



C. U. SHAH UNIVERSITY



**C. U. SHAH UNIVERSITY
WADHWAN CITY
FACULTY OF SCIENCES**

B.Sc.

SEM - II

**Syllabi (CBCS)
Mathematics**



C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.

SEMESTER: II

SUBJECT NAME: Mathematics-II

SUBJECT CODE: 4SC02MAT1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester								
Th	Tu	Pr	Total		Theory				Practical				Total Marks
					Sessional Exam		University Exam		Internal		University		
					Marks	Hrs	Marks	Hrs	Pr	TW			
4	0	0	4	4	30	1.5	70	3	--	--	--	100	

Objectives: -The main objective of this course is

- To learn Cones, Cylinders.
- To learn Conicoids and Cartesian co-ordinate.
- To learn Higher order linear differential equations.
- To learn algebra of a complex number.
- To calculate the roots of any complex number.
- To learn Complex functions.

Prerequisites:-

Students must be familiar with the properties of functions, the algebra of functions, and the graphs of functions. Students should have basic knowledge differential equations. Also they should have basic knowledge of complex numbers of at least 10+2 level.



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Course outline:-

Sr. No.	Course Contents	Hours
1	Definition of a cone, vertex, guiding curve and generators; equations Cones, enveloping cone of a sphere; conditions for a cone to have three mutually perpendicular generators; tangent lines and plane at point. Condition for tangency (statement only), reciprocal cones, intersection of two cones with a common vertex.	08
2	Definition of a cylinder, its equations; enveloping cylinder of a sphere; the right circular cylinder and its equation.	06
3	Conicoids, ellipsoid, hyperboloids of one and two sheets types. Types of Conicoids and their properties.	03
4	Linear differential equations of higher order with constant coefficients, Operator D, auxiliary equation, roots of auxiliary equations, Methods to obtain Complementary Function (C.F.), solutions of Homogeneous differential equations $f(D)y = 0$ for real and complex roots.	05
5	Operator $\frac{1}{D}$, Solutions of differential equations of the types $f(D)y = X$. Methods to obtain Particular Integral (P.I.) when $X = e^{ax}$, $X = \sin(ax + b)$, $X = \cos(ax + b)$, $X = x^m$, $X = e^{ax}V$.	06
6	Equation reducible to linear differential equations with constant equations, Cauchy's linear differential equations, Legendre's linear differential equations, Simultaneous linear differential equations.	06
7	Complex numbers, Polar form of complex number. De'Moivre's theorem, nth roots of a complex number, Fundamental theorem of algebra (statement only), Multiple roots and test for multiplicity.	07
8	Expansions of $\cos n\theta$, $\sin n\theta$, $\tan n\theta$ in terms of $\cos \theta$, $\sin \theta$, $\tan \theta$ respectively ($n \in N$). Expansion of $\cos^n \theta$, $\sin^n \theta$ in a series of cosines or sines of multiple angles of θ ($n \in N$). Expansion of $\cos \theta$, $\sin \theta$, $\tan \theta$ in terms of θ .	05
9	Exponential, circular and hyperbolic functions.	07
10	Logarithm functions for complex and real numbers, Inverse circular and hyperbolic functions for complex and real numbers.	07

Learning Outcomes:-

After the successful completion of the course, students will be able to

- Analyze differential equations.
- Solve Higher order ODES.
- Imagine three dimensional objects virtually.
- Understand the concepts of complex numbers and some complex functions.



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- Demonstrate this knowledge by working suitable problems and developing their own proofs, and by presenting and writing work inside and outside of class.

Books Recommended:-

1. 'Analytical solid Geometry', **Shanti Narayan and P. K. Mittal**, *S. Chand And Co.* New Delhi.
2. 'Higher Engineering Mathematics, Thirty-fifth edition.', **B. S. Grewal**, *Khanna Publication*
3. 'The calculus with analytic geometry', **Louis Leithold**, *Harper- Collins Pub.*
4. 'The Elements of Co-ordinate Geometry', **S. L. Loney**, *Mac Milan & Co.*
5. 'A Textbook of Analytical Geometry of three dimensions', **P. K. Jain and Khalid Ahmad**.
6. 'Elementary Treatise on Co-ordinate Geometry of three dimensions', **R. J. T. Bell**, *Mac Milan Co.*
7. 'Advanced Engineering Mathematics', **E. Kreyszig**, *New Age International Publishing Co.*
8. 'Complex Variables and Applications', **R. V. Churchill, J. W. Brown**, *McGraw-Hill Book Co.*
9. 'Principles of Real Analysis', **S. C. Malik**, *New Age International, New Delhi.*
10. 'Integral Calculus', **Shanti Narayan and P. K. Mittal**, *S. Chand And Co.* New Delhi.

E-Resources:-

1. en.wikipedia.org/wiki/Analytic_geometry
2. www.britannica.com/EBchecked/topic/22548/analytic-geometry
3. www.jimloy.com/geometry/analytic.htm
4. <http://mathworld.wolfram.com/AnalyticGeometry.html>
5. ualr.edu/lasmoller/descartes.html
6. en.wikipedia.org/wiki/Linear_differential_equation
7. www.ufgop.org/pdf/calcululs-review-of-analytic-geomtry/
8. tutorial.math.lamar.edu/Classes/DE/Linear.aspx
9. www.khanacademy.org/math/differential-equations
10. en.wikipedia.org/wiki/Complex_number
11. www.purplemath.com/modules/complex.htm
12. www.mathsisfun.com/numbers/complex-numbers.html
13. <http://mathworld.wolfram.com/ComplexNumber.html>
14. <http://mathworld.wolfram.com/ComplexFunction.html>
15. en.wikipedia.org/wiki/Complex_analysis



FACULTY OF SCIENCES

DEPARTMENT OF MATHEMATICS

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SEMESTER: II

SUBJECT NAME: Mathematics Practical-II

SUBJECT CODE: 4SC02MAP1

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0	0	6	6	3	--	--	--	--	20	10	70	100	

Objectives: -The objective of this course is

- To learn about cones, cylinders.
- To learn conicoids and Cartesian co-ordinate.
- To learn higher order linear differential equations.
- To learn algebra of a complex number.
- To calculate the roots of any complex number.
- To learn Complex functions.

Prerequisites:-

Students must be familiar with the properties of functions, the algebra of functions, and the graphs of functions. Students should have basic knowledge differential equations. Also they should have basic knowledge of complex numbers of at least 10+2 level.

Course outline:-

Sr. No.	Course Contents
1	Integration of rational function of x and a linear surd $(Ax + B)(ax^2 + bx + c)^{-1/2}$ and $(Ax + B)(ax^2 + bx + c)^{1/2}$
2	Cone, Cylinder.
3	Sketching of Quadric surfaces.
4	General solution of Linear differential equations $F(D)y = X$, where $X = e^{ax}, \sin(ax + b), \cos(ax + b), x^m, e^{ax}V$ (where V is a function of x Only), Reducible equation to LDE with constant coefficient



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5	Descarte's rule of sign, Relation between roots and coefficients.
6	Solution of cubic equations (Cardan's method), Solution of biquadratic equations (Ferarri's method)
7	Algebra of Complex numbers, De'Moivre's theorem.
8	Expansions of $\cos n\theta$, $\sin n\theta$, $\tan n\theta$ in terms of $\cos \theta$, $\sin \theta$, $\tan \theta$ respectively ($n \in N$). Expansion of $\cos^n \theta$, $\sin^n \theta$ in a series of <i>cosines</i> or <i>sines</i> of multiple angles of θ ($n \in N$).
9	Exponential, circular and hyperbolic functions.
10	Logarithm functions for complex and real numbers, Inverse circular and hyperbolic functions.

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8. 'Complex Variables and Applications', **R. V. Churchill, J. W. Brown**, McGraw-Hill Book Co.
9. 'Principles of Real Analysis', **S. C. Malik**, New Age International, New Delhi.
10. 'Integral Calculus', **Shanti Narayan and P. K. Mittal**, S. Chand And Co. New Delhi.

Notes:-

1. Problem solving skill in mathematics is an important aspect in the teaching of mathematics.
2. There would be problem solving session of six hours per week and they will be conducted in batches.