

APPENDIX - AI
MADURAI KAMARAJ UNIVERSITY
(University with Potential for Excellence)

B. Sc. Mathematics (Semester)

REGULATIONS AND SYLLABUS

(This will come into force from the academic year 2018-2019)

1. INTRODUCTION OF THE PROGRAMME:

The goal of the course is to help students to develop a valuable mental ability – A powerful way of thinking that our ancestors have developed over three thousand years. This course is designed with particular students in mind. People who want to develop or improve mathematics – based analytic thinking for professional or general life purposes. To achieve this aim, the first year of the course has very little traditional mathematical content, focusing instead on the thinking processes require for mathematics. The second year of the course provides mathematical thinking to succeed in their major. The third year of the course engages in thinking about mathematical ideas. After completing the course, one can apply effective strategies of thinking to approach questions in their lives with insight and innovation. Finally any one can think more effectively and imaginatively throughout their lives.

2. ELIGIBILITY FOR ADMISSION

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu or any other Examination accepted by syndicate, as equivalent thereto, with Mathematics as one of the subjects in Higher Secondary Education.

2.1 DURATION OF THE COURSE :

The students shall undergo the prescribed course of study for a period of three academic years (Six semesters).]

2.2. MEDIUM OF INSTRUCTION

English/Tamil

3. OBJECTIVES OF THE PROGRAMME:

- To provide students with a systematic understanding of core areas and to offer the students a range of ways to develop their skills and knowledge
- To lay a foundation for a wide choice of careers and particularly careers requiring problem solving abilities
- To provide the foundation for higher education in Mathematics

Students must have earned 75% of attendance in each course for appearing for the examinations. Students who have earned more than 70% and less than 75% of attendance have to apply for condonation in the prescribed form with prescribed fee. Students who have earned more than 60% and less than 70% of attendance have to apply for condonation in the prescribed form with prescribed fee along with a medical certificate. Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after the completion of the programme.

12. QUESTION PAPER PATTERN

Part A

Each question carries equal marks

Ten objective type questions

10 x 1 = 10 marks

Two questions from each unit

Part B

Five questions (Either Or type)

5 x 7 = 35 marks

One question from each unit

Part C

Three questions out of five questions

3 x 10 = 30 marks

One question from each unit

13. SCHEME OF EVALUATION

The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points.

Mark statement contains $CCPA = \frac{\sum(\text{Marks} \times \text{Credits})}{\sum(\text{Credits})}$ where the summations cover all the papers appeared up to the current semester.

14. PASSING MINIMUM

The passing minimum is 40% (External minimum is 27 out of 75; No minimum for internal, but External + Internal should be at least 40)

14.1 Classification :

S.No.	Range of CCPA	Class
1.	40 & above but below 50	III
2.	50 & above but below 60	II
3.	60 & above	I

15. REVALUATION PROVISION

Candidates may apply for revaluation of the paper which was already valued, within ten days from the date of publication of the result in the university website along with required forms and fees.

16. TEACHING METHODOLOGY

Each subject is designed with lectures/assignments/peer team teaching/seminar etc. to meet effective teaching and learning.

17. TEXT BOOKS

List of text books will be given at the end of the syllabus of the each subject.

18. REFERENCE BOOKS

List of reference books are followed by the list of text books.

19. RE-TOTALING AND REVALUATION PROVISION

Students may apply for re-totaling and revaluation after declaration of result within 15 days.

20. TRANSITORY PROVISION

The candidates of previous syllabus scheme may be permitted to write exams in their own schemes up to the examinations of April 2020 as a transitory provision.

Subjects of Study in B. Sc (Mathematics)

Semester	Parts	Subjects	No.of. Courses	Hours per Six Working days	Credits	Max Marks
I	I	Tamil Paper I	1	6	3	100
	II	English Paper I	1	6	3	100
	III Core Subjects	1. Calculus	1	5	5	100
		2. Theory of Equations and Trigonometry	1	5	5	100
	Allied Subject I	Physics I	1	6	4	100
	IV Non Major Elective	Fundamentals of Mathematics	1	2	2	100
		Total		6	30	22

Semester	Parts	Subjects	No.of. Courses	Hours per Six Working days	Credits	Max Marks
II	I	Tamil Paper II	1	6	3	100
	II	English Paper II	1	6	3	100
	III Core Subjects	3. Differential Equations	1	5	5	100
		4. Analytical Geometry of 3D and Vector Calculus	1	5	5	100
	Allied Subject I	Physics II + Practical	2	6	3 + 1	100+100
	IV Non Major Elective	Quantitative Aptitude	1	2	2	100
		Total	7	30	22	700

Semester	Parts	Subjects	No.of. Courses	Hours per Six Working days	Credits	Max Marks
III	I	Tamil Paper III	1	6	3	100
	II	English Paper III	1	6	3	100
	III Core subject	5. Mechanics	1	6	6	100
	Allied Subject I	Physics III	1	6	4	100
	Allied Subject II	1. Programming in C	1	6	4	100
		Total	5	30	20	500

Semester	Parts	Subjects	No.of. Courses	Hours per Six Working days	Credits	Max. Marks
IV	I	Tamil Paper IV	1	6	3	100
	II	English Paper IV	1	6	3	100
	III Core subject	6. Basics of Analysis	1	6	6	100
	Allied Subject I	Physics IV + Practical	2	6	3 + 1	100+ 100
	Allied Subject II	2. Programming in C++ + Practical	2	6	3 + 1	100+ 100
		3. Extension Activities	1		1	
		Total	8	30	21	700

Semester	Parts	Subjects	No.of. Courses	Hours per Six Working days	Credits	Max. Marks
V	III Core Subjects	6. Modern Algebra	1	5	5	100
		7. Real Analysis	1	5	5	100
		8. Fundamentals of Statistics	1	5	5	100
		9. Operations Research	1	5	5	100
	Allied Subject II	2. Graph Theory	1	6	4	100
	IV Skill Based Subjects	1. Fourier Series and Laplace Transform	1	2	2	100
		2. Environmental Studies	1	2	2	100
		Total	7	30	28	700

Semester	Parts	Subjects	No.of. Courses	Hours per Six Working days	Credits	Max Marks	
VI	III Core Subjects	10. Linear Algebra	1	5	5	100	
		11. Complex Analysis	1	5	5	100	
		12. Statistics	1	5	5	100	
		13. Elective	1	5	4	100	
	Allied Subject II	3. Numerical Methods	1	6	4	100	
	IV Skill Based Subjects	3. Logic and Boolean Algebra	1	2	2	100	
		4. Value Education	1	2	2	100	
			Total	7	30	27	700

Syllabus for Core Subjects Paper 1 – CALCULUS

Objectives:

1. To introduce n^{th} derivative.
2. To introduce curvatures, evolutes and involutes.
3. To introduce double and triple integrals.

UNIT I

Differentiation: Definition (Only) - Successive differentiation - Trigonometrical transformation - Formation of equations involving derivatives - Leibnitz formula - Meaning of the derivative - Geometrical interpretation - Meaning of the sign of the differential coefficient - Expansion of functions - Taylor's theorem - Cauchy's form of remainder - Taylor's and Maclaurin's series.

UNIT II

Maxima and Minima of functions of two variables - Envelopes - Curvature - Circle, radius and centre of curvature - Cartesian formula for the radius of curvature - Coordinates of centre of curvature - Evolute and Involute.

UNIT III

Radius of curvature in polar coordinates - p-r equation - Pedal equation of a curve - Definite integrals and their properties.

UNIT IV

Reduction formula for $x^n e^{ax}$, $x^n \cos ax$, $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$, $\tan^n x$, $\sec^n x$, $x^m (\log x)^n$, $e^{ax} \cos bx$ - Bernoulli's formula - Evaluation of double integral- Double integral in polar coordinates - Triple integral.

UNIT V

Change of variables - Jacobian - Change of variable in case of two variables and three variables - Beta and Gamma functions - Properties of Beta function - Relation between Beta and Gamma functions.

Text Book:

T. K. M. Pillai and S. Narayanan, Calculus, Volume I, II, S. Viswanathan Publishing Company, 2012.

Unit I: Chapter III, IV- Sections 2.1, 2.2, Chapter VII

Unit II: Chapter VIII - Sections 4, 4.1, Chapter X upto Section 2.5

Unit III: Chapter X - Sections 2.6, 2.7, Volume II, Chapter 1 - Section 11

Unit IV: Volume II Chapter 1 - Sections 13, 14, 15-1 and Chapter 5-Sections 1, 2, 3, 4

Unit V: Chapter 6 - Sections 1, 2, Chapter 7 - Sections 1, 2, 3, 4

Reference Books:

1. Dr. S. Arumugam and Prof. A. Thangapandi Isaac, Calculus, New Gamma Publishing House, June 2014.
2. Shanthi Narayan, Dr. P. K. Mittal, Differential Calculus, S. Chand Publishing Company Ltd., 2005.

Paper 2 - THEORY OF EQUATIONS AND TRIGONOMETRY

Objectives:

1. To solve cubic and biquadratic equations
2. To find logarithm of complex numbers

UNIT I

Introduction about polynomials, equations - Remainder theorem - Imaginary roots - Irrational roots - Relation between roots and coefficients of equations - Symmetric functions of the roots - Sum of powers of roots of an equation - Newton's Theorem.

UNIT II

Transformations of equations - Roots with signs changed - Roots multiplied by a given number - Reciprocal roots - Reciprocal equation - Increase and decrease the roots of a given equation by a given quantity - Removal of terms - Equations whose roots are any power of the roots of a given equation.

UNIT III

Descarte's rule - Rolle's theorem - Multiple roots - Strum's theorem - Newton's method of divisors - Horner's method.

UNIT IV

General solution of cubic equations - Cardon's Method - Ferrari's method of solving biquadratic equations - Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Examples on formation of equations - Expansion of $\sin^n \theta \cos^n \theta$, $\sin^n \theta \cos^m \theta$.

UNIT V

Expansion of $\sin \theta$, $\cos \theta$, $\tan \theta$ in powers of θ - Hyperbolic functions - Relation between hyperbolic functions - Inverse hyperbolic functions - Logarithm of complex quantities.

Text Books:

1. T. K. M. Pillai, T. Narayanan and K. S. Ganapathy, Algebra, Volume I, S. Viswanathan Publishing Company, 2012.
2. T. K. M. Pillai and S. Narayanan, Trigonometry, S. Viswanathan Publishing Company, 2009.

Reference Books:

1. Dr. S. Arumugam and Prof. A. Thangapandi Isaac, Classical Algebra Theory of Equations, New Gamma Publishing House, July 2016.
2. Dr. S. Arumugam and Prof. A. Thangapandi Isaac, Trigonometry, New Gamma Publishing House, November 2017.
3. Hari kishan, Theory of equations, Atlantic publishers and Distributers Pvt Ltd, December 2013.

Paper 4 – VALUE EDUCATION
(Syllabus Common to All Undergraduate Courses)

NON-MAJOR ELECTIVE
FUNDAMENTALS OF MATHEMATICS

Objectives:

1. To introduce important elementary concepts of mathematics for non-mathematics students
2. To develop computational skills

UNIT I

Numbers: Operations on numbers, Tests of divisibility.

UNIT II

Simplifications: BODMAS Rule, Modulus of a real number, Virnaculum.

UNIT III

Problems on Numbers, Problems on Ages.

UNIT IV

Percentage: Concept of percentage, Results on population, Results on depreciation.

UNIT V

Profit and Loss: Cost price, Selling price, Profit or gain, Loss.

Text Book:

R.S. Aggarwal, Quantitative Aptitude, S. Chand and Company Ltd., New Delhi, 2017.

Reference Books:

1. Dr.M.Manoharan, Dr.C.Elango and Prof K.L.Eswaran, Business Mathematics, Palani paramount Publications, Reprint 2013.
2. G. K. Ranganath, C. S. Sampangiram, Y. Rajaram, Text Book of Business Mathematics, Himalaya Publishing House, 2017.

B.SC., ANCILLARY PHYSICS (SEMESTER) SYLLABUS

CREDIT – 4

SEMESTER – I

PAPER I : MECHANICS, PROPERTIES OF MATTERS AND SOUND

Unit I:

Forces in nature – Central forces – Gravitational and electromagnetic – Conservative and Non-Conservative forces – Examples – Nuclear force – Friction – Angle of friction – Motion of bodies along an inclined plane – Work done by a force – Work done by a varying force – Expression for Kinetic energy – Expression for potential energy – Power.

Unit II:

Angular velocity – Normal acceleration (no derivation) – Centrifugal and Centripetal forces – Torque and angular acceleration – Work and power in rotational motion – Angular momentum – K.E of rotation – Moment of Inertia – Laws of parallel and Perpendicular axes theorems – M.I of circular ring, Circular Disc, Solid sphere, hollow sphere and cylinder.

Unit III:

Kepler's laws of planetary motion – Laws of Gravitation – Boy's method for G – Compound pendulum – Expression for period – Experiment to find g – Variation of g with latitude, altitude and depth – Artificial Satellites.

Unit IV:

Elastic moduli – Poisson's ratio – beams – Expression for bending moment – Determination of Young's modulus by uniform and non-uniform bending – I section girders. Torsion – Expression for couple per unit twist – Work done in twisting – Torsional pendulum – Derivation Poiseuille's formula (analytical method) – Bernoulli's theorem – Proof of Application – Venturimeter – Pitot tube.

Unit V:

Simple harmonic motions – Progressive Waves Properties – Composition of Two S.H.M and beats stationary waves – Properties – Melde's experiments for the frequency of Ultrasonic – Properties and Application.

Reference Books

1. Mechanics by D.S. Mathur – S. Chand & Co., 2008.
2. Properties of matter by Brijlal & N. Subramanyam 2004, S. Chand.
3. A Text Book of Sound by Brijlal & N. Subramanyam, S. Chand & Co 2004.
4. University Physics by Sears Zemansky and Gound, 6th edition (Naresa Publishing House, Chennai 1996)