aglasem.com

FOR MANIPUR CLASS 12 PREPARATION

Manipur Board Class 12 Syllabus 2027 Mathematics

EXAM	YEAR	TYPE	SUBJECT
Manipur Class 12	2027	Syllabus	Maths

MATHEMATICS

CLASS - XII

One Paper *Time : 3 Hours* *80 Marks*

Units	Unitwise Weightage	Marks	Periods
I.	**Relations and Functions [8 marks]**		
	1. Relations and Functions	4	9
	2. Inverse Trigonometric Functions	4	9
II.	**Algebra [10 marks]**		
	1. Matrices	5	13
	2. Determinants	5	11
III.	**Calculus [35 marks]**		
	1. Continuity and Differentiability	8	18
	2. Applications of Derivatives	8	14
	3. Integrals	10	26
	4. Applications of Integrals	3	7
	5. Differential Equations	6	14
IV.	**Vectors and Three Dimensional Geometry [14 marks]**		
	1. Vectors	7	14
	2. Three dimensional Geometry	7	16
V.	**Linear Programming [05 marks]**	5	11
VI.	**Probability [8 marks]**	8	18
	Total :	**80**	**180**

Unit-I: Relations and Functions [8 marks]

1. Relations and Functions :

Types of relations, reflexive, symmetric, transitive and equivalence relations. Types of functions, injective (one-one), surjective (onto), bijective functions.

2. Inverse Trigonometric Functions :

Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions.

Unit-II: Algebra **[10 marks]**

Matrices :

Concept, notation, order, equality, types of matrices, zero-matrix, Identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operartions on matrics; Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2)

Invertible matrices & proof of the uniqueness of inverse, if it exists (here all matrices will have real entries)

Determinants :

Determinant of a square matrix (upto 3x3 matrices), minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

Unit-III: Calculus **[35 marks]**

1. Continuity and Differentiability :

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions like $\sin^{-1} x$, $\cos^{-1} x$, $\tan^{-1} x$, derivative of implicit function. Concept of exponential and logarithmic functions and their derivatives.

Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.

2. Applications of Derivatives :

Applications of derivatives : Rate of change, increasing/decreasing functions, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals :

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type to be evaluated.

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}},$$

$$\int \frac{(px+q)}{ax^2 + bx + c} dx, \int \frac{(px+q)}{\sqrt{ax^2 + bx + c}} dx, \int \sqrt{a^2 \pm x^2}\, dx \text{ and } \int \sqrt{x^2 - a^2}\, dx, \int \sqrt{ax^2 + bx + c}\, dx$$

Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. Applications of Integrals :

Application in finding the area under simple curves, especially lines, areas of circles, parabolas/ellipses (in standard form only).

5. Differential Equations :

Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equations of the type :

$\frac{dy}{dx} + p(x)y = q(x)$, where $p(x)$ and $q(x)$ are functions of x or constants

$\frac{dx}{dy} + p(y) = q(y)$, where $p(y)$ and $q(y)$ are functions of y or constants

Unit-IV: Vectors and Three dimensional Geometry [14 marks]

1. Vectors

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Definition, Geometrical Interpretation, Properties and application of scalar (dot) product of vectors, vector (cross) product of vector.

2. Three-dinensional Geometry :

Direction cosines and direction ratios of a line joining two points, Cartesian and Vector equation of a line, Skew lines, Shortest distance between two lines. Angle between Two Lines.

Unit-V: Linear Programming [5 marks]

1. Linear Programming :

Introduction, definition of related terminology such as constraints, objective function, optimization. Graphical method of solving linear programming problems in two variables, feasible and unfeasible regions (bounded or unbounded), feasible and unfeasible solution. Optimal solutions (upto three non-trivial constriants).

Unit-VI: Probability [8 marks]

1. Probability :

Multiplication theorem on probability, Conditional probability, independent events, total probability, Baye's theorem.

Appendix :

1. **Proofs in Mathematics :**

   Through a variety of examples related to mathematics & already familiar to the learner, bring out different kinds of proofs : direct, contrapositive, by contradiction, by counter example.

2. **Mathematical Modelling :**

   Modelling real-life problems where many constraints may really need to be ignored (continuing from Class XI). However, now the models concerned would use techniques/results of matrices, calculus and linear programming.

PRESCRIBED TEXTBOOK :

1. Mathematics Part-I
   Textbook for Class XII
   Published by : NCERT, New Delhi

2. Mathematics Part-II
   Textbook for Class XII
   Published by : NCERT, New Delhi

3. Mathematics Lab Manual Class XII
   Published by : NCERT, New Delhi

REFERENCE BOOKS :

1. A Textbook of Mathematics Book-II for Class XII
   By : S.N. Chhibber, G.D. Dhall & J.C. Nijhawan.
   Published by : Macmillan Publishers India Pvt. Ltd.

2. Modern's abc of Mathematics for Class XII
   By : J.P. Mohindru
   Published by : Modern Publishers, Jalandhar.

3. S.M.A.R.T. Minds Mathematics (Vol-I to III) for Class XII
   By : Parijat Jain
   Published by : VK Global Publications Pvt. Ltd., New Delhi.

——§§§——

DESIGN OF QUESTION PAPER

Subject : **MATHEMATICS**
Class : XII
Full Mark : 80
Time : 3 Hours

I — WEIGHTAGE TO OBJECTIVES:

Objectives	Marks	Percentage
Knowledge (K)	12	15
Understanding (U)	40	51
Application (A)	24	30
Skill (S)	04	04
Total:	**80**	**100**

II — WEIGHTAGE TO FORM OF QUESTIONS:

Form of Questions	No. of Question	Time (in minutes)	Marks	Percentage
Essay/Long Answer: (E/LA)	6	67	30	37
Short Answer (SA-I)	3	27	12	15
Short Answer (SA-II)	4	27	12	15
Short Answer (SA-III)	5	23	10	13
Very Short Answer(VSA)	6	13	6	7
MCQ	10	23	10	13
Total:	**34**	**180**	**80**	**100**

III — WEIGHTAGE TO CONTENT:

UNIT		CONTENTS	Marks	Percentage
I	1.1	Relations and Functions	4	5
	1.2	Inverse Trigonometric Functions	4	5
II	2.1	Matrices	5	6
	2.2	Determinants	5	6
III	3.1	Continuity and Differentiability	8	10
	3.2	Applications of Derivatives	8	10
	3.3	Integrals	10	12
	3.4	Applications of Integral	3	4
	3.5	Differential Equations	6	8
IV	4.1	Vectors	7	9
	4.2	Three - dimensional Geometry	7	9
V	5.1	Linear Programming	5	6
VI	6.1	Probability	8	10
		Total:	**80**	**100**

IV — SCHEME OF SECTIONS : NIL

V — SCHEME OF OPTIONS : Internal option in one SA-I (case study question), two in SA-II, one in SA-III and three in E/LA

VI — DIFFICULTY LEVEL :

Difficult : 30% of the total marks
Average : 50% of the total marks
Easy : 20% of the total marks

Special Instruction: 1) Two questions of MCQ will be Assertion-Reason type question.
2) First option will be (a) & second option will be (b) in the internal option

Abbreviation : K(Knowledge),U(Understanding),C(Comprehension), Exp.(Expression), Skill(S), E(Essay Type), SA (Short Answer Type), VSA (Very Short Answer Type), MCQ(Multiple Choice Question)

INTERNAL ASSESSMENT	20 MARKS
Periodic Tests (Best 2 out of 3 tests conducted)	10 Marks
Mathematics Activities/Project Works	10 Marks

Conduct of Periodic Tests:

Periodic Test is a Pen and Paper assessment which is to be conducted by the respective subject teacher. The format of periodic test must have questions items with a balance mix, such as, very short answer (VSA), short answer (SA) and long answer (LA) to effectively assess the knowledge, understanding, application, skills, analysis, evaluation and synthesis. Depending on the nature of subject, the subject teacher will have the liberty of incorporating any other types of questions too. The modalities of the PT are as follows:

a) Mode: The periodic test is to be taken in the form of pen-paper test.

b) Schedule: In the entire Academic Year, three Periodic Tests in each subject may be conducted as follows:

Test	Pre-Mid-Term (PT-I)	Mid-Term (PT-II)	Post Mid-Term (PT- III)
Tentative Month			

This is only a suggestive schedule and schools may conduct periodic tests as per their convenience.

c) Average of Marks: Once schools complete the conduct of all the three periodic tests, they will convert the weightage of each of the three tests into ten marks each for identifying best two tests. The best two will be taken into consideration and the average of the two shall be taken as the final marks for PT.

d) The school will ensure simple documentation to keep a record of performance

Assessment of Activity Work:

Throughout the year any 10 activities shall be performed by the student from the activities given in the NCERT Laboratory Manual for the respective class (XI or XII) which is available on the link: http://www.ncert.nic.in/exemplar/labmanuals.html a record of the same may be kept by the student. An year end test on the activity may be conducted

The weightage are as under:

- The activities performed by the student throughout the year and record keeping: 5 marks
- Assessment of the activity performed during the year end test: 3 marks
- Viva-voce: 2 marks

SUGGESTIVE TOPICS FOR PROJECT

MATHEMATICS

CLASS XII

1.	**RELATIONS AND FUNCTIONS:**
	Congruent modules
	Composite function and inverse functions
2.	**INVERSE TRIGONOMETRIC FUNCTION:**
	(i) $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}, \tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}, \sec^{-1} x + \operatorname{cosec}^{-1} x = \frac{\pi}{2}$
	(ii) $\sin^{-1} x \pm \sin^{-1} y = \sin^{-1}\left(x\sqrt{1-y^2} \pm y\sqrt{1-x^2}\right)$
	(iii) $\cos^{-1} x \pm \cos^{-1} y = \cos^{-1}\left(xy \mp \sqrt{1-x^2}\sqrt{1-y^2}\right)$
	(iv) $\tan^{-1} \mathrm{x} \pm \tan^{-1} \mathrm{y} = \tan^{-1}\left(\frac{\mathrm{x} \pm \mathrm{y}}{1 \mp \mathrm{xy}}\right)$
3	**MATRICES:**
	Questions based on word problems.
4	**DETERMINANT:**
	Properties of determinant and Cramer's Rule etc.
5	**CONTINUITY AND DIFFERENTIABILITY**
	Rolle's Theorem, Langrange's Mean Value Theorem
6	**APPLICATIONS OF DERIVATIVES:**
	Slope of tangent and normal to a curve, Equations of tangent and normal
7	**INTEGRALS:**
	Integration as limit of sum with diagram
8	**APPLICATIONS OF INTEGRALS :**
	Finding the area under simple curves y=sin x, y=cos x and between two circles, two parabolas, circle and parabola, Area of triangle with given vertices, etc.
9	**DIFFERENTIAL EQUATIONS :**
	Formation of Differential Equations
10	**VECTORS:**
	Vector application in derivation of trigonometric formulae like - $\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y, \cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$ $\frac{a}{Sin\ A} = \frac{b}{Sin\ B} = \frac{c}{Sin\ C}, \quad aCos\ B + bCosA = c, \quad etc.$
11	**THREE-DIMENSIONAL GEOMETRY :**
	Conditions of perpendicularity and parallelism of two straight lines, Shortest distance between parallel lines
12	**L.P.P.:**
	Formation of L.P.P.
13	**PROBABILITY:**
	Random variables and probability distribution of random variable