VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN [AUTONOMOUS]

ELAYAMPALAYAM, TIRUCHENGODE-637205.

DEPARTMENT OF MATHEMATICS

B.Sc.–MATHEMATICS

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER OBE

(TANSCHE)

For the Candidates admitted from the year 2023-2024

ACADEMIC YEAR– 2023-24

SEM	SUBJECTCODE	COURSE	SUBJECTTITLE	Hours/ Week	CREDIT	INT.MARK	EXT. MARK	TOT. MARK
I	23U1LT01	Language-I	Tamil-I	6	3	25	75	100
	23U1LE01	English-I	English-I	4	3	25	75	100
	23U1MAC01	Core Course-I	Algebra & Trigonometry	5	4	25	75	100
	23U1MAC02	Core Course-II	Differential Calculus	5	4	25	75	100
	23U1MADE01	Discipline Specific Elective Course- I	Numerical Methods with Applications	4	3	25	75	100
	23U1MAS01	Skill Enhancement Course	Bridge Mathematics	2	2	25	75	100
	23U1ENAC01	Ability Enhancement Compulsory Course - I	Soft skills for Effective Communication	2	2	25	75	100
	23U1VE01	Value Education	Yoga	2	2	25	75	100
TOTAL				**30**	**23**	**200**	**600**	**800**

SEM	SUBJECTCODE	COURSE	SUBJECTTITLE	Hours/ Week	CREDIT	INT.MARK	EXT. MARK	TOT. MARK
II	23U2LT02	Language-II	General Tamil - II	5	3	25	75	100
	23U2LE02	English-II	English - II	5	3	25	75	100
	23U2MAC03	Core Course-III	Analytical Geometry (2D&3D)	5	4	25	75	100
	23U2MAC04	Core Course-IV	Integral Calculus	5	4	25	75	100
	23U2MADE02	Discipline Specific Elective Course- II	Discrete Mathematical Structures	4	3	25	75	100
	23U2MAS02	Skill Enhancement Course - II	Computational Mathematics	2	2	25	75	100
	23U2	Ability Enhancement Compulsory Course - II	Office Automation	2	2	25	75	100
	23U2	EVS	Environmental Studies	2	2	25	75	100
TOTAL				30	23	200	600	800

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="6">Bridge Mathematics</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="6">Skill Enhancement Course</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">23U1MAS01</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td>Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>2</td><td colspan="2">-</td><td>--</td><td colspan="2">2</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">To bridge the gap and facilitate transition from higher secondary to tertiary education;
To instil confidence among stakeholders and inculcate interest for Mathematics;</td></tr>
<tr><td colspan="2" rowspan="5">Course Outline</td><td colspan="6">UNIT-I:Algebra: Binomial theorem, General term, middle term, problems based on these concepts</td></tr>
<tr><td colspan="6">Unit II: Sequences and series (Progressions). Fundamental principle of counting. Factorial n.</td></tr>
<tr><td colspan="6">Unit III: Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.</td></tr>
<tr><td colspan="6">Unit IV: Trigonometry: Introduction to trigonometric ratios, proof of sin(A+B), cos(A+B), tan(A+B) formulae, multiple and sub multiple angles, sin(2A), cos(2A), tan(2A) etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule</td></tr>
<tr><td colspan="6">UnitV: Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.</td></tr>
<tr><td colspan="2">Recommended Text</td><td colspan="6">1. NCERT class XI and XII text books.
2. Any State Board Mathematics text books of class XI and XII</td></tr>
</table>

Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome

After completion of this course successfully, the students will be able to

CLO1: Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems

CLO2: Find the various sequences and series and solve the problems related to them. Explain the principle of counting.

CLO3: Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations

CLO4: Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.

CLO5: Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	POs						PSOs	
	1	2	3	4	5	6	1	2
CLO1	1	1	1	1	1	1	1	1
CLO2	2	1	1	2	2	1	2	1
CLO3	2	1	1	2	2	1	2	1
CLO4	1	1	1	1	1	1	2	1
CLO5	1	1	1	1	1	1	2	1

<table>
<tr><td>Title of the Course</td><td colspan="7">ALGEBRA & TRIGONOMETRY</td></tr>
<tr><td>Paper Number</td><td colspan="7">CORE M1</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">23U1MAC01</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td>Instructional Hours per week</td><td colspan="2">Lecture
4</td><td colspan="2">Tutorial
1</td><td>Lab Practice
--</td><td colspan="2">Total
5</td></tr>
<tr><td>Pre-requisite</td><td colspan="7">12th Standard Mathematics</td></tr>
<tr><td>Objectives of the Course</td><td colspan="7">• Basic ideas on the Theory of Equations, Matrices and Number Theory.
• Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.</td></tr>
<tr><td rowspan="4">Course Outline</td><td colspan="7">Unit I: Reciprocal Equations-Standard form–Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner’s method – related problems.
(Book1 – Chapter6: Sections 16,17,19,30).</td></tr>
<tr><td colspan="7">Unit II: Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems.
(Book1 – Chapter3: Sections 10,14; Chapter4: Sections-1,2,3,5,7,8,9. 11).</td></tr>
<tr><td colspan="7">Unit III: Inverse of a square matrix up to order 3, Characteristic equation –Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Diagonalization of square matrices - related problems.
(Book2 – Chapter2: Sections -8,16).</td></tr>
<tr><td colspan="7">Unit IV: Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion of $\tan n\theta$ in terms of $\tan\theta$, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta\sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+,\ldots,+\theta_n)$-Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ - related problems.
(Book3 - Chapter3: Sections 1 to 5).</td></tr>
</table>

	Unit V: Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems. (Book3 - Chapter4; Chapter5; Chapter6: Sections 1,3,3.1 Related problems.)
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.
Recommended Text	1. Manickavasagam Pillai, T.K., T. Natarajan and Ganapathy KS – Algebra Vol-I, Viswanathan Publishers and Printers Pvt Ltd., - 2008. 2. Manickavasagam Pillai, T.K., T. Natarajan and Ganapathy KS – Algebra Vol-II, Viswanathan Publishers and Printers Pvt Ltd., - 2008. 3. Manichavasagam Pillai, T.K. and S. Narayanan, Trigonometry– Viswanathan Publishers and Printers Pvt. Ltd. 2013.
Reference Books	1. W.S. Burnstine and A.W. Panton, Theory of equations 2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007 3. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005 4. C.V.Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003 5. J.Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012. 6. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.

Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Classify and Solve reciprocal equations

CLO 2: Find the sum of binomial, exponential and logarithmic series

CLO 3: Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix

CLO 4: Expand the powers and multiples of trigonometric functions in terms of sine and cosine

CLO 5: Determine relationship between circular and hyperbolic functions and the summation of trigonometric series

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="6">DIFFERENTIAL CALCULUS</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="6">CORE M2</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">23U1MAC02</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td colspan="2">Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td>Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td colspan="2"></td><td>4</td><td>1</td><td>--</td><td colspan="3">5</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">• The basic skills of differentiation, successive differentiation, and their applications.
• Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.</td></tr>
<tr><td colspan="2" rowspan="4">Course Outline</td><td colspan="6">UNIT-I: Successive Differentiation: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product. (Chapter3: Sections 1.1 to 1.6 and 2.1, Related problems.)</td></tr>
<tr><td colspan="6">UNIT-II: Partial Differentiation: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions.
(Chapter8: Sections 1.1 to 1.5.)</td></tr>
<tr><td colspan="6">UNIT-III: Partial Differentiation (Continued): Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers.
(Chapter8: Sections 1.6, 1.7 and Sections 4, 5.)</td></tr>
<tr><td colspan="6">UNIT-IV: Envelope: Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.
(Chapter10: Sections 1.1 to 1.4.)</td></tr>
</table>

	UNIT-V:Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature –Cartesian formula for the radius of curvature – The coordinates of the centre of curvature- Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates. (Chapter10: Sections 2.1 to 2.6)
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. S. Narayanan and T.K. Manicavachagom Pillay, Calculus-Volume I, (2004), S. Viswananthan Printers Pvt. Ltd.
Reference Books	1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002. 2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010. 3. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007. 4. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York, Inc., 1989. 5. T. Apostol, Calculus, Volumes I and II. 6. S. Goldberg, Calculus and mathematical analysis.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Find the nth derivative, form equations involving derivatives and apply Leibnitzformula

CLO 2: Find the partial derivative and total derivative coefficient

CLO 3: Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers

CLO 4: Find the envelope of a given family of curves

CLO 5: Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

<table>
<tr><td>Title of the Course</td><td colspan="6">NUMERICAL METHODS WITH APPLICATIONS</td></tr>
<tr><td>Paper Number</td><td colspan="6">Discipline Specific Elective Course 1</td></tr>
<tr><td rowspan="2">Category Core</td><td>Year</td><td>I</td><td>Credits</td><td>3</td><td>Course Code</td><td>23U1MADE01</td></tr>
<tr><td>Semester</td><td>I</td><td colspan="3"></td></tr>
<tr><td>Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td>Lab Practice</td><td>Total</td><td colspan="2"></td></tr>
<tr><td></td><td>3</td><td>1</td><td>--</td><td>4</td><td colspan="2"></td></tr>
<tr><td>Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td>Objectives of the Course</td><td colspan="6">• Method of successive approximation
• Finite Differences
• Numerical Differentiation & Numerical Integration</td></tr>
<tr><td rowspan="4">Course Outline</td><td colspan="6">UNIT-I
Method of successive approximation-The Method of false position-Newton Raphson Method-Generalized Newton’s Method-Muller’s Method.
Chapter 2 (sec2.1 to 2.5 and 2.8)</td></tr>
<tr><td colspan="6">UNIT-II
Finite Differences-Forward Differences and Backward Differences-Symbolic relations and Separation of symbols-differences of a polynomial-Newton’s formulae for Interpolation-Central difference Interpolation formulae-Gauss’s central difference formulae.
Chapter 3 (sec 3.3 ,3.5 to 3.7.1)</td></tr>
<tr><td colspan="6">UNIT-III
Numerical Differentiation--Numerical Integration-Trapezoidal rule-Simpson’s 1/3 rule-Simpson’s 3/8 rule-Boole’s and Weddle’s rule. Chapter 5 (sec 5.2(5.2.1),sec 5.4(5.4.1 to 5.4.4))</td></tr>
<tr><td colspan="6">UNIT-IV
Elimination Method- Gauss Jordan Method--Method of factorization-Solution of linear System-Iterative methods-Jacobian’s Method –Gauss Seidal Method. Chapter 6 (sec 6.3(6.3.1 to 6.3.3,(6.3.6, 6.3.7), sec 6.4)</td></tr>
</table>

	UNIT-V Solution of Taylor's Series-Picard's Method of Successive approximations- Euler's Method-RungeKutta Methods II order and III order. Chapter 7(sec 7.2 to 7.5)
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	**1. S. S. Sastry, "*Introductory Methods of Numerical Analysis*",** Prentice Hall of India Pvt. Ltd.,New Delhi, 2003. **2. P.Kandasamy, K.Thilgavathy, K.Gunavathi, "*Numerical Methods*",** 3rd Edition, 2012.
Reference Books	1. **E.Balagurusamy, "*Numerical Methods*",**Tata Mcgraw Hill Ltd., 1999. 2. **Richard L.Burden, J.Douglas Favies, "*Numerical Analysis*",** Nelson Education 2001**.** 3. **Arunkumar jalan, utpal sarkar, "*Numerical Methods*",** Universities press(India) privatelimited, 2015.
Website and e-Learning Source	https://nptel.ac.in https://ocw.mit.edu. https://www.mathscard.co.uk

Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: To recollect the basic concept of Newton's methodCLO 2:

To understand the concept of difference method.

CLO 3: To gain knowledge about types numerical differentiation and integration.CLO

4: To understand the Linear system of equations.

CLO 5: To analyze the concepts of Runge kutta methods.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2

<table>
<tr><td colspan="2">TitleoftheCourse</td><td colspan="7">ANALYTICAL GEOMETRY (Two & Three Dimensions)</td></tr>
<tr><td colspan="2">PaperNumber</td><td colspan="7">CORE M3</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">23U2MAC03</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours perweek</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td>Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">4</td><td colspan="2">1</td><td>--</td><td>5</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="7">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="7">• Necessaryskillstoanalyzecharacteristicsandpropertiesoftwo- and three-dimensional geometric shapes.
• Topresent mathematicalargumentsabout geometricrelationships.
• Tosolverealworld problemson geometryanditsapplications.</td></tr>
<tr><td colspan="2" rowspan="5">Course Outline</td><td colspan="7">UNIT-I:Pole,Polar-conjugatepoints andconjugatelines–diameters –conjugatediametersofanellipse-semidiameters-conjugate diameters of hyperbola. (Book1: Chapter9, 10)</td></tr>
<tr><td colspan="7">UNIT-II: Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle,conic–Equationofchord,tangent,normal.Equationsofthe asymptotesofahyperbola.(Book2:Chapter9)</td></tr>
<tr><td colspan="7">UNIT-III:SystemofPlanes-Lengthoftheperpendicular–Orthogonal projection.(Book3:Chapter2:Sections2.5,2.7,2.9)</td></tr>
<tr><td colspan="7">UNIT-IV: Representation of line–angle between a line and a plane –co – planar lines–shortest distance between two skew lines –length of theperpendicular–intersectionofthreeplanes.(Book3: Chapter3:Sections3.1,3.2,3.4,3.6,3.7,3.8)</td></tr>
<tr><td colspan="7">UNIT-V: Equation of a sphere-generalequation-section of a sphere by a plane-equation of the circle- tangent plane- angle of intersection of twospheres-conditionfortheorthogonality-radicalplane.(Book3: Chapter6:Sections6.1,6.2,6.3,6.4,6.6,6.7,6.8)</td></tr>
</table>

Extended Professional Component (is a part of internal component only, Nottobeincluded in the External Examination question paper)	Questionsrelatedtotheabovetopics,fromvariouscompetitive examinations UPSC / TNPSC / others to be solved (TobediscussedduringtheTutorialhour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency,ProfessionalCommunicationandTransferrableSkill
Recommended Text	1. Vittal P.R. and Malini V, Algebra, Analytical Geometry& Trignometry,Margam Publications, India.2018. 2. Manicavachagom Pillay T.K.and Natarajan T, A Text book of Analytical Geometry Part I-Two Dimensions, Divya Subramanian for Ananda Book Depot. 1996. 3. Shanti Narayan and Mittal P.K., Analytical Solid Geometry,S Chand Publishing, 2021.

ReferenceBooks	1. S.L.Loney, Co-ordinate Geometry. 2. RobertJ.T.Bell,Co-ordinateGeometryofThreeDimensions. 3. William F. Osgood and William C. Graustein, Plane and Solid Analytic Geometry, Macmillan Company, NewYork, 2016. 4. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010. 5. Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961. 6. Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010. 7. William H. McCrea, Analytical Geometry of ThreeDimensions, Dover Publications, Inc, New York, 2006. 8. JohnF.Randelph,CalculusandAnalyticGeometry, Wadsworth Publishing Company, CA, USA, 1969. 9. RalphPalmerAgnew,AnalyticGeometryandCalculuswith Vectors, McGraw-Hill Book Company, Inc. New York, 1962.
Websiteand e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with Pos and PSOs)

Students will be able to

CLO 1: Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola

CLO2: Findthepolarequationsofstraightlineandcircle,equationsofchord,tangentand normal and to find the asymptotes of hyperbola

CLO3: Explainindetailthe systemofPlanes

CLO 4: Explainindetailthe systemofStraightlines

CLO5: Explainindetailthe systemofSpheres

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	2	1	-	-	3	2	1
CLO2	2	2	2	1	-	-	3	2	1
CLO3	3	2	2	1	-	-	3	2	1
CLO4	3	2	3	1	-	-	3	2	1
CLO5	3	2	3	1	-	-	3	2	1

<table>
<tr><td colspan="2">Titleofthe Course</td><td colspan="6">INTEGRAL CALCULUS</td></tr>
<tr><td colspan="2">PaperNumber</td><td colspan="6">CORE M4</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">23U2MAC04</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours perweek</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td>Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">4</td><td colspan="2">1</td><td>--</td><td>5</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">• Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals.
• Knowledge about Beta and Gamma functions and their applications.
• Skillsto DetermineFourierseriesexpansions.</td></tr>
<tr><td colspan="2" rowspan="4">Course Outline</td><td colspan="6">UNIT-I: Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli’s formula.
(Chapter1:Sections13and14)</td></tr>
<tr><td colspan="6">UNIT-II: Multiple Integrals - definition of double integrals -evaluation of double integrals – double integrals in polar coordinates - Change of order of integration.
(Chapter5:Sections1,2.1, 2.2and3.1)</td></tr>
<tr><td colspan="6">UNIT-III: Triple integrals –applications of multiple integrals -volumes of solids of revolution - areas of curved surfaces–change of variables - Jacobian.
(Chapter5:Sections4,5.1,5.2,5.3,6.1,7andChapter6:1.1,1.2)</td></tr>
<tr><td colspan="6">UNIT-IV: Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions - Applications.
(Chapter7:Sections2.1,2.2,2.3, 3,4, and6.)</td></tr>
</table>

	UNIT-V: Geometric Applications of Integration – Areas under plane curves: Cartesian coordinates-Area of a closed curve – Areas in polar coordinates-Trapezoidal rule – Simpson's rule and Physical ApplicationsofIntegralcalculus–Centroid–Centreofmassofanarc - Centre of mass of a plane area- Centroid of a solid of revolution – Centroid of a surface of revolution . (Chapter2:Sections1.1to1.4,2.1,2.2andChapter3: 1.1to1.5Simple Applications)
Extended Professional Component (is a part of internal component only, Nottobeincluded in the External Examination questionpaper)	Questionsrelatedtotheabovetopics,fromvariouscompetitive examinations UPSC / TNPSC / others to be solved (TobediscussedduringtheTutorialhour)
Skills acquired fromthis course	Knowledge, Problem Solving, Analytical ability, Professional Competency,ProfessionalCommunicationandTransferrableSkill
Recommended Text	1. Narayanan SandManicavachagom Pillay T.K.Calculus-Volume II, (2006), S. Viswananthan Printers Pvt. Ltd.
ReferenceBooks	1. H. Anton, I. Birens and S.Davis,Calculus,John Wiley and Sons, Inc., 2002. 2. G.B.ThomasandR.L.Finney,Calculus,PearsonEducation,2007. 3. D.Chatterjee,IntegralCalculusandDifferentialEquations,Tata-McGraw Hill Publishing Company Ltd. 4. P. Dyke, AnIntroductionto Laplace Transformsand Fourier Series, SpringerUndergraduateMathematicsSeries,2001(secondedition).
Websiteand e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with Pos and PSOs)

Students will be able to

CLO1: Determinethe integralsofalgebraic,trigonometricand logarithmic functionsandto find the reduction formulae

CLO 2: Evaluate double and triple integrals and problems using change of order of integration

CLO 3: Solve multiple integrals and to find the areas of curved surfaces and volumes of solidsof revolution

CLO4: Explainbetaandgammafunctionsandtousetheminsolvingproblemsofintegration

CLO5: ExplainGeometricand Physicalapplicationsofintegralcalculus

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

Programme code	B.Sc	**Programme Title**	**Bachelor of Science (Mathematics)**	
Course Code	**23U2MADE02**	**Title**	**Batch**	2023-2026
		ELECTIVE II : DISCRETE MATHEMATICAL STRUCTURES	**Semester**	II
Hrs/Week	4		**Credits**	03

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To gain the knowledge about predicates, quantifiers and logical words.	K1, K2
CO2	To develop the concept of Normal forms.	K4
CO3	To understand the theory of Peano axiom.	K2, K3
CO4	To analyze Semi groups and Monoids.	K4, K5
CO5	To apply the concept of Boolean Algebra.	K3, K4

UNIT I: **(14 Hours)**

Mathematical Logic – Statements and Notations – Connectives – Negation – Conjunction – Disjunction – statement Formulas and Truth Table – Conditional and Biconditional – Well formed Formulas – Tautologies.

UNIT II: **(14 Hours)**

Normal Forms – Disjunctive Normal Forms – Conjunctive Normal Forms – Principal Disjunctive Normal Forms – Principal Conjunctive Normal Forms – Ordering and Uniqueness of Normal Forms. The Theory of inference for the statement calculus – validity using truth table – Rules of Inference – Consistency of Premises and indirect method of proof.

UNIT III : **(14 Hours)**

Relations & ordering – Relations – Properties of binary relation in a set – Functions – Definition & Introduction – Composition of Functions – Inverse function – Binary and n-array operations – Hashing Functions – Natural numbers – Peano Axioms & Mathematical Induction – Cardinality

UNIT IV: **(14 Hours)**

Algebraic systems – Definition & Examples – Semi groups and monoids – definition and examples – homomorphism of semi groups & monoids – sub semi groups & sub monoids – Grammars – Formal Definitionof a Language – Notions of Syntax Analysis.

UNIT V: **(14 Hours)**

Lattices as partially ordered sets: Definition and Examples – some properties of Lattices – Lattices as Algebraic systems – sub Lattices – Direct product and homomorphism.

Boolean Algebra: Definition and Examples – sub algebra, Direct product and homomorphism – Boolean Functions – Boolean Forms and Free Boolean Algebras – Values of Boolean Expression and Boolean Functions .

TOTAL : **70 Hours**

Power point Presentations, Seminar ,Quiz, Assignment

TEXT BOOK :

J.P.Trembly, R. Manohar, *"Discrete mathematical structures with applications to computer science"*, Tata Mc Graw Hill, , 2013.

REFERENCE BOOKS :

1. Prof.V.Sundaresan, K.S.Ganapathy Subramaniyan, K.Ganesan,*"Discrete Mathematics",* Tata Mc Graw Hill, 2000.

2. L.Lovarz, J.Pelikan, K.Vexztergombi, "*Discrete Mathematics*", Springer Int. Edition, 2002.

3. N.Chandrasekaran, M.Uma parvathi, "*Discrete Mathematics*", PHI Learning P. Ltd., 2010.

ONLINE SOURCES :

1. https://ocw.mit.edu.
2. https://nptel.ac.in
3. https://swayam.gov.in

Mapping with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	S	M	L	S	S	M	M	M	M	L	S	M	L	L	S
CO2	S	L	S	M	M	L	L	M	M	L	M	L	L	L	S
CO3	S	M	S	S	S	M	S	S	L	M	L	S	M	S	S
CO4	S	M	S	S	S	S	M	M	M	L	S	S	M	L	S
CO5	M	M	S	S	S	S	S	L	L	L	M	M	M	L	S

S - Strong; M - Medium; L – Low

23U2MAS02	COMPUTATIONAL MATHEMATICS		Credits 2
Year &Semester: I YEAR&II SEMESTER	**Course Category**	**SEC**	**Total:(L+T+P) Per week:1+1= 2**

CourseObjective

1.To introduce students to computational mathematics and its applications in olving mathematical problems.

2. Tofamiliarizestudentswiththebasicsof Scilabprogramminglanguageanditsuseinnumericalcomputations.

3. Toteachstudentshowtoimplementnumericalalgorithmsforsolvingmathematicalproblemsusing Scilab.

4. Toenablestudentstousecomputationalmethodstosolvemathematicalproblemsandinterprettheresultsobtained

UNIT	Details	No. of Hours
I	**Introduction to Scilab** – Scilab Environment:Manipulating thecommand line - Variables in Memory - Startup Commands - TheScilabMenu Bar–Toolboxes **Vectors** :Initialising vectors in Scilab -Mathematical operations on vectors - Relational operations on vectors - Logical operationsonvectors **Functions:** Built-in logical functions -Elementary MathematicalFunctions-Mathematicalfunctionsonscalars	5
II	**Matrices** : Introduction - Arithmetic operators for Matrices - Basicmatrixprocessing **Programming in Scilab** : Introduction - Variables & Variablenames - Assignment statements - Arithmetic, Relational & Logicaloperators - Input & Output - Flow control/branching /conditionalstatements - Breakandcontinue-HandlingMatricesWithLoops	5

III	Scripts - The Concept of Functions - User Defined Functions - SpecialFunction command **Graphic output** :Introduction - 2d Plotting - - Function versionsforgraphic commands -3d plotting	4
IV	**Numerical Methods using SCILAB [Concepts, Problem &Scilabcode]** **Solution of Algebraic and Transcendental Equation**: Bisectionmethod -Newton-Raphson method –Regula Falsi method - Secantmethod **Interpolation:** Finite Difference Operators – Newton's GregoryForward Interpolation Method, - Newton's Gregory backwardInterpolationMethod-Lagrangeinterpolationmethod	8
V	**NumericalDifferentiation**:Equalinterval -UnequalInterval **NumericalIntegration:**NewtonCotesformula-Trapezoidalrule -Simpson's1/3 rule–Simpson's3/8 rule-MonteCarlomethod	8
	Total	**30**

CourseOutcomes

CO	Oncompletionofthiscourse,studentswill
1	Develop an understanding of numerical methods for solving mathematicalproblems.
2	Acquireknowledgeofprogrammingconceptsandthebasicsof Scilablanguage.
3	Applynumerical algorithmstosolvemathematicalproblemsusing Scilab.
4	Implementandtestnumericalalgorithmsusing Scilab.
5	Analyzeandinterprettheresultsofnumericaldifferentiationandintegerations

TextBook

1.SCILAB(AFreeSoftwaretoMATLAB)-Author:AchuthsankarSNair& HemaRamchandran-: S. ChandPublishing-:2012

UnitI:Chapter 2–2.1,2.2,2.5, 2.8,2.9:Chapter3– 3.2to3.8

UnitII:Chapter4–4.1,4.2,4.3; Chapter5–5.1 to5.8

UnitIII: Chapter5–5.9to5.12 :Chapter8 –8.1– 8.4

2.NUMERICALMETHODSKIT: FORMATLAB,SCILABANDOCTAVEUSERSbyRohanVerma

UnitIV: Chapter1 &2

UnitV: Chapter 4&5

REFERENCE BOOK	
1	IntroductiontoScilab:ForEngineersandScientists.-SandeepNagar
2.	ComputinginScilab-ChetanaJain –CambridgeUniversity
3.	COMPUTER-BASED NUMERICAL & STATISTICAL TECHNIQUES - M.GOYAL- INFINITY SCIENCE PRESS LLC
Web Resources	
1.	https://www.scilab.org/tutorials-**ScilabTutorials**
2	https://egyankosh.ac.in/bitstream/123456789/88092/1/Unit-15.pdf
3	https://www.edx.org/course/scilab-programming-for-beginners
4	https://www.scilab.org/sites/default/files/Scilab_beginners.pdf
5	https://spoken-tutorial.org/tutorial-search/?search_foss=Scilab&search_language=English **Scilab Spoken Tutorials**