

ST. ALOYSIUS COLLEGE (AUTO), JABALPUR
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
2021-22
BACHELOR IN SCIENCE (B.Sc.)

Course Code	S1-MATH 1T
Course Title	Algebra, Vector Analysis and Geometry
Course Type	Core Course
Pre- requisite (if any)	To study this course a student must have had the subject Mathematics in class 12th
Course Learning Outcomes	The course will enable the student to: <ul style="list-style-type: none"> 1. Recognize consistent and inconsistent systems of linear equation by the row, echelon from the augmented matrix, using the rank of matrix 2. To find the Eigen values and corresponding Eigen vectors for a square matrix. 3. Using the knowledge of vector calculus in geometry 4. Enhance the knowledge of three dimensional geometrical figure(eg. Cone and cylinder)
Credit Value	Theory : 6
Total Marks	Max. Marks 25+75

Unit	Topics	No. of Lectures
I	1.1 Historical Background : 1.1.1. Development of Indian Mathematics: Later Classical Period(500-1250) 1.1.2. A brief biography of Varahamihira and Aryabhatta 1.2 Rank of a Matrix 1.3 Echelon and Normal Form of Matrix 1.4 Characteristic Equations of a Matrix 1.4.1 Eigen values 1.4.2 Eigen vectors	15
II	2.1 Cayley's Hamilton Theorem 2.2 Application of Cayley's Hamilton Theorem to find the inverse of a matrix 2.3 Application of Matrix to solve a System of linear equations 2.4 Theorems on consistency and inconsistency of a system of linear equations 2.5 Solving linear equations up to three unknowns	18

Revised

Pratibha

Adarsh *Alka* *Spain*

	2.6	Introduction to Congruence Modulo, Addition & Multiplication of Congruence Modulo. Its Applications	
III	3.1 3.2 3.3 3.3.1 3.3.2 3.4 3.5 3.6 3.7	Scalar and Vector product of three and four vectors Reciprocal vectors Vector differentiation Rules of differentiation Derivative of triple products Gradient, Divergence and Curl Directional derivatives Vector identities Vector equations	18
IV	4.1 4.2 4.3 4.4	Vector Integration Gauss theorem (without proof) and problems based on it. Green theorem (without proof) and problems based on it. Stoke theorem (without proof) and problems based on it.	15
V	5.1 5.2 5.3 5.4 5.4.1 5.4.2 5.4.3 5.4.4 5.5 5.5.1 5.5.2 5.5.3	General equation of second degree Tracing of conics System of conics Cone: Equation of cone with given base generators of cone condition for three mutually perpendicular generators Right circular cone Cylinder Equation of cylinder and its properties Right Circular Cylinder, Enveloping Cylinder	24
Text Books, Reference Books, Other Resources			

Suggested Reading

Text Books:

1. K.B. Datta: Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi 2000
2. Shanti Narayan- A Text Book of Vector Calculus, S. Chand & Co., New Delhi. 1987.
3. S.L. Loney- The Elements of Coordinate Geometry Part -I New Age International (P) Ltd. Publishers, New Delhi 2016
4. P. K. Jain and Khalil Ahmad- A Text Book of Analytical Geometry of Three Dimensions Willey Eastern Ltd., 1999.

Mandvi

Adarsh

Pratibha

Arjun Jain

5. Gerard G. Emch.R. Sridharan M.D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency Vol. 3,2005
6. मध्यप्रदेश हिंदी ग्रंथ अकादमी की पुस्तके ।

Reference Books:

1. **Chandrika Prasad:** A Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd.,Allahabad, 2017
2. **N. Jacobson :** Basic Algebra Vol. I and II, W.H.Freeman.2009.
3. **I.S.Luther and I.B.S. Passi:** Algebra Vo. I and II, Narosa Publishing House 1997.
4. N.Saran and S.N. Nigam- Introduction to Vector Analysis, Pothishala Pvt. Ltd. Allahabad 1990.
5. Murray R. Spiegel- Vector Analysis, Schaum Publishing Company.,New York,2017
6. Gorakh Prasad and H.C. Gupta- Text Book on Coordinate Geometry, Pothishala Pvt. Ltd. Allahabad 2000
7. P. K. Jain and Khalil Ahmad- A Text Book of Analytical Geometry of Two Dimensions Macmillan India Ltd.,1994.
8. S.L.Loney- The Elements of Coordinate Geometry,Part-2 Macmillan,1923.
9. N.Saran and R.S. Gupta- Analytical Geometry of Three Dimension, Pothishala Pvt. Ltd. Allahabad .1994.
10. R.J.T. Bell- Elementary Treatise on Coordinate Geometry of Three Dimensions, Macmillan India Ltd.,1994
11. Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House 1962

Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **100**

Continuous Comprehensive Evaluation (CCE): **25 Marks**

University Exam (UE): **75 Marks**

Internal Assessment:	Class Test	15
Continuous Comprehensive Evaluation (CCE)	Assignment/Presentation	10
		Total Marks: 25
External Assessment:	Section (A): Three Very Short Questions	$03 \times 03 = 09$
University Exam (UE)	(50 Words Each)	
Time: 02.00 Hours	Section (B): Four Short Questions	$04 \times 09 = 36$
	(200 Words Each)	
	Section (C): Two Long Questions	$02 \times 15 = 30$
	(500 Words Each)	Total Marks: 75

Handwritten signature

Handwritten signature

Handwritten signature

ST. ALOYSISUS' COLLEGE (AUTONOMOUS)
JABALPUR, M. P., INDIA
 Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
 College with Potential for Excellence by UGC
 DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)
2021-22

Course Code	S1-MATH 2T
Course Title	Calculus differential equation (paper 2)
Course Type	Core Course
Pre- requisite (if any)	To study this course a student must have had the subject Mathematics in class 12 th
Course Learning Outcomes	The course will enable the student to: <ol style="list-style-type: none"> 1. Sketch curves in a plane using its mathematical in the different coordinate system of reference. 2. Using the derivatives in Optimization Social sciences, Physics and Life sciences etc. 3. Formulate the Differential equations for various Mathematical models. 4. Using techniques to solve and analyze various Mathematical models.
Credit Value	Theory : 6
Total Marks	Max. Marks 25+75 min passing marks 33

Unit	Topics	No. of Lectures
I	1.1 Historical Background : <ol style="list-style-type: none"> 1.1.1. Development of Indian Mathematics: Ancient and Early Classical Period (till 500 CE) 1.1.2. A brief biography of Bhaskaracharya (with special reference to Lilavati and Madhava) 1.2 Successive differentiation <ol style="list-style-type: none"> 1.2.1 Leibnitz theorem 1.2.2 Maclaurin's series expansions 1.2.3 Taylor's series expansions 1.3 Partial Differentiation <ol style="list-style-type: none"> 1.3.1 Partial derivative of higher order 1.3.2 Euler's theorem on homogeneous functions 1.4 Asymptotes <ol style="list-style-type: none"> 1.4.1 Asymptotes of algebraic curves 1.4.2 Conditions for existence of Asymptotes 1.4.3 Parallel Asymptotes 1.4.4 Asymptotes of polar curves 	15
II	2.1 Curvature	

Handwritten signatures:
 Handely
 Aruna Pratibha
 Ajay
 Saini

	2.1.1 Formula of radius of Curvature 2.1.2 Curvature at origin 2.1.3 Centre of Curvature 2.2 Concavity and Convexity 2.2.1 Concavity and convexity of curves 2.2.2 Points of inflexion 2.2.3 Singular point 2.2.4 Multiple points 2.3 Tracing of curves 2.3.1 Curves represented by Cartesian Equation 2.3.2 Curves represented by Polar Equations	18
III	3.1 Integration of transcendental functions 3.2 Introduction to Double and Triple Integral 3.3 Reduction formulae 3.4 Quadrature 3.4.1 For Cartesian coordinates 3.4.2 For Polar coordinates 3.5 Rectification 3.5.1 For Cartesian coordinates 3.5.2 For Polar coordinates	18
IV	4.1 Linear differential equations 4.1.1 Linear equations 4.1.2 Equations reducible to the linear form 4.1.3 Change of variables 4.2 Exact differential equations 4.3 first order and higher degree equations 4.3.1 Equation solvable for x, y and p 4.3.2 Equations homogeneous in x and y 4.3.3 Clairaut's equation 4.3.4 singular solutions 4.3.5 geometrical meaning of a differential equation 4.3.6 Orthogonal trajectories	18
V	5.1 Linear differential equation with constant coefficients 5.2 Homogeneous linear ordinary differential equations 5.3 Linear differential equations of second order 5.4 Transformation of equations by changing the dependent variable/ independent variable 5.5 Method of variation of parameters.	18
	Text Books, Reference Books, Other Resources	

Suggested Reading

Text Books:

1. Gorakh Prasad- Differential Calculus, Pothishala Private Ltd., Allahabad.
2. Gorakh Prasad- Integral Calculus, Pothishala Pvt. Ltd. Allahabad.

Handwritten signatures: Handing, Prashant, Adarsh, Alka, Sparsh

3. M. D. Raisinghanianar: Ordinary and Partial Differential equations. S. Chand & Co Ltd.2017
4. Gerard G. Emch.R. Sridharan M.D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency Vol. 3,2005
5. मध्यप्रदेश हिंदी ग्रंथ अकादमी की पुस्तके ।

Reference Books:

1. N.Piskunov - Differential and Integral Calculus, CBS Publishers,1996 .
2. G.F. Simmons- Differential Equation, Tata McGraw Hill, 1972.
3. E.A.Codington- An Introduction to ordinary differential Equation, Prentice Hall of India, 1961.
4. D.A.Murray- Introductory Course in Differential Equations, Orient Longman(India) 1967.
5. H.T.H. Piaggio- Elementary Treatise on Differential Equations and their Application, C.B.S. Publisher & Distributors, Delhi, 1985
6. Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House 1962

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	100	
Continuous Comprehensive Evaluation (CCE):	25 Marks	
University Exam (UE):	75 Marks	
Internal Assessment:	Class Test	15
Continuous Comprehensive Evaluation (CCE)	Assignment/Presentation	10
		Total Marks: 25
External Assessment:	Section (A): Three Very Short Questions	$03 \times 03 = 09$
University Exam (UE)	(50 Words Each)	
Time: 02.00 Hours	Section (B): Four Short Questions	$04 \times 09 = 36$
	(200 Words Each)	
	Section (C): Two Long Questions	$02 \times 15 = 30$
	(500 Words Each)	
		Total Marks: 75

Handwritten signatures and notes:

Handwritten: *Handwritten*

Handwritten: *Handwritten*

Handwritten: *Handwritten*

Handwritten: *Handwritten*