THIRUVALLUVAR UNIVERSITY

SERKKADU, VELLORE–632115

B.Sc. MATHEMATICS WITH COMPUTER APPLICATION

SEMESTER - II

SYLLABUS

FROM THE ACADEMIC YEAR

2023 – 2024

S.No.	Part	Study Components Course Title		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-2	6	3	Tamil/Other Languages	25	75	100
2.	II	English	Paper-2	4	3	English	25	75	100
3.	II	NMSDC: Language Proficiency for Employability	Paper-1	2	2	Overview of English Communication	25	75	100
4.	III	Core Course –CC III	Paper-2	5	5	Analytical Geometry & Vector Analysis	25	75	100
5.	III	Core Course –CC IV	Practical - 2	5	5	Differential Equations and its Applications	25	75	100
6.	III	Elective II Generic/ Discipline Specific	Elective II	6	3	Programming with Python (with Lab)	25	75	100
7.	IV	Skill Enhancement Course SEC-2	Paper2	2	2	Mathematics For Completive Examinations-II	25	75	100
8.	IV	Skill Enhancement Course SEC-3 (Discipline Specific)	Paper 1	2	2	Office Automation	25	75	100
		Sem. Total		**32**	**25**		**200**	**600**	**800**

<table>
<tr><td>Title of the Course</td><td colspan="7">ANALYTICAL GEOMETRY &VECTOR ANALYSIS</td></tr>
<tr><td>Paper Number</td><td colspan="7">CORE PAPER III</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">5</td><td rowspan="2">Course Code</td><td rowspan="2"></td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">4</td><td colspan="2">1</td><td colspan="2">--</td><td>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">• Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes.
• To present mathematical arguments about geometric relationships.
• To solve real world problems on geometry and its applications.</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="7">UNIT-I: System of Planes - Length of the perpendicular - Orthogonal projection.</td></tr>
<tr><td colspan="7">UNIT-II: Representation of line - angle between a line and a plane - co – planar lines - shortest distance between two skew lines - length of the perpendicular - intersection of three planes.</td></tr>
<tr><td colspan="7">UNIT-III: Equation of a sphere - general equation - section of a sphere by a plane-equation of the circle - tangent plane - angle of intersection of two spheres- condition for the orthogonality - radical plane.</td></tr>
<tr><td colspan="7">UNIT-IV:Vector Differentiation: Directional Derivative - Gradient- Unit normal to the surface - Equation of tangent plane to a surface - Equation of normal to a surface – Divergence – Curl – Laplacian Differential operators.</td></tr>
<tr><td colspan="7">UNIT-V:Vector Integration: Evaluation of line integral - surface integral and volume integrals. Application of Green’s theorem - Gauss-Divergence theorem – Stokes theorem (proofs of theorems not included)-simple problems.</td></tr>
<tr><td>Skills acquired from this course</td><td colspan="7">Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</td></tr>
<tr><td>Recommended Text</td><td colspan="7">1. S. L. Loney, Co-ordinate Geometry.</td></tr>
</table>

	2. Robert J. T. Bell, Co-ordinate Geometry of Three Dimensions. 3. Vector Analysis by P.Duraipandian and Kayalal Pachaiyappa ,S.Chand 4. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K. Mittal - S.Chand & Co.Pvt.Ltd
Reference Books	1. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010. 2. Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961. 3. Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010. 4. William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006. 5. John F. Randelph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969. 6. Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.
Website and e-Learning Source	https://nptel.ac.in

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Solve problems in the system of Planes

CLO 2: Estimate the angle between the line and plane, coplanar lines and shortest distance between skew lines.

CLO 3: Understand the concept of equation of sphere and its applications.

CLO 4: Calculate Directional Derivative, Divergence and Curl.

CLO 5: Apply Green's theorem, Gauss-Divergence theorem, Stoke's theorem to evaluate Area and Volume

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

3 - Strong Correlation 2 - Medium Correlation 1 - Low Correlation

<table>
<tr><td>Title of the Course</td><td colspan="6">DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS</td></tr>
<tr><td>Paper Number</td><td colspan="6">CORE PAPER IV</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">5</td><td rowspan="2">Course Code</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">4</td><td>1</td><td colspan="2">--</td><td>5</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">• Knowledge about the methods of solving Ordinary and Partial Differential Equations.
• The understanding of how Differential Equations can be used as a powerful tool in solving problems in science.</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="6">UNIT-I: Ordinary Differential Equations: Variable separable - Homogeneous Equation – Non - Homogeneous Equations of first degree in two variables - Linear Equation - Bernoulli’s Equation - Exact differential equations.</td></tr>
<tr><td colspan="6">UNIT-II: Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y-Equation solvable for x- Clairauts’ form - Linear Equations with constant coefficients - Particular integrals of algebraic, exponential, trigonometric functions and their products.</td></tr>
<tr><td colspan="6">UNIT-III: Simultaneous linear differential equations - Linear Equations of the Second Order - Complete solution in terms of a known integrals - Reduction to the Normal form - Change of the Independent Variable-Method of Variation of Parameters.</td></tr>
<tr><td colspan="6">UNIT-IV: Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions - complete integral - singular integral-General integral-Lagrange’s Linear Equations - Simple Applications.</td></tr>
<tr><td colspan="6">UNIT-V: Special methods – Standard forms - Charpit’s Methods – Simple Applications.</td></tr>
<tr><td>Skills acquired from this course</td><td colspan="6">Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</td></tr>
</table>

Recommended Text	1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984. 2. I. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition, 1967. 3. S.Narayanan & T.K.Manicavachagam Pillay, Calculus Vol III, S.Vishwanathan Printers and publishers pvt.ltd, Chennai (2016).
Reference Books	1. D.A. Murray, Introductory course in Differential Equations, Orient and Longman 2. H.T. H. Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi,1985. 3. Horst R. Beyer, Calculus and Analysis, Wiley, 2010. 4. Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer-Verlag, New York. 1983. 5. TynMyint-U and Lognath Debnath. Linear Partial Differential Equations for Scientists and Engineers. (4th Edn.) Birhauser, Berlin. 2007. 6. N.P.Bali, Differential Equations, Firewall Media Publications,(2006). 7. S.Narayanan, Differential Equations and its Applications, Dhivya Subramanian for Anand Book Depot(2017).
Website and e-Learning Source	https://nptel.ac.in

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations

CLO 2: Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products

CLO 3: Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters

CLO 4: Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations

CLO 5: Explain standard forms and Solve Differential equations using Charpit's method

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

3 - Strong Correlation 2 - Medium Correlation 1 - Low Correlation

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="6">PROGRAMMING WITH PYTHON AND LAB</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="6">ELECTIVEPAPER II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td>Credits</td><td>3</td><td>Course Code</td><td></td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td colspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2"></td><td colspan="2">3</td><td>--</td><td colspan="2">1</td><td>4</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">• Describe the core syntax and semantics of Python programming language.
• Discover the need for working with the strings and functions.
• Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
• Understand the usage of packages and Dictionaries
• To know the costs and profit maximization</td></tr>
<tr><td colspan="2" rowspan="4">Course Outline</td><td colspan="6">UNITI-Introduction to Python–Origins–Features–Downloading and Installing Python– Running Python – Python Documentation. Getting Started – Program Output statement – Program Input function – Python Basics – Statements and syntax –Variable Assignment – Identifiers – Numbers – Introduction – Integers – Double Precision Floating Point Numbers – Complex Numbers – Operators – Built-in functions for all numeric types.</td></tr>
<tr><td colspan="6">UNIT II-Sequences: Strings, Lists and Tuples – Sequences – Strings – Strings and Operators–String-Only Operators–Built-in Functions–String Built-inMethod–Lists–Operators-Built-inFunctions–List Type Built-in Methods–Tuples—Tuple Operators and Built-in Functions-</td></tr>
<tr><td colspan="6">UNIT III- Conditionals and Loops–If statement– else statement– elif statement–Conditional expressions–while statement–for statement–break statement–Continue statement–pass statement –Functions and Functional Programming–Calling Functions–Creating Functions–Passing Functions–Formal Arguments-Variable-Length Arguments.</td></tr>
<tr><td colspan="6">UNIT IV-Errors and Exceptions – Exceptions in Python – Detecting and Handling Exceptions Context Management – with statement – Raising Exceptions – Modules – Modulesand Files – Name spaces – Importing Modules – Features of Module - Import –Module Built-in Functions–Packages.</td></tr>
</table>

	UNIT V- Files and Input / Output: File Objects – File Built-in Functions – File Built-in Methods – File Built-in Attributes – Command-Line Arguments - File System –Object-oriented Programming – Introduction – Classes – Class Attributes –Instances– Instance Attributes.
Practical Course Outline	1. Program for Systemconfiguration 2. WorkingwithStrings 3. WorkingwithLists 4. WorkingwithTuples 5. WorkingwithDictionary 6. Workingwithconditionalloops–if, else, elif 7. Workingwithconditionalexpressions–for, while,break,continue 8. Implementingprogramsonfunctions 9. Workingwithfunction–formalargumentsandvariable-lengtharguments 10. WorkingwithDetectingandHandlingException 11. Workingwithmodules 12. Working withBuilt-inFunctions
Skills acquired from this course	1. Impart knowledge and skill in getting started with Python basic concepts. 2. Expose to the concepts of sequences, string and built-in-function of python. 3. Introduce the various control statements and looping for decision making. 4. Study the exceptions and error handling in program execution. 5. Gain knowledge on file management in Python Programming.
RecommendedTexts	Wesley J.Chun, "Core Python Programming", 2nd Edition, Pearson Education LPE, NewDelhi,2007.

ReferenceBooks	1. Mark Summerfield, Programming in Python 3, Pearson Education LPE, New Delhi, 1996. 2. Python Programming, Brain draper, kindle unlimited pvt.ltd. 3. Core Python Programming, Dr.R.Nageswara Rao, dreamtech pvtltd. Kindle. 4. The complete reference on Python, Martin.C.Brown MAC GrawHill pvt.ltd. 5. Coding for beginners using Python .Louie Stowell, kindle publishing pvt.ltd.
Website and e-Learning Source	1. https://www.programiz.com/python-programming 2. https://www.guru99.com/python-tutorials.html 3. https://www.w3schools.com/python/python_intro.asp 4. https://www.geeksforgeeks.org/python-programming-language/ 5. https://en.wikipedia.org/wiki/Python_(programming_language)

METHOD OF EVALUATION:

Continuous Internal Assessment	**End Semester Examination**		**Total**
	Theory	**Practical**	
25	**50**	**25**	**100**

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Develop and execute simple Python programs.

CLO2: Write simple Python programs using conditionals and looping for solving problems.

CLO3: Decompose a Python program into functions.

CLO4: Represent compound data using Python lists, tuples, dictionaries etc.

CLO5: Read and write data from/to files in Python programs.

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

3- Strong Correlation 2-Medium Correlation 1- Low Correlation

Titleof theCourse		**MATHEMATICSFORCOMPETIVEEXAMINATIONS-II**					
PaperNumber		**SEC 2**					
Category	Core	**Year**	I	**Credits**	2	**Course Code**	
		Semester	II				
InstructionalHours perweek		**Lecture**	**Tutorial**	**LabPractice**	**Total**		
		2	--	--	2		
Pre-requisite		12th StandardMathematics					
Objectives of theCourse		Aftertakingthecourse, Topreparethestudentsforcompetitiveexaminations					
CourseOutline		**Unit I:** Time and work – Time and distance – Problems on Trains.(Book1:Chapters15,17,18).					
		UnitII: Simpleinterest,compoundInterest–Bargraphs–PieCharts–LineGraphs.(Book1:Chapters21,22,37,38,39).					
		UnitIII: LogicalSequenceofWords–ArithmeticalReasoning–InsertingtheMissingCharacter.(Book2,Section:1,Chapters13–15)					
		UnitIV: DataSufficiency–DecisionMaking–VerificationofTruthoftheStatement.(Book2,Section:1,Chapters16,17,20.)					
		UnitV: Non-VerbalReasoning–AnalyticalReasoning–GroupingofIdenticalFigures.(Book2,Section:3,Chapter3,4,13)					

Extended Professional Component (is a part of internal component only, Nottobeincluded in the External Examinationquestionpaper)	Questionsrelatedtotheabovetopics,fromvariouscompetitive examinationsUPSC/TNPSC/otherstobesolved(Tobediscussedduringthe Tutorialhour)
Skills acquired fromthiscourse	Knowledge,problemsolving,analyticalability,professional competency,professionalcommunicationandtransferableskill.

Recommended Text	1.R.S.Aggarwal,*QuantitativeAptitudeforCompetitiveExaminations*,RevisedEdition,S.ChandandCompanyLtd.,RamNagar,NewDelhi,Reprint2022. 2. R.S.Agarwal,*AModernApproachToVerbalAndNonverbalReasoning*,S.Chand,2018.
ReferenceBooks	V.V.K.Subbiraj,*TestofReasoning–Verbal/Non-Verbal&GeneralIntelligenceforCompetitiveExaminations*,SuraBooks,2007

CourseLearningOutcomes

Thiscoursewillenablethestudentsto:

CONumber	COStatement	Knowledge Level
CO1	makecritiqueofquantitativeinformationusing proportionalreasoning	K5
CO2	Interpretandcompareweightedaverages,indices, ranking.	K2
CO3	identifyusesandmisusesofpercentagesrelatedtoaproperunderstanding ofthebases.	K1
CO4	examiningandestimatingpercentagesasratesper100	K3,K4
CO5	solveforanunknownquantityinproportional situation	K6

E-learningsource:www.tcyonline.com/tests/mathematics-competitive-examhttp://www.indiabix.com/online-test/non-verbal-reasoning-test/http://books.tamilcube.com/career/aptitude-test/non-verbal-reasoning/non-verbal-reasoning-questions-001.aspx

https://www.kent.ac.uk/careers/tests/spatialtest.htmhttp://www.careerbless.com/aptitude/qa/home.phphttp://www.careerride.com/online-aptitude-test.aspx

OFFICE AUTOMATION

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	2		2		3	4	25	75	100

Learning Objectives	
LO1	The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point.
LO2	The course is highly practice oriented rather than regular class room teaching.
LO3	To acquire knowledge on editor, spread sheet and presentation software.

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	Introductory concepts: Hardware and Software - Memory unit – CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems - Introduction to Programming Languages.	
II	Word Processing: File menu operations - Editing text – tools, formatting, bullets and numbering - Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, printing – Preview, options, merge.	
III	Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying	
IV	Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	
V	Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.	
	Total	

Course Outcomes	
CO1	Understand the basics of computer systems and its components.
CO2	Understand and apply the basic concepts of a word processing package.
CO3	Understand and apply the basic concepts of electronic spreadsheet software.
CO4	Understand and apply the basic concepts of database management system.
CO5	Understand and create a presentation using PowerPoint tool.

Textbooks	
1	Peter Norton, “Introduction to Computers” –Tata McGraw-Hill.
Reference Books	
1	Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw- Hill.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	Web content from NDL / SWAYAM or opensource web resources