06-Dec	5	INTEGRATION	1. Integration using PartialFractions 2. Definite Integrals	i) 1 Define definite integral as the limit of a sum. ii) Describe the fundamental theorem of integralcalculus and recognize the following basic properties:

						iii) Apply definite integrals to calculate area under thecurve iv) Use MAPLE command int to evaluate definite andindefinite integrals v) Recognize the formula for integration by parts. vi) Apply method of integration by parts to evaluateintegrals of the following types: • $\int \sqrt{a^2 - x^2}\, dx, \int \sqrt{a^2 + x^2}\, dx, \int \sqrt{x^2 - a^2}\, dx$ vii) Evaluate integrals using integration by parts. .
20	Mon, 09-Dec	Sat, 14-Dec	5	PLANE ANALYTIC GEOMETRY-STRAIGHT LINE	1. Division of a Line Segment 2. Slope (Gradient) of a StraightLine 3. Equation of a Straight Line Parallel to Co-ordinate Axes	2.To solve problems based on condition of tangency
21	Mon, 16-Dec	Fri, 20-Dec	3	1. PLANE ANALYTIC GEOMETRY-STRAIGHT LINE 2.CIRCLE	4. Distance of a Point From a Line 5. Equation of Circle	6. Find the angle between two coplanar intersectingstraight lines. 7. Find the equation of family of lines passing through the point of intersection of two givenlines. 8. Recognize a point with respect to position of aline.
22	Mon 23-Dec	Sat,28-Dec	**Winter Break**			
Winter Vacations Dec 21 to Dec 31, 2024						

23	Mon, 30-Dec	Fri, 03-Jan	2	Parabola	1. Angle Between Lines 2. Standard equation of a parabola. 3. Concept of basic terms to be used. 4. Standard equation of an ellipse and hyperbola. 5. Concept of foci, Directrices, Latus rectum & Eccentricities Parametric Equation of Parabola, ellipse & Hyperbola.. Equations of chord.	1. Find the perpendicular distance from a point to thegiven straight line. 2. Find the distance between two parallel lines 3. To apply basic terms in solving problems. To find equation of ellipse & hyperbola under various conditions
24	Mon, 06-Jan	Sat, 11-Jan	00	Second Term Exam		
25	Mon, 13-Jan	Fri,17-Jan	00	Second Term Exam		
Term-II Teaching Days-40 Classes conducted 69.34%						

26	Mon, 20-Feb	Sat, 25-Feb	5	PARABOLA, ELLIPSE AND HYPERBOLA	1 Parabola 2.General Form of Equation of aParabola 3. Equations of Tangent andNormal of Parabola 4. Define parabola and its elements (i.e. focus, directrix,eccentricity, vertex, is, focal chord and latus rectum).	Define parabola and its elements (i.e. focus, directrix,eccentricity, vertex, is, focal chord and latus rectum). Derive the general form of an equation of a parabola Define parabola and its elements (i.e. focus, directrix,eccentricity, vertex, is, focal chord and latus rectum). Define parabola and its elements (i.e. focus, directrix,eccentricity, vertex, is, focal chord and latus rectum). Find the condition when a line is tangent to a parabola at a point and hence write the equation of a tangent line in slope form. Find the equation of a tangent and a normal to a parabola at a point.
27	Mon, 27-Jan	Sat, 31-Jan	4	PARABOLA, ELLIPSE AND HYPERBOLA	1. Application of Parabola 2. Ellipse 3. Standard Form of Equation ofan Ellipse 4. Equations of Tangent andNormal of an Ellipse	Derive the general form of an equation of a parabola. i) Define ellipse and its elements (i.e. centre, foci, vertices, covertices, directrices, major and minor axes, eccentricity, focal chord and latera recta). Explain that circle is a special case of an ellipse. ii) Derive the standard form of equation of an ellipseand identify its elements. iii) Find the equation of an ellipse with the followinggiven elements iv) Recognize tangent and normal to an ellipse. v) Find points of intersection of an ellipse with a lineincluding the condition of tangency. vi) Find the equation of a tangent in slope form. vii) Find the equation of a tangent and a normal to anellipse at a point

28	Mon, 03-Feb	Sat, 08-Feb	4	PARABOLA, ELLIPSE AND HYPERBOLA	1. Equations of Tangent and Normal of an Ellipse 2. Hyperbola 3. Standard Form of Equationof Hyperbola 4. Translation and Rotation ofAxes	i) Define hyperbola ii) Define elements of hyperbola (i.e. centre, foci, vertices, directrices, transverse and conjugate axes, eccentricity, focal chord and latera recta). iii) Recognize tangent and normal to a hyperbola. iv) Find: • points of intersection of a hyperbola with a lineincluding the condition of tangency, • the equation of a tangent in slope form. v) Find the equation of a tangent and a normal to ahyperbola at a point. vi) Define translation and rotation of axes and demonstrate through examples. vii) Find the equations of transformation for • translation of axes, • rotation of axes. viii) Find the transformed equation by using translation or rotation of axes. ix) Find new origin and new axes referred to old origin and old axes. x) Find the angle through which the axes be rotated about the origin so that the product term *xy* isremoved from the transformed equation. • ,
29	Mon, 10-Feb	Fri, 14-Feb	4	DIFFERENTIAL EQUATIONS	1.Introduction 2.Formation Differential of Equations 3.Solution Differential of Equation	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 firstdegree of the form:

						Solve real life problems related to differential equations
30	Mon, 17-Feb	Sat, 22-Feb	5	DIFFERENTIAL EQUATIONS	Orthogonal Trajectories	i) Define and find orthogonal trajectories (rectangularcoordinates) 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, 24-Feb	Sat, 28-Feb	5	PARTIAL DIFFERENTIATION	.1.Differentiation of Functionof Two Variables	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 homogeneousfunctions. Verify Euler's theorem for homogeneous functions of different degrees (simple cases).
32	Mon, 03-Mar	Sat, 08-Mar	5	PARTIAL DIFFERENTIATION	2.Euler's Theorem	Find partial derivatives of a function of two variables iii) Define a homogeneous function of degree n. iv) State and prove Euler's theorem on homogeneousfunctions. Verify Euler's theorem for homogeneous functions of different degrees (simple cases).
33	Mon, 10-Mar	Fri, 14-Mar	5	INTRODUCTION TO NUMERICAL METHODS	1.Numerical Solution of Non-linear Equations 2.Numerical Quadrature	i) Describe importance of numerical methods. ii) Explain the basic principles of solving a non-linearequation in one variable. iii) Calculate real roots of a non-linear equation in onevariable by • bisection method, • regula-falsi method Use MAPLE command **fsolve** to find numerical solution of an equation and demonstrate through examples

						i) Define numerical quadrature. Use • Trapezoidal rule, • Simpson's rule, to compute the approximate value of definiteintegrals without error terms
34	Mon, 17-Mar	Sat, 22-Mar	5	INTRODUCTION TO NUMERICAL METHODS	1.Numerical Solution of Non-linear Equations 2.Numerical Quadrature	iv) Describe importance of numerical methods. v) Explain the basic principles of solving a non-linearequation in one variable. vi) Calculate real roots of a non-linear equation in onevariable by • Newton-Raphson method. Use MAPLE command trapezoid for trapezoidalrule and simpson for Simpson's rule and demonstrate through examples
35	Mon, 24-Mar	Sat, 29-Mar	00	Revision / Prelims Exams		
36	Mon, 31-Mar	Fri, 04-Apr	01			
37	Mon, 07-Apr	Sat,12-Apr	06			
38	Mon, 14-Apr	Sat,18-Apr	05			
Term-III Working Days- 57 Teaching Days - 42 Classes conducted 100%						
			137		**Syllabus Coverage =**	**100%**
				Prelims Examination		

Checked By HOD: _____