THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: I/III **Paper type: Allied**

Paper code: A – 01 **Name of the Paper: ALLIED MATHEMATICS – I** **Credit:4**

(For B.Sc., Physics , Chemistry, Computer Science and Statistics)

Total Hours per Week: 7 Lecture Hours: 7 Tutorial Hours: ….. Practical Hours: …..

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Course Objective

1. To explore the fundamental concepts of Mathematics.
2. To acquire knowledge about finding approximate roots of the polynomial equations.
3. To improve students' ability in applications of matrices and calculus.
4. Students are exposed to understanding the concept of derivatives and their applications.
5. To expose double and triple integrals and their applications.

Course Outcomes

1. After studied unit -1, the student will be able to find out the approximate roots of polynomial equations.

2. After studied unit -2, the student will be able to develop the skills of finding roots of simultaneous equations.

3. After studied unit -3, the student will be able to demonstrate knowledge about matrices and their applications.

4. After studied unit -4, the student will be able to carry out calculations of problems related to curvature and radius of curvature.

5. After studied unit -5, the student will be able to evaluate double and triple integrals, and enabled to understand the applications of integration in real-life situations.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I: SOLUTIONS OF TRANSCENDENTAL AND ALGEBRAIC EQUATIONS

Iteration method**,** Bisection method, Newton's method - Regula Falsi method, Horner's method(without proof) (Simple problems only)

Unit-II: SOLUTIONS OF SIMULTANEOUS EQUATIONS

Gauss Elimination method - Gauss Jordan method - Gauss Seidel Iterative method - Gauss Jacobi method (Restricted to three variables only) (Simple problems only)

UNIT-III: MATRICES

Characteristic equation of a square matrix– Eigen values and eigen vectors – Cayley – Hamilton theorem [without proof] – Verification and computation of inverse matrix-

UNIT-IV: DIFFERENTIAL CALCULUS

n-th derivatives – Leibnitz theorem [without proof] and applications – Jacobians– Curvature and radius of curvature in Cartesian co-ordinates and polar co-ordinates.

UNIT-V: APPLICATION OF INTEGRATION

Evaluation of double, triple integrals – Simple applications to area, volume, and centroid.

TEXT BOOKS:

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.
   Unit-I: Chapter 1
   Unit-II: Chapter 2

2. P. Duraipandian and Dr. S. Udayabaskaran (1997), "Allied Mathematics" , Vol I & II. Chennai: Muhil Publishers.
   Unit-III: Sec(1.1.1,1.1.2,1.2,1.4.3),
   Unit-IV: Sec(2.7,4.1,4.1.1,4.2),
   Unit-V: Chap:3(3.4,3.4.1,3.5,3.5.1,3.5.2,3.6),

REFERENCE BOOKS:

1. P. Balasubramanian and K. G. Subramanian. 1997, "Ancillary Mathematics", Vol I & II. New Delhi: Tata McGraw Hill.
2. S.P.Rajagopalan and R.Sattanathan(2005), "Allied Mathematics", Vol I & II. New Delhi: Vikas Publications.
3. S.J.Venkatesan, "Allied Mathematics - I", Sri Krishna Publications, Chennai.
4. P. R. Vittal (2003), "Allied Mathematics", Margham Publication, Chennai.
5. A.Singaravelu "Numerical Methods"Meenakshi Publications

Course Material: website links, e-Books and e-journals

https://www.classcentral.com/course/polynomials-roots-44577
https://ocw.mit.edu/courses/22-15-essential-numerical-methods-fall-2014/pages/syllabus/
https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/
https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	S	M	S	S	M
CO2	M	S	S	S	S	S	S	M	M	S
CO3	M	S	S	S	S	S	M	S	S	S
CO4	S	S	S	M	S	S	M	M	M	S
CO5	S	M	S	M	M	M	M	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: II/IV **Paper type: Allied**

Paper code: A – 02 Name of the Paper: PAPER – 2 – ALLIED MATHEMATICS –II Credit:4

(For B.Sc., Physics , Chemistry, Computer Science and Statistics)

Total Hours per Week: 7 Lecture Hours: 7 Tutorial Hours: ….. Practical Hours: …..

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Course Objective

1. This course is designed for the students to expose the topics such as expansions of trigonometric functions, partial differential equations, vector differentiation, and integration.
2. To gain knowledge of expansions of trigonometric functions.
3. To acquire the knowledge of solving partial differential equations.
4. Basic knowledge of vector calculus.
5. To understand and carry out the calculations of a given set of data.

Course Outcomes

1. After studied unit -1, the student will be able to find out the expansions of trigonometric functions and carry out problems related to hyperbolic and inverse hyperbolic functions.
2. After studied unit -2, the student will be able to provide a basic knowledge of partial differential equations and develops knowledge on handling practical problems.
3. After studied unit -3, the student will be able to demonstrate knowledge of solving problems involving vector and scalar functions.
4. After studied unit -4, the student will be able to carry out problems on vector integration.
5. After studied unit -5, the student will be able to understand the applications of differentiation and integration in real-life situations.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	No	Yes	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

UNIT-I:TRIGONOMETRY

Expansions of $\sin^n\theta$, $\cos^n\theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ – Expansions of $\sin\theta$, $\cos\theta$, $\tan\theta$ in terms of θ – Hyperbolic and inverse hyperbolic functions – Logarithms of complex numbers.
Unit-I: Chap: 6 (6.1,6.1.1-6.1.3,6.2,6.2.1-6.2.3,6.3,6.4)

UNIT-II: PARTIAL DIFFERENTIAL EQUATIONS

Formation-complete integrals and general integrals-Four standard types-Lagranges equations.
Unit-II: Chap:6 (6.1,6.1.1,6.2,6.3,6.4).

UNIT-III: VECTOR DIFFRENTIATION

Vector functions- Derivative of a vector function- Scalar and vector point functions- Gradient of a scalar point function- Gradient- Directional derivatives –Unit vector normal to a surface – angle between the surfaces-divergence, curl.
Unit-IIISec(8.1,8.1.1,8.2,8.3,8.3.1,8.3.2,8.4,8.4.1,8.4.2,8.4.3,8.4.4).

UNIT-IV: VECTOR INTEGRATION

Green's theorem in the plane- Gauss divergence theorem- Stoke's theorem [without proofs].
Unit-IV:Sec(8.6.1, - 8.6.3).

UNIT-V: FINITE DIFFERENCES

Operator E, Relation between Δ , ∇ and E – Interpolation – Newton – Gregory forward & backward formulae for interpolation-Lagrange's interpolation formula for unequal intervals(without proof) .
Unit-V:Sec(5.1,5.2).

TEXT BOOK:
1.P. Duraipandian and S. Udayabaskaran(1997), "Allied Mathematics", Vol I & II. Chennai: Muhil Publishers.
Unit-I: Chap: 6 (6.1,6.1.1-6.1.3,6.2,6.2.1-6.2.3,6.3,6.4), Vol I,
Unit-II: Chap:6 (6.1,6.1.1,6.2,6.3,6.4), Vol II,
Unit-IIISec(8.1,8.1.1,8.2,8.3,8.3.1,8.3.2,8.4,8.4.1,8.4.2,8.4.3,8.4.4),Vol I,
Unit-IV:Sec(8.6.1, - 8.6.3), Vol I,
Unit-V:Sec(5.1,5.2), Vol II.

REFERENCE BOOKS:

1. P. Balasubramanian and K. G. Subramanian. 1997, "Ancillary Mathematics", Vol I & II. New Delhi: Tata McGraw Hill.
2. S.P.Rajagopalan and R.Sattanathan(2005), "Allied Mathematics", Vol I & II. New Delhi: Vikas Publications.
3. S.J.Venkatesan, "Allied Mathematics - II", Sri Krishna Publications, Chennai.
4. P. R. Vittal (2003), "Allied Mathematics", Margham Publications, Chennai.
5. P.Kandhasamy, K. Thilagavathy (2003), "Allied Mathematics" Vol I & II, New Delhi: Tata McGraw Hill.
6. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

Course Material: website links, e-Books and e-journals
https://tutorial.math.lamar.edu/Extras/AlgebraTrigReview/AlgebraTrig.aspx

https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/
https://www.engineering.iastate.edu/student-services/orientation/math-142-trigonometry-analytical-geometry/
https://www.classcentral.com/course/edx-differential-equations-fourier-series-and-partial-differential-equations-11763
https://www.classcentral.com/course/vector-calculus-engineers-17387
https://www.classcentral.com/course/brilliant-vector-calculus-59277

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	M	M	M	M
CO2	M	M	M	S	S	S	M	S	S	M
CO3	S	S	S	S	M	M	S	S	M	S
CO4	M	S	S	S	S	M	M	M	M	M
CO5	S	S	S	M	M	M	M	M	M	M

PO – Programme Outcome CO – Course outcome

S – Strong M-Medium L – Low (may be avoided)