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FOR MANIPUR CLASS 11 PREPARATION

Manipur Board Class 11 Syllabus 2027 Mathematics

EXAM	YEAR	TYPE	SUBJECT
Manipur Class 11	2027	Syllabus	Maths

MATHEMATICS

CLASS - XI

Time : 3 Hours *80 Marks*

Units	Unitwise Weightage	Marks	Periods
I.	**Sets, Relations and Functions [23 marks]**		
	1. Sets, Relations and Functions	10	23
	2. Trigonometric Functions	13	29
II.	**Algebra [25 marks]**		
	1. Complex Number and Linear Inequalities	8	23
	2. Permutations, Combinations and Binomial Theorem	10	27
	3. Sequence and Series	7	16
III.	**Co-ordinate Geometry [12 marks]**		
	1. Straight Lines	6	14
	2. Circle, Conic Section and Introduction to Three-dimension Geometry	6	14
IV.	**Calculus [8 marks]**		
	Limits and Derivatives	8	12
V.	**Statistics and Probability [12 marks]**	12	22
	Total =	**80**	**180**

Unit-I: Sets, Relations and Functions [23 marks]

1. Sets

Sets and their representations, Finite and infinite sets, Empty set, Equal sets, Subsets, Subsets of the set of real numbers, especially intervals (with notations), Universal set, Venn diagrams, Complements of a set, Operation on sets (union and intersection and difference of sets).

2. Relations and Functions

Ordered pairs, Cartesian product of sets, Number of elements in the Cartesian product of two finite sets. The product sets $R \times R$ (or R^2) and $R \times R \times R$ (or R^3) where R is the set of real numbers.

Relation from one set to another, Pictorial diagrams, Domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation of a function, Domain, Co domain and range of a function. Real valued function and their domain and range. Some specific functions and their graphs including constant, identity, polynomial, rational, modulus, signum and greatest integer function. Sum, difference, product and quotients of real valued functions.

3. Trigonometric functions

Positive and negative angles, Measurement of angles, Sexagesemal system and circular system, Conversion from one system to another. Definition of trigonometric functions with the help of unit circle. Signs of trigonometric functions (Quadrant Rule). The identity $\sin^2 x+\cos^2 x = 1$. Graphs of trigonometric functions. To express $\cos(x \pm y)$ and $\sin(x \pm y)$ in terms of $\sin x$, $\sin y$, $\cos x$ and $\cos y$. Deducing identities like :

$$tan(x \pm y) = \frac{tanx \pm tany}{1 \mp tanxtany}, \cot(x \pm y) = \frac{cotxcoty \mp 1}{coty \pm cotx}$$

$$sin\alpha + sin\beta = 2sin\frac{\alpha+\beta}{2}\, cos\frac{\alpha-\beta}{2}; sin\alpha - sin\beta = 2cos\frac{\alpha+\beta}{2} sin\frac{\alpha-\beta}{2}$$

$$cos\alpha + cos\beta = 2cos\frac{\alpha+\beta}{2} cos\frac{\alpha-\beta}{2}; cos\alpha - cos\beta = -2sin\frac{\alpha+\beta}{2} sin\frac{\alpha-\beta}{2}$$

Identities related to $sin2x, cos2x, tan2x, sin3x, cos3x \text{ and } tan3x$

Unit-II: Algebra [25 marks]

1. Complex numbers.

Need for complex numbers. The fundamental imaginary $\sqrt{-1}$ unit (or i). Complex numbers in the form of a + ib, Real and imaginary parts of a complex number, Complex conjugates, Representation of a complex number by a point in a plane, Argand diagram, Modulus of a complex number, Algebra of complex numbers.

2. Linear Inequalities.

Linear inequalities, Algebraic solution of linear inequalities in one variable and their representation on the number line.

3. Premutations and Combinations.

Fundamental principle of counting, Factorial n where n is a non-negative integer, Permutation as an arrangement, Meaning of ${}^nP_r$ or $P(n,r)$, Permutations in which things (i) may be repeated (ii) are not all different. Combination, Meaning of ${}^nC_r$ or $C(n,r)$. Important properties of ${}^nP_r$ and ${}^nC_r$. Applications of permutations and combinations.

4. Binomial Theorem.

Bionomial theorem for a positive integral index (proof). Pascal's triangle, Simple Applications.

5. Sequence and Series.

Sequence and Series, A.M., Geometric progression (G.P.), First term, Common ratio, general term, sum to n terms of a G.P., Geometric Mean (G.M.), Relation between A.M. and G.M. Infinite G.P. and its sum.

Unit-III: Coordinate Geometry [12 marks]

1. Straight lines :

Brief recall of 2D geometry from earlier classes. Slope of a line and angle between two lines, various forms of equation of a straight line, Parallel to axes, slope-intercept form, point-slope form, two point form, intercepts form. Distance of a point from a line.

2. Conic Sections :

Definition, Equation of circle with given centre and radius, General equation of a circle, its centre and radius. Equation of a circle when the end points of a diameter are given.

Sections of a cone. Definition of a conic section (degenerated conic section). Equation of a conic section having given eccentricity, focus and directrix. Standard equation and simple properties of parabola, ellipse and hyperbola.

3. Introduction to Three-dimentional Geometry :

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points.

Unit-IV: Calculus [08 marks]

Limits and derivatives :

Idea of limit, Left hand and right hand limits, conditions for existence of limit. Fundamental Theorem on limit (statement only) and standard limits

(i) $\lim_{x\to a}\frac{x^n-a^n}{x-a}=na^{n-1}$ (with proof)

(ii) $\lim_{x\to 0}\frac{\sin x}{x}=1$ (with proof)

iii) $\lim_{x\to 0}\frac{e^x-1}{x}=1$ (with proof)

iv) $\lim_{x\to 0}\frac{\log(1+x)}{x}=1$ (with proof)

Derivative introduced as rate of change both as that of distance function and geometrically. Definition of derivative, relate it to slope of tangent to a curve; Derivative of sum, difference, product and quotient of functions. Derivative of polynomial and trigonometric functions.

Unit-V: Statistics and Probability [12 marks]

1. Statistics :

Measure of dispersion, Range, Mean deviation, Variance and Standard deviation of ungrouped/grouped data.

2. Probability :

Events, occurrence of events, “not”, “and” & “or” events, exhaustive events,

mutually exclusive events, Axiomatic (set theoretic) probability, connections with the theories of earlier classes**.** Probability of an event, probability of "not", "and" & "or" events.

Appendix :

1. **Infinite series :** Exponential and Logarithmic series.
2. **Mathematical Modelling :**

Consolidating the understanding developed upto Class X. Focus on modelling problems related to real life (like environment, travel, etc.) and connecting with other subjects of study where many constraints may really need to be ignored, formulating the model, looking for solutions, interpreting them in the problems situation and evaluating the model.

PRESCRIBED TEXTBOOK :

1. Mathematics
   Textbook for Class XI
   Published by : NCERT, New Delhi
2. Mathematics Lab Manual Class XI
   Published by : NCERT, New Delhi

REFERENCE BOOKS :

1. A Textbook of Mathematics Book-I for Class XI
   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 XI
   By : J.P. Mohindru
   Published by : Modern Publishers, Jalandhar.
3. S.M.A.R.T. Minds Mathematics (Vol-I to II) for Class XI
   By : Parijat Jain
   Published by : VK Global Publications Pvt. Ltd., New Delhi.

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DESIGN OF QUESTION PAPER

Subject : MATHEMATICS
Class : XI
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	Sets, Relations and Functions	10	13
	1.2	Trigonometric functions	13	17
II	2.1	Complex Numbers and Linear Inequalities	8	10
	2.2	Permutations & Combinations and Binomial Theorem	10	13
	2.3	Sequence and Series	7	8
III	3.1	Straight lines	6	7
	3.2	Circle, Conic Section and Introduction to Three dimensional Geometry	6	7
IV	4.1	Limits and Derivatives	8	10
V	5.1	Statistics and Probability	12	15
		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

CLASS-XI MATHEMATICS

S.No.	Content
	Unit-I: Sets and Functions
1.	**Sets**
	Practical problems on Union and Intersection of two sets.
2.	**Relations and Functions**
	Composition of Functions
3.	**Trigonometric Functions**
	General solution of trigonometric equations of the type sin y = sinα, cos y = cosα and tan y = tanα.
	Unit-II: Algebra
1.	**Principle of Mathematical Induction**
	Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.
2.	**(Complex Numbers and) Quadratic Equations**
	Polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations (with real coefficients) in the complex number system, cube roots of unity
3.	**Linear Inequalities**
	Graphical solution of linear inequalities in two variables. Graphical method of finding a solution of system of linear inequalities in two variables.
4.	**Binomial Theorem**
	General and middle term in binomial expansion. Properties of binomial co-efficients
5.	**Sequence and Series**
	Formulae for the following special sums $\sum_{k=1}^{n} k, \sum_{k=1}^{n} k^2, \sum_{k=1}^{n} k^3$
6	Idea of Logarithm, Anti-Logarithm and their applications
	Unit-III: Coordinate Geometry
1.	**Straight Lines**
	Normal form. General equation of a line.
2.	**Introduction to Three-dimensional Geometry**
	Section formula.
	Unit-IV: Calculus
1.	**Limits and Derivatives**
	Derivatives of composite functions (Chain rule).
	Unit-V Statistics and Probability
1.	**Probability**
	Random experiments; outcomes, sample space (set representation).