O'LEVEL MATHEMATICS

SYLLABUS

INTERIM JOINT MATRICULATION BOARD EXAMINATION (IJMBE)
ORDINARY LEVEL MATHEMATICS SYLLABUS (REVISED 2012)

Introduction:

This syllabus is for both teaching and examination, and is equivalent to Senior Secondary Certificate Examination (SSCE).

Students admitted into any of the affiliated colleges or any tertiary institution in general who do not hold the equivalent of SSCE credit in Mathematics are expected to score at least 40% in IJMB 'O' Level Mathematics to remedy their deficiencies.

In the examination the use of mathematical and statistical tables, and pocket calculators are permitted. Candidates are expected to bring mathematical instruments because they will not be allowed to borrow such instruments and other materials from other candidates in the examination hall. Graph papers as may be required will be provided during the examination.

Objective:

The IJMB 'O' Level Mathematics is aimed at testing among others, the students':

i. understanding of mathematical concepts and applications to everyday living
ii. ability to recognise mathematical problems and solve them
iii. computational skills and accuracy
iv. appropriate, logical and abstract thinking

Examination:

The examination will consist of two papers as follows:

Paper I: This will be a 40 question objective test lasting one hour fifteen minutes (1 hour 15 minutes). Candidates are expected to answer all the questions. This paper will be 40% of the total marks.

Paper II: This will contain nine (9) questions out of which candidates are expected to answer any six (6) questions in two hours (2 hours). This paper will carry 60% of the total marks.

First Semester:	**Duration:**
Topics 1 – 23	150hrs
Second Semester:	**Duration:**
Topics 24 – 31	138hrs

DETAILED SYLLABUS

FIRST SEMESTER

SECTION A: NUMBER AND NUMERATION

S/NO:	TOPICS / CONTENTS	ACTIVITIES / PRACTICAL GUIDE	DURATION
1.	FRACTIONS, DECIMALS AND PERCENTAGES The law of equivalence of common fractions. Basic processes applied to common fractions. Basic processes applied to decimal fractions. Relationship between percentages, common fractions and decimal fractions Fractions, ratios, decimals (terminating and recurring) and percentages Household arithmetic including budgeting, saving, rent, taxes, etc. Commercial arithmetic including profit and loss, interest, discount, commission, etc.	Illustrate equivalent fractions, common fraction and percentages, using squared paper and paper folding. Emphasize the interactions between the different fractional system, e.g. 0.5 x 1.2 is identical to $\frac{1}{2}$ x $1\frac{1}{5}$ and $\frac{1}{4}$ = 0.25 = 25% Express ratios as decimal fraction including simple cases of recurrence, e.g. $\frac{1}{4}$ = 0.25, $\frac{1}{3}$= 0.33 = 0.3 $\frac{1}{9}$ = 0.11 = 0.1, $\frac{3}{4}$ = 0.75 Conversion between fractions, decimal and percentages. **NOTE:** Decimal fractions should be largely confined to two places, e.g. 0.2 – 1.32 is inappropriate in mathematics and should be presented as 0.20 – 1.32. Extension of decimal places beyond 2. Enquiry into profit and loss in trading. Application to commerce generally. Rate of interest charged on short-term loan, e.g. N60 due a week later. Mention cheques, money order, postal orders, etc.	1week/6hrs
2.	APPROXIMATIONS Place value, approximation and significant figures	Revise place value. Discuss the need for approximation and reasons for degree of approximation. Consider many practical examples, e.g.: Population of a big city to nearest thousand, the population of a small city to the nearest ten. The height of a person to three significant figures.	1week/6hrs

		Students should be asked to produce many different examples. Caution should be exercised not to encourage false notion of accuracy, e.g. 1.3456. Mention should be made of equipment for measuring to a greater degree of accuracy when circumstances demand it, particular reference should be made to equipment available in the school science laboratory or to any being used by surveyor in the vicinity.	
3.	NUMBER BASES Operation in different number bases from 2 to 10. Conversion from one base to another	Illustrate the process of conversion of numbers from base 10 to other bases by successive division and keeping the remainder, e.g. convert 7 base 10 to a number in base 2, i.e.: 2 | 7 ----- R 2 | 3 ----- 1 2 | 1 ----- 1 0 ----- 1 ↑ therefore $7_{10} = 111_2$ Also give examples on how to convert from other number bases to base 10, e.g. $23_4 = 2 \times 4^1 + 3 \times 4^0$ $= 8 + 3$ $= 11_{10}$ Conversion from one base to another, this should be done via base 10, e.g. convert 23_4 to a number in base 2, i.e. $23_4 = 2 \times 4^1 + 3 \times 4^0$ $= 8 + 3$ $= 11_{10}$ and then 2 | 11 – R 2 | 5 – 1 2 | 2 – 1 2 | 1 – 0 ↑ 0 – 1 therefore $23_4 = 1011_2$ Conversion to include decimals.	1week/6hrs
4.	INDICES Laws of Indices Standard form	Basic arithmetic operations in different number base from 2 – 10. The laws of indices should be illustrated and simple examples	1week/6hrs

	Relationship between indices and logarithms, e.g. $y = 10^K \Leftrightarrow k = \log_{10} y$	involving negative and fractional indices should be given. i. $a^m \times a^n = a^{m+n}$ ii. $a^m \div a^n = a^{m-n}$ iii. $(a^m)^n = a^{mn}$ iv. $a^{m/n} = \sqrt[n]{a^n} = (\sqrt[n]{a^m})$, etc. Expressing of numbers in the form $a \times 10^b$ where $1 < a < 10$ and b is an integer Illustrate by example how some problems in logarithms could be solved by changing it to indices and vice versa.	
5.	LOGARITHMS Basic rules of logarithms, i.e. - $\log_{10}(PQ) = \log_{10}P + \log_{10}Q$ - $\log_{10}(P/Q) = \log_{10}P - \log_{10}Q$ - $\log_{10}P^n = n \log_{10}P$ - $\log_B{}^A = \frac{\log_C{}^A}{\log_C{}^B}$	Calculation involving multiplication, division, powers and square roots. Remember that the proofs of the rules are not required only application is needed Use of table of logarithms, base 10 logarithm and anti-logarithm tables	1week/6hrs
6.	SURDS Simplification and rationalization of simple surds	Surds of the form a , $a\sqrt{b}$, and $\sqrt{b}$ $\frac{1}{\sqrt{a} + \sqrt{b}}$ where a, is rational and b is a positive integer. Basic arithmetic operation should be perform on surds. Also note that $\sqrt{(a+b)} \neq \sqrt{a}+\sqrt{b}$, $\sqrt{(a-b)} \neq \sqrt{a}-\sqrt{b}$.	1week/6hrs
7.	**SETS** (i) Idea of sets, universal set, finite and infinite sets, subsets, empty sets and disjoint sets. Notation for union, intersection and complement of sets. (ii) Algebra of sets, commutative, associative and distributive properties Solutions of practical problems involving classification using Venn diagrams	Notations: $\in$, $\cap$, ϕ, { }, U, p^1 (the complement of p) or p^c. Difference of sets, e.g. A-B. Illustrate using simple examples of finite sets The use of Venn diagrams restricted to at most 3 sets	1week/6hrs

SECTION B: ALGEBRAIC PROCESSES

S/NO:	TOPICS / CONTENTS	ACTIVITIES / PRACTICAL GUIDE	DURATION
8.	ALGEBRAIC IDEAS AND PROCESSES Exercises involving both positive and negative rational numbers. Word problems involving simple algebraic fractions	Simplification and evaluation should only involve binomials and trinomials. Expressions of the following types: (i) $\frac{1-x}{2+y}, \frac{1}{u} + \frac{1}{v} = \frac{u+v}{uv}$ (ii) $\frac{6(1+x)}{3x+3}, \frac{3x^2}{x^2} + x = 14$ (iii) $2xy + 6x + 2y$ where $x = -2, y = 4$	2weeks/ 12hrs
	Expansion of binomials and trinomials with a result of not more than four terms	Exercises should include the following types: (a) $4a(ab + bc + 2ac)$ (b) $(a + b)(a + b)$ or $(a + b)^2$ (c) $(a + b)(a - b)$ or $a^2 - b^2$ (d) $(ax + b)(cx + d)$	
	Factorization of expressions with not more than four terms	Exercises should include the following types: (a) $x^2 + 5x + 6$ (b) $x^2 + 4x + 4$ (c) $ac + ad + bc + bd$ (d) $a^2 - 9$	
	Change of subject of a formula	Help the students to see factorization as the reverse process of expansion Revise solutions of simple equations. Work problems of the following types: If $3x = 5 + 2y$, find x or y in terms of the others $k = 2(a + b)$ (Expression for Perimeter of rectangle) then $k = 2a + 2b$ that is $2a = k - 2b$ $a = \frac{k - 2b}{2}$ or $\frac{1}{2}(k - 2b)$ Introduce examples to improve the skills of expansion and factorization	

	Relationship between indices and logarithms, e.g. $y = 10^K \Leftrightarrow k = \log_{10} y$	involving negative and fractional indices should be given. i. $a^m \times a^n = a^{m+n}$ ii. $a^m \div a^n = a^{m-n}$ iii. $(a^m)^n = a^{mn}$ iv. $a^{m/n} = \sqrt[n]{a^n} = (\sqrt[n]{a^m})$, etc. Expressing of numbers in the form $a \times 10^b$ where $1 < a < 10$ and b is an integer Illustrate by example how some problems in logarithms could be solved by changing it to indices and vice versa.	
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6.	SURDS Simplification and rationalization of simple surds	Surds of the form a , $a\sqrt{b}$, and $\sqrt{b}$ $\frac{1}{\sqrt{a} + \sqrt{b}}$, where a, is rational and b is a positive integer. Basic arithmetic operation should be perform on surds. Also note that $\sqrt{(a+b)} \neq \sqrt{a}+\sqrt{b}$, $\sqrt{(a-b)} \neq \sqrt{a}-\sqrt{b}$.	1week/6hrs
7.	**SETS** (i) Idea of sets, universal set, finite and infinite sets, subsets, empty sets and disjoint sets. Notation for union, intersection and complement of sets. (ii) Algebra of sets, commutative, associative and distributive properties Solutions of practical problems involving classification using Venn diagrams	Notations: $\in$, $\cap$, ϕ, { }, U, p^1 (the complement of p) or p^c. Difference of sets, e.g. A-B. Illustrate using simple examples of finite sets The use of Venn diagrams restricted to at most 3 sets	1week/6hrs

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	Expansion of binomials and trinomials with a result of not more than four terms	Exercises should include the following types: (a) $4a(ab + bc + 2ac)$ (b) $(a + b)(a + b)$ or $(a + b)^2$ (c) $(a + b)(a - b)$ or $a^2 - b^2$ (d) $(ax + b)(cx + d)$	
	Factorization of expressions with not more than four terms	Exercises should include the following types: (a) $x^2 + 5x + 6$ (b) $x^2 + 4x + 4$ (c) $ac + ad + bc + bd$ (d) $a^2 - 9$	
	Change of subject of a formula	Help the students to see factorization as the reverse process of expansion. Revise solutions of simple equations. Work problems of the following types: If $3x = 5 + 2y$, find x or y in terms of the others $k = 2(a + b)$ (Expression for Perimeter of rectangle) then $k = 2a + 2b$ that is $2a = k - 2b$ $a = \frac{k - 2b}{2}$ or $\frac{1}{2}(k - 2b)$ Introduce examples to improve the skills of expansion and factorization	

	Further factorization	Harder problems on factorization should include expressions of the types: (a) $4x^2 - 9y^2$ (b) $x^2 - y^2$ (c) $x^2 + 2\,2x - 8$ (d) $m^2 - 3n^2 + mn - 3nm$ In general, expressions should not exceed quadratics, but cubic of the form $x^3 - x$ or $x^3 - 5x^2 + 6x$ may be included	
9.	LINEAR EQUATIONS Linear equations in not more than 2 variables Linear inequalities	Solving linear equations by standard methods and graphically. Solution of word problems. Comparison of results obtained by graphical and algebraic methods Students should be introduced to solve inequalities by performing the same operations on both sides of the inequality Until the solution is obtained, e.g. If $-x < 3$, solve for x (add x to both sides) $x - x < 3 + x$ simplify $0 < 3 + x$ add -3 to both sides $-3 < 3 - 3 + x$ simplify $-3 < x$ or $x > -3$ Make comparison of results obtained by graphical and algebraic methods Graphing and identifying the regions making up the solution of linear inequalities. Solve and give harder exercises.	1week/6hrs
10.	LITERAL RELATIONS Change of subject of literal equations	Introduce literal equations with practical applications, example: $A = 2\pi r^2 + 2\pi rh$ Total surface area of cylinder. Find h in terms of A, r and π. Relate this to work done in mensuration	1week/6hrs
11.	ALGEBRAIC EQUATIONS Quadratic expression as the sum of the square of a linear	Students should observe the result of the expansion of expressions like	

	expression and a constant. Solution of equation by completing the square. Deducing formula from completion of square	$(x + a)^2$. Given an expression of this form $E = x^2 + ax$ Students should learn to find the constant term, k, which can be added to the expression so as to make the result a perfect square For example: $(x^2 + 6x) + 9 = (x + 3)^2$ This method of solving quadratic equations should be compared with the earlier methods used and the different methods be applied to the same equation	2weeks/ 12hrs
	Graphical solution of a pair of equations of the form $y = ax^2 + bx + c$ and $y = mx + k$. Use a quadratic graph to solve a related equation, e.g. Graphy of $y = x^2 + 5x + 6$ to solve $x^2 + 5x + 4 = 0$ Drawing of a tangent to a curve. Use of tangent to determine one variable	After drawing the two graphs, students should be able to recognise the points of intersection as the solutions of the equations Use of a set-square to draw tangents to curves at given points	
	Revise linear inequalities in one variable. Graphs of linear inequalities in two variables	Exercises should include practical problems where there are restrictions on two variables	
	Revision of factorization. Solution of quadratic equations using: (i) Factorization (ii) Completing the squares (iii) Formula (iv) Symmetric properties of the roots $\alpha + \beta = \frac{-b}{a}$ and $\alpha\beta = \frac{c}{a}$ (v) Graphical methods	Revise factorization and also the expansion of algebraic factors. Work problems using the fact that if the product of 2 numbers is zero, one of the numbers must be zero. Extend this to factors. Check solutions by substituting in the original equations. Work problems illustrating the use of the five methods of solving quadratic equations as stated in the content	
	Solutions of two simultaneous equations where one is linear and the other quadratic; using graphical methods	Solve the equation $f(x) = x^2 - 3x + 5$ by:	

		(i) Drawing the graph of f(x) and noting the intersection of the x - axis (ii) Setting f(x) = 0 5" that $x^2 = 3x - 5$
	Work problems based on linear and quadratic equations Quadratic equations	Draw graphs of x^2 and $3x - 5$ on the same scale. Obtain the x-coordinates of the intersections for the solutions. Compare the solutions in (i) and (ii) Solve the equations $y = 3x^2 - 4x + 9$ ..... (i) $y = 5x - 7$ ..... (ii)
	Algebraic solutions of problems on direct, inverse and partial variation. Joint variation	by equating (i) = (ii) to obtain $3x^2 + x - 2 = 0$ and then solve by completing the square. Solve problems in various areas such as science, commerce, economics, statistics and engineering linked with accuracy of results when comparing graphical and algebraic methods Use methods of factorization and graphical solutions. Students should be encouraged to explain solutions that must be rejected on practical grounds. The use of the graphical method where an expression cannot be factorised easily should be emphasized The mass, M, varies directly with the length, L is: M) L. (ii) $A \alpha \frac{1}{s}$, T α 1 S When the value of a variable y is proportional to the product of variables p and x, y is said to vary jointly as p and x, e.g. $I = \frac{PRT}{100}$
12.	POLYNOMIALS Addition, subtraction and multiplication of polynomials (not exceeding degree 3)	Define a polynomials as: $f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x^1 + a_0$ where a_i s are real numbers and 0 < i < n, x is a variable unknown and n is

		referred to as the degree of the polynomial. Use simple examples to illustrate the three operations.	1week/6hrs
	Factor Theorem and Remainder Theorem Zeros of a polynomial function ($n < 3$) Divide a polynomial of degree not greater than 3 by a polynomial of lesser degree	Examples should be worked for these two theorems, using polynomials of degree not greater than 3. Solve by: (i) Factorizing (ii) Trial and error (iii) Formula (iv) Use of graphs Work simple examples such as: Divide $3x^2 - 2x + 1$ by $x - 2$ and $4x^3 + 3x^2 - 2x + 1$ by $x^2 + 2x - 1$	
13.	PROGRESSIONS Definitions of Arithmetic Progression (A.P.). Use formula for nth term and sum of n terms of an A.P. Definition of a geometric progression (G.P.). Use formula for the nth term and the sum of n terms of a geometric series	Define an A.P., find the nth term, sum of the n terms. Application to compound interest and Hire Purchase Define what is G.P. Find the nth term and sum of the n terms. Also apply the concept of G.P. to finance with reference to Hire Purchase and compound interest	1week/6hrs
14.	BINARY OPERATIONS Binary operations: Properties of closure, inverse, identity, commutativity, associativity and distributivity	Check whether or not the sets N (the natural numbers) Z (the integers); Q (the rationals), R (the real numbers) are closed under the four rational operations. Repeat for the other three properties. Define a binary operation □ (+, -, x, ÷) on a sets as □ : A x A♠ A satisfying one or all of the properties of closure, commutativity, associativity and distributivity. Check that 0 is the identity element in Z (integers) with respect to addition, that 1 is the identity element of Q – (0) (non-zero rational numbers) with respect to multiplication	1week/6hrs
15.	MATRICES AND DETERMINANTS 2 x 2 matrices	Addition, subtraction and perform matrix multiplication of 2 x 2 matrices. Give examples to show that the multiplication of matrices is non-commutative, i.e. AB ≠ BA. Do simple applications of matrices. Give basic illustration of matrices as an example of linear transformation.	1week/6hrs

	2 x 2 and 3 x 3 matrices	Use determinants to calculate the area of a triangle given the coordinates of the three vertices. Define determinants as a volume or better still in two dimensions as an area as follows: Consider the general matrix $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ under A $\begin{pmatrix} 1 \\ 0 \end{pmatrix} \rightarrow \begin{pmatrix} a \\ c \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \end{pmatrix} \rightarrow \begin{pmatrix} b \\ d \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ $\begin{pmatrix} a+b \\ c+d \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 00 \end{pmatrix} \rightarrow \begin{pmatrix} 0 \\ \end{pmatrix}$	

SECTION C: PLANE GEOMETRY

S/NO:	TOPICS / CONTENTS	ACTIVITIES / PRACTICAL GUIDE	DURATION
16.	ANGLES AND PARALLEL LINES (i) Angle at a point add up to 360° (ii) Adjacent angles on a straight line are supplementary (iii) Vertically opposite angles are equa! (iv) Alternate angles are equal (v) Corresponding angles are equal (vi) Interior opposite angles are supplementary (vii) Intercept theorem	Proofs of these standard results are not required. Rather, students should know the results. Acute, Obtuse and Reflex angles are to be covered Application to proportional division of line segments in triangles	1week/6hrs
17.	TRIANGLES (i) The sum of the angles of a triangle is two right angles (ii) The exterior angle of a triangle equals the sum of the two interior opposite angles (iii) Congruent triangles (iv) Similar triangles (v) Special triangles	Proofs not required Conditions for congruency to be known Equiangular, ratio of sides and areas to be taught Isosceles, equilateral, right angled, scalene triangles and their properties	

			1week/6hrs
18.	QUADRILATERALS (i) Special quadrilaterals: Parallelogram, Rhombus, Rectangle Square and Trapezium (ii) Parallelograms on the same base and between the same parallels are equal in area	Proof not required. Applications in problems involving shapes	1week/6hrs
19.	POLYGONS (i) The sum of the angles of a polygon (ii) Properties of exterior angles of a polygon		1week/6hrs
20.	CIRCLES (i) The angle which an arc of a circle subtends at the centre is twice that which it substends on the remaining part of the circumference (ii) Angles in semi-circle is a right angle (iii) Angles in the same segment are equal (iv) Angles in opposite segments are supplementary (v) Perpendicularity of tangent and radius (vi) Angles in alternate segment	Proofs of basic theorems not required Cyclic quadrilateral chords	1week/6hrs

SECTION D: MENSURATION

S/NO:	TOPICS / CONTENTS	ACTIVITIES / PRACTICAL GUIDE	DURATION
21.	LENGTHS AND PERIMETERS (i) Lengths of arcs of circles (ii) Lengths of chords of circles (iii) Perimeters of sectors and segments of circles	$\ell = \frac{2\pi r\theta}{360^0}$ Use trigonometric ratios, where required, to determine lengths of chords. Work various examples on perimeter	1week/6hrs
22.	AREAS AND VOLUMES (i) Areas of triangles and special quadrilaterals (ii) Areas of circles, sectors and segments (iii) Surface areas and volumes of cubes, cuboids, cylinders, cones, pyramids, prisms, spheres and composite figures (iv) Volumes of similar solids	Relation between surface area of a cone and the sector of a circle	1week/6hrs
23.	THE EARTH AS A SPHERE (i) Lines of longitudes and latitudes (ii) Calculations of distances on the surface of the earth	Compare with the definitions in Geography and reconcile the two Treat simple examples. Work examples involving known places	1week/6hrs

150 hours

SECOND SEMESTER

SECTION E: CONSTRUCTION AND LOCI

S/NO:	TOPICS / CONTENTS	ACTIVITIES / PRACTICAL GUIDE	DURATION
1.	CONSTRUCTIONS (i) Bisectors of angles and line segments (ii) Line parallel / perpendicular to a given line (iii) Angles 90^{o}, 60^{o}, 45^{o}, 30^{o} (iv) Angle equal to a given angle (v) Triangles and Quadrilaterals	Draw thin lines, make arcs and curves to facilitate the use of protractors and a pair of compasses to measure angles	2weeks/ 12hrs
2.	LOCI (i) Parallel lines and perpendicular bisectors (ii) Angle bisectors (iii) Circles	Locus of points must be based on geometrical principles relating to parallel lines, perpendicular bisectors of lines, angle bisectors, etc.	2weeks/ 12hrs

SECTION F: TRIGONOMETRY

S/NO:	TOPICS / CONTENTS	ACTIVITIES / PRACTICAL GUIDE	DURATION
3.	SINE, COSINE AND TANGENT OF ANGLES (i) Sine, cosine and tangent of acute angles and their reciprocals. (ii) Use of trigonometric tables (iii) Trigonometric ratios of special angles, i.e. 30^o, 45^o, 60^o, etc. (iv) Sine, cosine and tangent of angles from 0^o to 360^o (v) Graphs of sine, cosine and tangent (vi) Sine and cosine rules	This can be explained by drawing a right angled triangle This can be discussed by drawing an isosceles right-angled triangle (in case of 45^o, etc.) This can be discussed by drawing a circle of unit radius and divided into four quadrants Plot the graph by taking the values of 0^o, $0^o < \varsigma < 360^o$ at interval The sine rule can be illustrated by drawing a triangle with two sides and an angle given, e.g. <ABC with a = 3cm, b = 5cm and <ABC = 70^o	2weeks/12hrs
4.	ANGLES OF ELEVATION AND DEPRESSION (i) Angles of elevation and depression (ii) Applications of angles of elevation and depression to heights and distances	Give examples of angles of elevation, e.g. angles of viewing the top of a building. Also give examples of angles of depression, e.g. viewing a person from the top of a tree	2weeks/12hrs
5.	BEARINGS (i) Bearing	Give examples of bearing in the form 035^o, $N50^oE$, 230^o, etc. Also use the sine or cosine rule to find the distances and heights of objects in problems involving bearing, e.g. the bearing of a town A from a town B is 40^o. If A is 160 km from B, how far north of A is B?	2weeks/12hrs

6.	TRIGONOMETRIC IDENTITIES AND EQUATIONS (i) Trigonometric identities, e.g. $Sin^2x + cos^2x = 1$, $1 + tan^2x = sec^2x$ (ii) Simplification of trigonometric expressions using identities	This can be demonstrated by using a right-angled triangle, e.g. equations of the form $sinx = 0.5$; $cosx = sin^2x + 1$ simple cases only	3weeks/18hrs

SECTION G: STATISTICS AND PROBABILITY

S/NO:	TOPICS / CONTENTS	ACTIVITIES / PRACTICAL GUIDE	DURATION
7.	STATISTICS (i) Importance of statistics and need for data collection (ii) Graphical presentation of data; frequency tables, pictograms, pie charts, line-graphs, bar charts, etc. (iii) Measures of central tendency; mean, mode and median for both grouped and discrete data (iv) Histograms, frequency polygon, curve, mode, cumulative frequency curve (Ogive). Median, quartiles and percentiles (v) Measures of dispersion; range, inter-quartile range, mean deviation and standard deviation from the mean, variance	Introduce realistic problem where decisions depend on data, e.g. 1. Conduct of examination depend on the data of registered students 2. Road improvement depends on data on road density Discuss the importance of data presentation in these forms, e.g. for easy visualization and analysis. Reading and drawing simple inferences from graphs and interpretations of data in histograms Examples for both the discrete and grouped cases should be used to determine these measures. The importance of each of these measures should be mentioned. Exclude unequal class interval. Use of assumed means should be discussed The mode of the distribution can be estimated from the histogram. The median of the distribution should be estimated from the cumulative frequency curve. Examples should cover both the discrete and grouped data The importance of these measures should be stressed	3weeks/18hrs

8.	PROBABILITY (i) Introduction to the occurrence of probability (chance) in everyday life (ii) Experimental and theoretical probability using a simple sample space (iii) Addition of probability for mutually exclusive and independent events (iv) Multiplication of probabilities for independent events	Encourage students to give examples of probability in everyday life A practical example of a sample space can be given, e.g. the set of all possible outcomes when a coin is tossed, or when a card is drawn from a deck students can be encouraged to give examples Include equally likely events, e.g. the probability of throwing a head with a fair coin. Interpretation of 'and' and 'or' in probability. Only simple cases should be treated	3weeks/18hrs
9.	**Revision**		4weeks/24hrs
		Total	**138hrs**

Recommended Texts / Reference Materials:

1. Adelodun, A.A. (2000): Distinction in Mathematics Comprehensiv Revision Text (3rd Edition). Ado-Ekiti, ENPL.

2. Ale, S.O. (1985): Essentials of Basic Mathematics. Ahmadu Bel University Press Limited, Zaria.

3. Lassa, P.N. and Ilori, S.A. (1995): Further Mathematics for Senic Secondary Schools. Ibadan University Press, Ibadan.

4. Macrae, M.F. et al (2001): New General Mathematics for Senic Secondary Schools (3rd Edition), Books 1 – 3. Pearson Education Limite Edinburgh Gate, Harlour, Essex.

5. MAN, (1991): Secondary Mathematics, Books 1 – 3. University Press Ibadan 6.NERDC (1998): Further Mathematics for Senior Secondar Schools. University Press, Ibadan.