B.Sc., MATHEMATICS

COURSE STRUCTURE WITH SYLLABUS

PROGRAMME CODE: 3USMAT

2024-2025

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)

Accredited by NAAC- An ISO 9001:2015 Certified Institution

SUNDARAKKOTTAI, MANNARGUDI–614016.

TAMILNADU, INDIA.

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B.Sc., MATHEMATICS
CHOICE BASED CREDIT SYSTEM– LEARNING OUTCOMES BASED CURRICULUM FRAME WORK (CBCS–LOCF)
(For the candidates admitted in the academic year 2024–2025)

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a "cafeteria" type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

OUTCOME-BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses with in a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education

institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education Course: is defined as a theory, practical or theory cum practical subject studied in a semester.
Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.
Programme: is defined as the specialization or discipline of a Degree.
Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.
Programme Specific Outcomes (PSOs): PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.
Some important terminologies repeatedly used in LOCF.
Core Courses (CC) A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.
Discipline Specific Elective Courses (DSE) Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

Generic Elective Courses An elective course chosen generally from an **unrelated discipline/subject,** with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.
Non Major Elective (NME). A student shall choose at least two Non – major Elective Courses (NME) from outside his /her department. Non –Major Elective I – Those who choose Tamil in Part

I can choose a non –major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studies in school level or b) Special Tamil if Tamil language was studies upto 10^{th} & 12^{th} std.

Skill Enhancement Courses (SECs) These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge**.**

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Undergraduate Programme:

Programme Pattern: The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III: Core Course (Theory, Practicals, Generic Elective courses , Discipline Specific Elective courses , Compulsory and Optional Allied courses, Project)

Part-IV: Non Major Elective, Foundation Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

Part –V

Extension activity, Gender studies

EXAMINATION

Continuous Internal Assessment (CIA):

UG - Distribution of CIA Marks

Passing Minimum: 40 %

Assisgnment-3	=	30%
Test-2	=	50%
Seminar	=	10%
Attendance	=	10%

Question Paper Pattern

Part A:

Part A 1 (10X1=10 marks)
One word question/ Fill in /True or False/ Multiple Choice QuestionsTwo Questions from Each unit

Part A 2 (5X2=10 marks)

Short Answers/ Match the following
One question from Each unit
Total Marks – 20
Part B: (5X5=25 marks)
Paragraph Answers
Either/ or type, One Question from each unit
Part C: (10X3=30)
Essay Type Answers
Answer 3 out of 5 Questions
One Question from each unit
Part A: K1 Level
Part B: K2, K3 and K4 Level
Part C: K5 and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	**It is the ability to remember the previously learned**
2	K2	Comprehension/ Understanding	**The learner explains ideas or concepts**
3	K3	Application/Applying	**The learner uses information in a new way**
4	K4	Analysis/Analysing	**The learner distinguishes among different parts**
5	K5	Evaluation/Evaluating	**The learner justifies a stand or decision**
6	**K6**	**Synthesis /Creating**	**The learner creates a new product or point of view**

WEIGHTAGE of K –LEVELS IN QUESTION PAPER

(Cognitive Level) K-LEVELS →	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
END SEMESTER EXAMINATIONS (ESE)	20		25		30		**75**
Continuous Internal Assessment (CIA)	20		25		30		**75**

QUESTION PATTERN FOR END SEMESTER EXAMINATION/ Continuous Internal Assessment

PART		**MARKS**
PART –A I. (No choice ,One Mark) **TWO** questions from each unit	(10x1=10)	**20**
II. (No choice, Two Mark) **ONE** question from each unit	(5x2=10)	
PART –B (Either/ or type,5-Marks) **ONE** question from each unit	(5x5=25)	**25**
PART –C (3 out of 5) (10Marks) **ONE** question from each unit	(3x10=30)	**30**
	Total	**75**

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION							
DURATION: 3.00 Hours.							**Max Mark :75**
K-LEVELS	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
PART							
PART –A (One Mark, No choice) (10x1=10)	10						**10**
(2-Marks,Nochoice) (5x2=10)	10						**10**
PART –B (5-Marks)(Either/or type) (5x5=25)		5	10	10			**25**
PART –C (10 Marks)(3 out of 5) (3x10=30) Courses having only **K5,K6** levels, K5 level- 3 Questions, K6 level- 2 Questions **(One K6 level question is compulsory)**					20	10	**30**
Total	**20**	**05**	**10**	**10**	20	10	**75**

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) , respectively. These two are calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{N} C_i G_i}{\sum_{I=1}^{n} C_i}$	$WAM\ (Weighted\ Average\ Marks) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{I=1}^{n} C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses **Passed** in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

1. For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
2. For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
3. Grade in Part –IV and Part-V shall be shown separately and it shall not be taken

into account for classification.

4.A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.

5.Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses - UG

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	NA	RA

The candidate's performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including pervious semester /s is indicated by **Cumulative Grade Point Average (CGPA).**

Table-3: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

The candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good".

VISION

Promoting the arithmetic skill in the minds of the women students who hail from the rural and economically weaker section of the society, as Mathematics is the queen of Sciences.

MISSION

- To promote the analytical thinking through logical reasoning
- To create a mind set for quick arithmetic calculations

PROGRAMME OUTCOMES FOR B.Sc., DEGREE PROGRAMMES

PO No.	Programme Outcomes (*Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)*
PO-1	**Disciplinary knowledge**: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate program of study in Bachelor of Science.
PO-2	**Critical thinking, Problem Solving and Reflective thinking:** think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, with self awareness and reflexivity of both self and society.
PO-3	**Analytical & Scientific Reasoning:** evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO-4	**Research-related Skills:** develop a sense of capability for relevant/appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation.
PO-5	**Digital literacy and Effective Communication:** use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic mediain English and in one or more Indian languages, and make meaning of the world by connecting people, ideas , books, media and technology; efficiently communicate thoughts and ideas in a clear and concise manner.
PO-6	**Individual and Team Work:** effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interest so for a common cause and work efficiently as a member of a team.

PO-7	**Multicultural Competence and Social Interaction:** understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO-8	**Awareness of Ethical issues, Human values and Gender Issues:** embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work and understand the value of relationship between self and the community and aware of the various issues concerning women and society.
PO-9	**Awareness of Environment and Sustainability:** understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO-10	**Self directed and Lifelong learning:** acquire knowledge and skills, including learning "how to learn", that are necessary for participating in learning activities throughout life andto engage in independent and life-long learning in the broadest context of socio-technological changes.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO No.	Program Specific Outcomes (B.Sc., Mathematics)
PSO1	Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.
PSO2	Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.
PSO3	To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

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CHOICE BASED CREDDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS – LOCF)
(For the candidates admitted in the academic year 2024 – 2025)

ELIGIBILITY: A Pass in 10+2 with Mathematics as one of the core subject

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/ Week	Ins. Hours/Week				Credit	Exam Hours	Marks		Total
						L	T	P	O/S			CIA	ESE	
I	I	Language Course-I	U24LC101	Pothutamil- 1 Tamil Ilakkiya varalaru - 1	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-I	U24ELC101	General English-I	6	5	1	-	-	3	3	25	75	100
	III	Core Course-I	U24MA101	Algebra & Trigonometry	5	4	1	-	-	5	3	25	75	100
		Core Course-II	U24MA102	Differential Calculus	4	3	1	-	-	4	3	25	75	100
		Allied Course-I	U24APY101	Allied Physics- I	3	2	1	-	-	2	3	25	75	100
		Allied Practical I	U24APY102P	Allied Physics Practical	2	1	-	1	-	- -	--	---	--	--
	IV	Non Major Elective-I		Non Major Elective-I	2	1	1	-	-	2	3	25	75	100
		Foundation Course	U24FCMA11	Bridge Mathematics	2	1	1	-	-	2	3	25	75	100
				TOTAL	**30**	22	**7**	**1**	**-**	**21**	-	-	-	**700**
II	I	Language Course- II	U24LC202	Pothutamil- 2 Tamil Ilakkiya varalaru - 2	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-II	U24ELC202	General English-II	6	5	1	-	-	3	3	25	75	100
	III	Core Course–III	U24MA203	Analytical Geometry (Two& Three Dimensions)	5	4	1	-	-	5	3	25	75	100
		Core Course -IV	U24MA204	Integral Calculus	4	3	1	-	-	4	3	25	75	100
		Allied Practical -I	U24APY102P	Allied Physics Practical	2	1	-	1	-	2	3	25	75	100
		Allied Course-II	U24APY203	Allied Physics- II	3	2	1	-	-	2	3	25	75	100
	IV	Non Major Elective-II		Non Major Elective-II	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course-I	U24SEMA21	Mathematics for Competitive Examinations	2	1	1	-	-	2	3	25	75	100
				Total	**30**	**22**	**7**	**1**		**23**	-	-	-	**800**

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/Week	Ins. Hours/Week				Credit	Exam Hours	Marks		Total
						L	T	P	O/S			CIA	ESE	
III	I	Language Course- III		Pothutamil- 3 Tamilaga Varalarum Panpadum	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-III		General English-III	6	5	1	-	-	3	3	25	75	100
	III	Core Course -V		Vector Calculus and its Applications	5	4	1	-	-	5	3	25	75	100
		Core Course -VI		Differential Equations and Applications	4	3	1	-	-	4	3	25	75	100
		Allied Course-III		Introduction to Computer Office Automation	3	2	1	-	-	2	3	25	75	100
		Allied Practical -II		Office Automation Lab	2	1	-	1	-	--	--	--	--	--
	IV	Skill Enhancement Course –II		Quantitative Reasoning - I	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course –III		Quantitative Reasoning - II	2	1	1	-	-	2	3	25	75	100
			TOTAL		**30**	**22**	**7**	**1**		**21**		-	-	**700**
IV	I	Language Course- IV		Pothutamil- 4 Tamilum Ariviyalum	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-IV		General English-IV	6	5	1	-	-	3	3	25	75	100
	III	Core Course - VII		Industry Module-Industrial Statistics	4	3	1	-	-	4	3	25	75	100
		Core Course - VIII		Elements of Mathematical Analysis	5	4	1	-	-	5	3	25	75	100
		Allied Practical - II		Office Automation Lab	2	1	-	1	-	2	3	25	75	100
		Allied Course-IV		Fundamentals of C Programing	3	2	1	-	-	2	3	25	75	100
	IV	Skill Enhancement Course–IV		Probability and Statistics	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course –V		Computational Mathematics	2	1	1	-	-	2	3	25	75	100
			TOTAL		**30**	**22**	**7**	**1**	**-**	**23**	-	-	-	**800**
	Internship/ Industrial visit/Field visit				**-**	**-**	**-**	**-**	**-**	**-**	-	-	-	**-**
V	III	Core Course - IX		Abstract Algebra	5	4	1	-	-	5	3	25	75	100
		Core Course –X		Real Analysis	5	3	1	-	1	5	3	25	75	100
		Core Course -XI		Mathematical Modelling	5	4	1	-	-	4	3	25	75	100
		Core Course - XII		Mechanics	5	4	1	-	-	4	3	25	75	100
		Elective Course–I		Difference equations with application / Numerical Methods with Applications / Introduction to Sagemath	4	3	1		-	3	3	25	75	100
		Elective Course–II		Operations Research / Number Theory& Cryptography / Introduction to MATLAB	4	3	1	-	-	3	3	25	75	100
	IV	Environmental Studies		Environmental Studies	2	1	-	-	1	2	3	25	75	100

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/Week	Ins. Hours/Week				Credit	Exam Hours	Marks		Total
						L	T	P	O/S			CIA	ESE	
		Internship/ Industrial visit/ Field visit		Internship/ Industrial visit/ Field visit	-	-	-	-	-	2	-	-	-	-
			TOTAL		**30**	**22**	**6**	**-**	**2**	**28**		-	-	**700**
VI	III	Core Course -XIII		Linear Algebra	6	4	1	-	1	4	3	25	75	100
		Core Course -XIV		Complex Analysis	6	4	1	-	1	4	3	25	75	100
		Core Project		Research Methods and Project with viva-voce/Group Project	5	**-**	1	4	-	5	3	25	75	100
		Elective Course -III		Discrete Mathematics / Astronomy / Introduction to LATEX	4	3	1		-	3	3	25	75	100
		Elective Course -IV		Graph Theory and Applications / Fuzzy Sets & its applications / Introduction to R - Programming	4	3	1	-	-	3	3	25	75	100
	IV	Value Education		Value Education	2	1	-	-	1	2	3	25	75	100
		Professional competency Course		Aptitude and reasoning skills for competitive	2		1	-	1	2	3	25	75	100
	V	Gender Studies		Gender Studies	1	1	-	-	-	1	3	25	75	100
		Extension activity		Extension activity	-	-	-	-	-	1	-	-	-	-
				TOTAL	**30**	**16**	**6**	**4**	**4**	**25**	-	-	-	**800**
				GRAND TOTAL	**180**	**126**	**40**	**8**	**6**	**141**	-	-	-	**4500**
	*Extra Credit			MOOC/SWAYAM/NPTEL						2	-	-	-	-
				Value Added Courses (Atleast One Per Year)						2	-	-	-	-

L-Lecture **T-Tutorial** **P-Practical** **S-Seminar**

Credit Distribution for B.Sc., Mathematics

S.No	Part	Subject	No. of Courses	Total Credits
1	I	Language	4	12
2	II	English	4	12
3	III	Core Course –Theory	14	62
4		Core Project	1	05
5		AC (Elective Generic/ Discipline Specific Elective -I) -Theory	4	08
6		AC (Elective Generic/ Discipline Specific Elective -I) –Practical	2	04
7		Elective Course-Theory	4	12
8	IV	Non-Major Elective	2	04
9		Foundation Course – FC	1	02
10		Skill Enhancement Course	5	10
11		Internship/ Industrial visit/ Field visit	1	02
12		Environmental Studies	1	02
13		Value Education	1	02
14		Professional competency skill	1	02
15	V	Extension Activity	1	01
16		Gender Studies	1	01
Total			47	141

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Course Code	Title of The Paper
I	IV	NME-I	U24NMEMA11	Business Mathematics I
II	IV	NME-II	U24NMEMA22	Business Mathematics II

SEMESTER I

Semester: I-CC- I-:ALGEBRA AND TRIGONOMETRY

Ins. Hrs./Week:5 **Course Credit**:5 **Course Code**: **U24MA101**

Unit I: Reciprocal Equations (15 Hours)

Reciprocal Equations -Standard form–Increasing or decreasing the roots of a given eqn.- Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems.

Unit II:Some Expansions (15 Hours)

Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems.

Unit III: Eigen values and Eigen Vectors (15 Hours)

Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems.

Unit IV:Expansions of Trigonomometric Identities (15 Hours)

Expansions of sinnθ, cosnθ in powers of sinθ, cosθ - Expansion of tan nθ in terms of tan θ, 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 θ, cos θ and tan θ in terms of θ –related problems.

Unit V: Hyperbolic functions (15 Hours)

Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.

Total Lecture Hours - 75

COURSE OUTCOME

The students should be able to

1. Classify and Solve reciprocal equations.
2. Find the sum of binomial, exponential and logarithmic series.
3. Find Eigen values, Eigen vectors, verify Cayley – Hamilton theorem and diagonalize agiven matrix
4. Expand the powers and multiples of trigonometric functions in terms of sine and cosine.
5. Determine relationship between circular and hyperbolic functions and the summation of trigonometric series.

TEXT BOOKS

1. Manicavachagam Pillai T.K., Natarajan T., Ganapathy K.S. 2007. Algebra

Volume I, S.Viswanathan Pvt. Limited, Chennai.

2. Manicavachagam Pillai.T.K., Natarajan.T., Ganapathy K.S., 2013. Algebra, Volume II, S.Viswanathan Pv.t Limited, Chennai.

3. Arumugam S, Thangapandi Issac A and Somasundaram A. 1999. Trigonometry and Fourier Series. New Gamma Publications, Palayamkkottai.

UNIT I : Chapter 6 : Sec. 16,17,19,30 of (1)

UNIT II : Chapter 3 : Sec. 1,1.1,1.2,6 to 10,14 of (1)
Chapter 4 : Sec 2,3,5,6,7,11 of (1)

UNIT III : Chapter 2 : Sec. 8,16 of (2)

UNIT IV : Chapter 1 : Sec. 1.1 to 1.3

UNIT V : Chapter 2 : Sec. 2.1,2,2,

Chapter 3 : Full & Chap. 4 : Sec. 4.1,4.2

REFERENCE BOOK(S)

1. Burnstine. W.S. and Panton. A.W., Theory of equations.
2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
3. Thomas.G.B. and Finney. R.L., Calculus, 9th Ed., Pearson Education, Delhi, 2005.
4. Durell. C. V. and Robson., Advanced Trigonometry, Courier Corporation, 2003.
5. Stewart J., Redlin.L., and Watson. S, Algebra and Trigonometry, Cengage Learning, 2012.
6. Calculus and Analytical Geometry, Thomas. G.B. and Finny R. L., Pearson Publication, 9th Edition, 2010.

E-RESOURCES

1. https://byjus.com/jee/theory-of-equations/

2. https://byjus.com/maths/eigen-values/

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	1	3	2	2	3	3	1	3	3	2	2	1
CLO2	2	1	3	1	1	3	1	3	1	1	3	2	1
CLO3	3	2	3	1	3	2	1	2	3	2	3	1	1
CLO4	1	2	3	2	3	3	1	2	3	2	3	2	1
CLO5	3	1	2	3	3	3	1	2	3	1	3	2	1

Strong: 3 Medium: 2 Low:1

Semester: I-CC- II: Differential Calculus

Ins. Hrs./Week:4 **Course Credit**:4 **Course Code**: **U24MA102**

UNIT-I: Successive Differentiation **(12 Hours)**

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.

UNIT-II: Partial Differentiation **(12 Hours)**

Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions.

UNIT-III: Partial Differentiation (Continued) **(12 Hours)**

Homogeneous functions – Partial derivatives of a function of two functions – Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers.

UNIT-IV: Envelope **(12 Hours)**

Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.

UNIT-V: Curvature **(12 Hours)**

Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates.

Total Lecture Hours - 60

COURSE OUTCOME

The students should be able to

1. Expand the nth derivative, form equations involving derivatives and apply Leibnitz formula.
2. Find the partial derivative and total derivative coefficient.
3. Determine maxima and minima of functions of two variables and use the Lagrange's method of undetermined multipliers.
4. Classify the envelope of a given family of curves.
5. Find the evolutes and involutes and find the radius of curvature using polar co-ordinates.

TEXT BOOKS

1. Narayanan S. and Manicavachagam Pillai T.K. 2003. Calculus Volume I. S.Viswanathan (Printers & Publishers) Pvt. Limited, Chennai.

UNIT - I Chapter III : Sec. 1.1 to 1.6 & 2.1

UNIT- II Chapter VIII : Sec. 1.1 to 1.5

UNIT- III Chapter VIII : Sec. 1.6,1.7,4,5

UNIT- IV Chapter X : Sec. 1.1 to 1.4

UNIT -V Chapter X : Sec. 2.2 to 2.6

REFERENCE BOOK(S)

1. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer-Verlag, New York, Inc., 1989.
2. T. Apostol, 1975, Calculus, Volumes I and II.
3. S. Goldberg, 1976 Calculus and mathematical analysis, John Wiley and Sons, Inc..
4. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
5. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010.
6. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) Pvt.Ltd. (Pearson Education), Delhi, 2007.

E-RESOURCES

1. https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	2	1	3	2	3	1	3	2	3	3	2	1
CLO2	1	2	3	3	1	3	1	3	2	1	3	2	1
CLO3	3	2	3	3	3	1	1	2	3	2	3	2	1
CLO4	2	1	3	3	2	3	1	2	3	2	3	2	1
CLO5	3	1	2	3	3	3	1	2	3	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI,MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2024 -2025)
DEPARTMENT OF PHYSICS
For the students of I B.Sc. Mathematics

Semester: I – AC - I: Allied Physics – I

Ins. Hrs. / Week:3 **Course Credit: 2** **Course Code: U24APY101**

UNIT – I Waves, Oscillations and Ultrasonics (10 Hours)

Simple harmonic motion (SHM) – Composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – Laws of transverse vibrations of strings – Determination of AC frequency using Sonometer (steel and brass wires) – Ultrasound – production – piezoelectric method – application of ultrasonics: Medical field – Lithotripsy.

UNIT – II: Properties of Matter (10 Hours)

***Elasticity*:** Elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum. ***Viscosity*:** Streamline and Turbulent motion – Critical Velocity – Coefficient of viscosity – Poiseuille's formula – Comparison of viscosities – Burette method. ***Surface tension*:** Definition – Molecular theory – Droplets formation – shape, size and lifetime – COVID transmission through droplets, saliva – Drop weight method – Interfacial surface tension.

UNIT – III: Heat and Thermodynamics (8 Hours)

Joule - Kelvin effect – Joule - Thomson Porous Plug experiment – Theory – Temperature of inversion – Liquefaction of Oxygen – Linde's process of liquefaction of air – Liquid Oxygen for medical purpose – Thermodynamic System – Thermodynamic Equilibrium – Laws of thermodynamics – Heat engine – Carnot's cycle – Efficiency – Entropy – Change of entropy in reversible and irreversible process.

UNIT – IV: Electricity and Magnetism (8 Hours)

Potentiometer – Principle – Measurement of Thermoemf using potentiometer –Magnetic field due to a current carrying conductor – Biot-Savart's law – Field along the axis of the coil carrying current – Peak, Average and RMS values of ac Current and Voltage – Power factor and Current values in an AC circuit – Types of switches in household and factories – Smart wifi switches -Fuses and Circuit breakers in houses.

UNIT – V: Digital Electronics and Digital India (9 Hours)

Logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – Universal building blocks – Boolean algebra – De Morgan's theorem – verification – overview of Government initiatives: software technological parks under MeitY, NIELIT- Semiconductor laboratories under Dept. of Space – an introduction to Digital India**.**

Total Lecture Hours – 45

COURSE OUTCOME

1. Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.
2. Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life. Connect droplet theory with Corona transmission.
3. Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.
4. Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyze them mathematically verify circuits and apply the concepts to construct circuits and study them.
5. Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. Infer operations using Boolean algebra and acquire elementary ideas of IC circuits. Acquire information about various Govt. programs/ institutions in this field.

TEXT BOOK(S)

1. R. Murugesan (2001), *Allied Physics*, S. Chand & Co, New Delhi.
2. Brijlal and N.Subramanyam (1994), *Waves and Oscillations*, Vikas Publishing House, New Delhi.
3. Brijlal and N.Subramaniam (1994), *Properties of Matter*, S.Chand & Co., New Delhi.
4. J. B. Rajam and C.L.Arora (1976), *Heat and Thermodynamics,* (8^{th} edition), S.Chand & Co., New Delhi.
5. R. Murugesan (2005), *Optics and Spectroscopy*, S.Chand & Co,New Delhi.
6. A. Subramaniyam, *Applied Electronics, 2^{nd}Edn.,* National Publishing Co.,Chennai.

REFERENCE BOOK(S)

1. Resnick Halliday and Walker (2018), *Fundamentals of Physics* (11^{th}edition),John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. V. R. Khanna and R.S.Bedi (1998), *Textbook of Sound*, 1^{st}Edn. Kedharnaath Publish & Co, Meerut.
3. N. S. Khare and S.S.Srivastava (1983), *Electricity and Magnetism*, 10^{th}Edn., Atma Ram & Sons, New Delhi.
4. D. R. Khanna and H.R. Gulati (1979), *Optics*, S. Chand & Co. Ltd., New Delhi.
5. V. K. Metha (2004), *Principles of Electronics*, 6^{th}Edn., S.Chand and Company.

E- RESOURCES

1. https://youtu.be/M_5KYncYNyc
2. https://youtu.be/ljJLJgIvaHY
3. https://youtu.be/7mGqd9HQ_AU
4. https://youtu.be/h5jOAw57OXM
5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/

Course Learning Outcome (for Mapping with POs and PSOs)

	Pos										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	3	2	3	3	3	1	2	2	2	3	2	1
CLO2	3	3	2	1	3	3	2	2	2	2	3	2	1
CLO3	3	2	2	3	3	3	2	3	3	2	3	2	1
CLO4	3	3	1	2	3	3	2	3	3	2	3	2	1
CLO5	3	2	2	2	3	3	2	2	2	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI,MANNARGUDI– 614 016.
(For the candidates admitted from the academic year 2024 -2025)
DEPARTMENT OF PHYSICS
For the students of I B.Sc. Mathematics

Semester: I - AP- I: Allied Physics Practical
(Any Eight Experiments)

Ins. Hrs. /Week: 2 **Course Credit: 2** **Course Code: U24APY102P**

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever, scale and telescope
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by torsional oscillations without mass
5. Surface tension and interfacial Surface tension – drop weight method
6. Comparison of viscosities of two liquids – burette method.
7. Specific heat capacity of a liquid – half time correction
8. Verification of laws of transverse vibrations using sonometer
9. Calibration of low range voltmeter using potentiometer
10. Determination of thermo emf using potentiometer
11. Verification of truth tables of basic logic gates using ICs
12. Verification of De Morgan's theorems using logic gate ICs.
13. Use of NAND as universal building block.
14. Radius of curvature of lens by forming Newton's rings
15. Thickness of a wire using air wedge
16. Wavelength of mercury lines using spectrometer and grating
17. Refractive index of material of the lens by minimum deviation
18. Refractive index of liquid using liquid prism
19. Determination of AC frequency using sonometer
20. Specific resistance of a wire using PO box
21. Thermal conductivity of poor conductor using Lee's disc
22. Determination of figure of merit table galvanometer
23. Determination of Earth's magnetic field using field along the axis of a coil
24. Characterisation of Zener diode
25. Construction of Zener/IC regulated power supply.
26. Construction of AND, OR, NOT gates using diodes and transistor.
27. NOR gate as a universal building block.

Total Lecture Hours – 30

COURSE OUTCOME

1. Understand the laboratory technique and to educate and motivate the students in the field of Physics.
2. Summarize the working of semiconductor devices like Zener diode, ICs and practical devices.
3. Relate the importance of interpreting improving practical models based on observation.
4. Appreciate interdisciplinary nature of science.
5. Apply the home appliances in electronic devices.

TEXT BOOK(S)

1. Dr. S. Somasundaram, *Practical Physics*, Apsara Publications, Tiruchirappalli, 2012.

2. R. Sasikumar, *Practical Physics*, PHI Learning Pvt. Ltd, New Delhi2011.

REFERENCE BOOK(S)

1. S. Srinivasan, *A Text Book of Practical Physics*, Sultan Chand Publications.

E – RESOURCES

1. https://youtu.be/Q8Otf6k3uGk

2. https://youtu.be/8DhfUz0idwM

Course Learning Outcome (for Mapping with POs and PSOs)

	Pos										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	3	2	2	3	2	2	3	2	2	3	2	3
CLO2	2	3	3	3	2	2	3	2	3	3	2	3	2
CLO3	3	2	3	2	3	3	2	3	3	3	3	3	3
CLO4	3	3	3	3	3	2	3	2	2	2	3	2	3
CLO5	2	2	3	3	2	3	3	3	3	2	3	3	2

Strong: 3 Medium: 2 Low: 1

Semester: I- NME - I : Business Mathematics - I

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code:U24NMEMA11**

UNIT – I: Logical Statement and Truth Table (6 Hours)

Logical statement - Truth Tables- Negation - Compounding - Negation of Compound Statements - Tautologies and Fallacies - Propositions - Algebra of Propositions - Conditional Statements – Biconditional Statements.

UNIT – II: Theory of Sets (6 Hours)

A Set - Elements of a set - Methods of Describing a Set - Types of Sets - Venn diagrams - Operations on sets - Intersection and Union of Sets - Complement of a set - De- Morgan's Law.

UNIT - III: Logarithms (6 Hours)

Laws of Operations - Logarithmic Tables - Operations with Logarithms – Compound Interest – Depreciation – Annuities.

UNIT-IV: Permutations and Combinations (6 Hours)

Fundamental rule of counting – Permutations – Factorial Notation – Permutation of n Different Things – Circular Permutations – Permutations of Things not all Different – Restricted Permutations.

UNIT – V: Arithmetic and Geometric Progression (6 Hours)

Arithmetic Progression - Sum of a series in A.P - Arithmetic Mean.

Total Lecture Hours- 30

COURSE OUTCOME

The students should be able to

1. Understand the concept of logical statement, truth table, negation, negation of compound statements, arguments and joint denial.
2. Extrapolate the sets, algebra of Sets and its properties.

3. Develop the knowledge of calculations with logarithms in case of compound interest.
4. Improve the concepts of permutations and combination and its difference.
5. Derive the arithmetic and geometric progression and its applications in solving problems.

TEXT BOOKS

1. Sancheti.D.C and Kapoor.V.K, 2014. Business Mathematics, Revised Edition. Sultan Chand & Sons, Educational Publishers, New Delhi.
   UNIT I Chapter 1 : Sec. 1.1 to 1.10
   UNIT II Chapter 2 : Sec. 2.1 to 2.10
   UNIT III Chapter 7 : Sec. 7.1 to 7.2
   UNIT IV Chapter 9 : Sec. 9.1 to 9.7
   UNIT V Chapter 12 : Sec. 12.1 to 12.3

REFERENCE BOOK(S)

1. Gupta, Saxena Dr.Sinha, 2019. Business Mathematics, SBPD Publications.
2. Mariappan.P, 2015. Business Mathematics, Pearson India Education Services Pvt. Limited.
3. Rayarikar.A.V and Dixit.P.G, 2019. Business Mathematics, Nirali prakashan advancement of knowledge.
4. Shuka.S.M, 2019. Business Mathematics, Sahitya Bhawan Publications, Revised.
5. Vittal.P.R, 2018. Mathematics Foundation, Re-Edition, Margham Publications.

E_RESOURCES

1. https://www.whitman.edu/mathematics/higher_math_/section01.01.html
2. https://www.researchgate.net/publication/297319798_Set_theory
3. https://www.researchgate.net/publication/50315356_APPLICATION_OF_THE_PRINCIPLES_OF_PERMUTATION_AND_COMBINATION_IN_MATHEMATICS_IN_TELECOMMUNICATIONS
4. https://www.onlinemathlearning.com/geometric-sequences-nth-term.html
5. https://www.toppr.com/ask/content/concept/arithmetico-geometric-progressions-207710/

Course Learning Outcome (for Mapping with POs and PSOs)

	Pos										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	2	3	2	3	3	3	1	2	3	3	2	1
CLO2	2	1	2	1	2	3	2	3	1	1	3	2	1
CLO3	3	2	3	2	1	3	1	2	3	2	3	2	1
CLO4	1	2	3	2	3	3	2	2	3	2	3	2	1
CLO5	3	1	2	3	3	3	1	2	3	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SENGAMALATHAYAAREDUCATIONALTRUSTWOMEN'SCOLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: I-FC: Bridge Mathematics

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code : U24FCMA11**

UNIT-I: **(6 Hours)**

Algebra: Binomial theorem, General term, middle term, problems based on these concepts

Unit II: **(6 Hours)**

Sequences and series (Progressions). Fundamental principle of counting. Factorial n.

Unit III: **(6 Hours)**

Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.

Unit IV: **(6 Hours)**

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.

Unit V: **(6 Hours)**

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.

Total Lecture Hours –30

COURSE OUTCOME

The students should be able to

1. Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems
2. Find the various sequences and series and solve the problems related to them. Explain the principle of counting.
3. Find the number of permutations and combinations in different cases. Apply the principleof counting to solve the problems on permutations and combinations
4. 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.
5. 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.

TEXT BOOK(S)

1. NCERT class XI and XII text books.
2. Any State Board Mathematics text books of class XI and XII

REFERENCE BOOK(S)

1. Shanti Narayan, Mittal R. K, Integral Calculus for Competitions, S. Chand & Company Ltd, New Delhi.
2. Gupta S.C, Kapoor. V. K, 2002, Fundamentals of Mathematical Statistics, 11 Ed., Sultan Chand & Sons, New Delhi.
3. Nivadita Gupta, Mathematics-I, Kalyani Publishers, New Delhi.

E-RESOURCES:

1. https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	1	3	2	3	3	3	1	2	3	3	2	1
CLO2	2	1	3	1	3	3	2	3	1	1	3	2	1
CLO3	3	2	3	1	3	3	1	2	3	2	3	2	1
CLO4	1	2	3	2	3	3	1	2	3	2	3	2	1
CLO5	3	1	2	3	3	3	1	2	3	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER II

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI-614016

(For the Candidates admitted in the academic year 2024–2025)

DEPARTMENT OFMATHEMATICS

B.Sc., MATHEMATICS

Semester :II-CC-III: Analytical Geometry (Two & Three Dimensions)

Ins.Hrs./Week:5 **Course Credit**:5 **Course Code**: U24MA203

UNIT-I :Hyperbola **(15 Hours)**

Equation of a hyperbola-Tracing the hyperbola-Tangent and normal at the point-The asymptotes - Angle between the asymptotes -Conjugate hyperbola - The asymptotes of the hyperbola - Conjugate diameter – Rectangular hyperbola.

UNIT-II: Polar Equations **(15 Hours)**

Polar coordinates-Equation of a straight line -Circle-The -Polar equation of a conic – The Equation of the chord of the conic – The asymptotes of the conic – The equation of the normal at the point.

UNIT-III : Planes **(15 Hours)**

System of Planes -Angle between the planes-Length of the perpendicular – The equation of the planes bisecting the angle between the planes.

UNIT-IV :Straight Line **(15 Hours)**

A straight line –Symmetrical form-The plane and the straight line-Angle between a plane and a line– coplanar lines - The shortest distance between two given lines.

UNIT-V : Sphere **(15 Hours)**

Equation of a sphere – General equation- Length of tangent to the sphere-Plane section of a sphere - Intersection of two spheres- Tangent plane to the sphere.

Total Lecture Hours-75

COURSE OUTCOME

The students should be able to

1. Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola.
2. Expand the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola.
3. Explain in detail the system of Planes.
4. Determine in detail the system of Straight lines.
5. Find in detail the system of Spheres.

TEXTBOOKS

1. Manicavachagom Pillay T.K., Natarajan T., 2008. A textbook of Analytical Geometry part-I Two Dimensions, S.Viswanathan Pvt. Ltd,.
2. Manicavachagom Pillay T.K., Natarajan T., 2013. A text book of Analytical Geometry part-II Three Dimensions, S.Viswanathan Pvt. Ltd,.

UNIT- I Chapter VIII:Sec.1to10of(1)

UNIT- II Chapter IX : Sec.1 to12 of (1)

UNIT- III Chapter II : Sec. 1 to11of (2)

UNIT-IV Chapter III : Sec. 1to 8 of(2)

UNIT-V Chapter IV: Sec. 1 to 8 of (2)

REFERENCE BOOKS:

1.G.B.Thomas and R. L. Finny Calculus and Analytical Geometry, Pearson Publication, 9th Edition, 2010.

2. Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., NewYork,1961.

3. EarlW.Swokowski and Jeffery A.Cole, Algebra and Trigonometry with Analytic Geometry, Twelth 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-HillBook Company, Inc. New York, 1962.

E-RESOURCES

1.https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	1	3	2	3	3	3	1	2	3	3	1	1
CLO2	2	1	3	1	3	3	2	2	1	1	3	2	1
CLO3	3	2	3	1	2	3	1	2	2	2	3	2	1
CLO4	1	2	3	2	3	3	1	2	3	2	3	2	1
CLO5	3	1	2	3	3	3	1	2	3	1	3	2	1

Strong: 3 Medium: 2 Low: 1

Semester: II-CC- IV: Integral Calculus

Ins. Hrs./Week: 4 **Course Credit**: 4 **Course Code**: **U24MA204**

UNIT-I: Integration **(12 Hours)**

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.

UNIT-II: Multiple Integrals **(12 Hours)**

Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Change of order of integration.

UNIT-III: Triple integrals **(12 Hours)**

Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces–change of variables – Two important results regarding Jacobians – Transformation from Cartesian to polar co-ordinates - Transformation from Cartesian to spherical polar co-ordinates.

UNIT-IV: Beta and Gamma functions **(12 Hours)**

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.

UNIT-V: Geometrical Applications of integration **(12 Hours)**

Areas under plane curves: Cartesian co-ordinates – Area of a closed curve – Areas in polar co-ordinates.

Total Lecture Hours - 60

COURSE OUTCOME

The students should be able to

1. Determine the integrals of algebraic, trigonometric and logarithmic functions and find the reduction formulae.
2. Evaluate double and triple integrals and problems using change of order of integration.
3. Solve multiple integrals, find the areas of curved surfaces and volumes of solids of revolution.
4. Explain beta and gamma functions and use them in solving problems of integration
5. Explain Geometric and Physical applications of integral calculus.

TEXT BOOKS

1. Narayanan S. and Manicavachagam Pillai T.K. 2011. Calculus. Volume II. S.Viswanathan (Printers & Publishers) Pvt. Limited, Chennai.

UNIT - I Chapter 1 : Sec. 13,14,15.1
UNIT - II Chapter 5 : Sec. 2.1.,2.2, 3.1
UNIT - III Chapter 5 : Sec. 4,5.1,5.2,6.1,7 &
Chapter 6 Sec. 1.1,1.2,2.3,2.4
UNIT - IV Chapter 7 : Sec. 2.1,2.2,2.3,3,4,5,6
UNIT - V Chapter 2 : Sec. 1.1,1.2,1.3,1.4

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, 2007.
3. D. Chatterjee, Integral Calculus and Differential Equations, Tata-McGraw Hill Publishing Company Ltd.
4. P. Dyke, An Introduction to Laplace Transforms and Fourier Series, Springer Undergraduate Mathematics Series, 2001 (second edition).

E-RESOURCES

1. https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	1	2	2	3	3	1	3	2	3	3	2	1
CLO2	1	2	3	1	3	3	1	1	2	3	3	2	1
CLO3	3	2	3	1	3	3	1	2	3	2	3	2	1
CLO4	2	3	1	2	3	3	1	3	2	2	3	2	1
CLO5	1	3	2	3	1	3	3	2	3	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI,MANNARGUDI– 614 016.
(For the candidates admitted from the academic year 2024 -2025)
DEPARTMENT OF PHYSICS
For the students of I B.Sc. Mathematics

Semester: II – AC - II: Allied Physics – II

Ins.Hrs. / Week: 3 **Course Credit: 2** **Course Code: U24APY203**

UNIT – I Optics **(10 Hours)**

Interference – Interference in thin films – Colors of thin films – Air wedge – determination of diameter of a thin wire by air wedge – Diffraction – Diffraction of light vs sound – Normal incidence – experimental determination of wavelength using diffraction grating (no theory) – Polarization – Polarization by Double reflection – Brewster's law.

UNIT – II Atomic Physics **(10 Hours)**

Atom models – Bohr atom model – Mass number – Atomic number – Nucleons – Vector atom model – various quantum numbers – Pauli's exclusion principle – Electronic configuration – Periodic classification of elements – Bohr Magneton – Stark effect –Zeeman effect (elementary ideas only) – Photo electric effect – Einstein's photoelectric equation – Applications of photoelectric effect: Solar cells, Solar panels, Optoelectric devices.

UNIT – III Nuclear Physics **(8 Hours)**

Nuclear models – Liquid drop model – Magic numbers – Shell model – Nuclear energy – Mass defect – Binding energy – Radioactivity – uses – Half- life – Mean life - Radio isotopes and uses – Controlled and Uncontrolled chain reaction – Nuclear fission – Energy released in fission – Chain reaction – Critical reaction – Critical size - Atom bomb – Nuclear reactor – Breeder reactor – Importance of commissioning PFBR in our country – Heavy water disposal, Safety of reactors: Seismic and floods – Introduction to DAE, IAEA – Nuclear fusion – Thermonuclear reactions – Differences between fission and fusion.

UNIT – IV Introduction to Relativity and Gravitational Waves **(8 Hours)**

Frame of reference – Postulates of Special theory of relativity – Galilean transformation equations – Lorentz transformation equations – Derivation – Length contraction – Time Dilation – Twin Paradox – Mass-Energy equivalence – Introduction on Gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences.

UNIT – V Semiconductor Physics **(9 Hours)**

P- n Junction diode – Forward and reverse biasing – Characteristic of diode – Zener diode – characteristic of Zener diode – Voltage regulator – Full wave bridge rectifier – construction and working – Advantages (no mathematical treatment) – USB cell phone charger – Introduction to e-vehicles and EV charging stations.

Total Lecture Hours - 45

COURSE OUTCOME

1. Explain the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns.
Outline the foundation of different atom models and various experiments establishing quantum concepts..
2. Summarize the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models.
Solve problems on delay rate half-life and mean-life. Interpret nuclear processes like fission and fusion. Understand the importance of nuclear energy, safety measures carried and get our Govt. agencies like DAE guiding the country in the nuclear field.
3. To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa.
4. Relate this with current research in this field and get an overview of research projects of National and International importance, like LIGO, ICTS, and opportunities available.
5. Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations.

TEXT BOOK(S)

1. R. Murugesan (2005), *Allied Physics*, S.Chand & Co, New Delhi.
2. K. Thangaraj and D.Jayaraman (2004), *Allied Physics*, Popular Book Depot, Chennai.
3. Brijlal and N.Subramanyam (2002), *Text book of Optics*, S.Chand & Co, New Delhi.
4. R. Murugesan (2005), *Modern Physics*, S.Chand & Co,New Delhi.
5. A. Subramaniyam, *Applied Electronics*, 2nd Edn.,National Publishing Co., Chennai.

REFERENCE BOOK(S)

1. Resnick Halliday and Walker (2018), *Fundamentals of Physics*, 11th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. D.R.Khanna and H.R. Gulati (1979), *Optics*, S.Chand & Co. Ltd., New Delhi.
3. A.Beiser (1997), *Concepts of Modern Physics*, Tata McGraw Hill Publication, New Delhi.
4. Thomas L. Floyd (2017), *Digital Fundamentals*, 11thEdn., Universal Book Stall, New Delhi.
5. V.K.Metha (2004), *Principles of electronics,* 6thEdn., S.Chand and Company, New Delhi.

E – RESOURCES

1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo
2. https://www.youtube.com/watch?v=JrRrp5F-Qu4
3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/
4. https://www.atoptics.co.uk/atoptics/blsky.htm -
5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

Course Learning Outcome (for Mapping with POs and PSOs)

	Pos										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	3	3	3	3	3	2	3	3	3	3	3	3
CLO2	2	3	3	3	2	3	3	2	3	2	2	3	3
CLO3	2	3	2	3	3	2	3	3	3	3	3	2	3
CLO4	3	2	3	3	3	3	3	2	2	2	3	3	3
CLO5	2	3	3	3	3	3	3	3	3	3	3	3	2

Strong: 3 Medium: 2 Low: 1

Semester: II- NME - II : Business Mathematics - II

Ins. Hrs./Week: 2 **Course Credit: 2** **Course Code: U24NMEMA22**

UNIT – I: Coordinate Geometry **(6 Hours)**

Introduction – Directed Line – Quadrants and Coordinates – Coordinates of Mid-Points – Distance between two points.

UNIT – II: Circle **(6 Hours)**

Circle – Equation of circle – Different forms of Circle – General equation of Circle – Equation of tangent to Circle.

UNIT – III: Vector Algebra **(6 Hours)**

Vectors – Types of Vectors – Operations on Vectors – Addition – Properties of Operation of Addition – Subtraction.

UNIT- IV: Matrix Algebra **(6 Hours)**

Introduction - Definition - Types of Matrices - Scalar Multiplication of a Matrix - Equality of Matrices - Addition and Subtraction - Multiplication - Properties - Transpose of a Matrix.

UNIT – V **(6 Hours)**

Determinants of a Square Matrix - Determinants of Order Two - Cramer's rule - Determinants of Order three.

Total Lecture Hours – 30

COURSE OUTCOME

The students should be able to

1. Improve the knowledge of Straight line and different forms of straight lines and their applications in solving problems.
2. Promote the concepts in Circle, Tangent and normal and solution of problems.
3. Solve problems based on the concepts of Addition, subtraction, scalar product and vector product.
4. Apply the knowledge in matrix and Inverse of a matrix in solving problems.
5. Understand the concept of determinants.

TEXT BOOKS

1. Sancheti D.C. and Kapoor V.K, 2014. Business Mathematics, Revised Edition. Sultan Chand & Sons, Educational Publishers, New Delhi.

UNIT - I Chapter 15 : Sec. 15.1 to 15.5

UNIT - II Chapter 15 : Sec. 15.22 to 15.25

UNIT - III Chapter 19 : Sec. 19.1 to 19.6

UNIT - IV Chapter 20 : Sec. 20.1 to 20.10

UNIT - V Chapter 20 : Sec. 20.11 to 20.15

REFERENCE BOOK(S)

1. Gupta, 2019. Saxena Dr.Sinha, Business Mathematics, SBPD Publications.
2. Mariappan.P, 2015. Business Mathematics, Pearson India Education Services Pvt. Limited.
3. Rayarikar.A.V and Dixit.P.G, 2019. Business Mathematics, Nirali prakashan advancement of knowledge.
4. Shuka.S.M, 2019. Business Mathematics, Sahitya Bhawan Publications, Revised.
5. Vittal.P.R, 2018. Mathematics Foundation, Re-Edition. Margham Publications,

E_RESOURCES

1. https://www.academia.edu/40468313/Business_Mathematics1stedition
2. https://www.coursehero.com/file/35285098/BASIC-MATHEMATICS-Coordinate-Geometrypdf/
3. https://www.academia.edu/10235680/BUSINESS_MATHEMATICS
4. https://bnmjjwinf292.com/mk3ngxw9g?key=0f22c1fd609f1 3cb7947c8cabfe1a90d&submetric=14961611
5. https://www.researchgate.net/publication/281838644_An_Introduction_to_Business_Mathematics

Course Learning Outcome (for Mapping with POs and PSOs)

	Pos										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	3	2	3	3	3	1	2	2	2	3	2	1
CLO2	3	3	2	1	3	3	2	2	2	2	3	2	1
CLO3	3	2	2	3	3	3	2	3	3	2	3	2	1
CLO4	3	3	1	2	3	3	2	3	3	2	3	2	1
CLO5	3	2	2	2	3	3	2	2	2	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI-614 016.

(For the Candidates admitted in the academic year 2024–2025)

DEPARTMENT OF MATHEMATICS

UG-SKILL ENHANCEMENT COURSE-I

Semester II: Mathematics for Competitive Examinations

Ins.Hrs:2 **Credit:**2 **Course Code**: **U24SEMA21**

UNIT I: HCF and LCM **(6 Hours)**

Highest common Factor (HCF)– Least Common Multiple (LCM).

UNIT II: Ratio and Proportion **(6 Hours)**

Ratio-Proportion–Some Problems.

UNIT III: Reasoning **(6 Hours)**

Coding and Decoding Test - Some Examples.

UNIT IV: Reasoning continued **(6 Hours)**

Logical Reasoning–Puzzles–Dice.

UNIT V: Simple Interest and Compound Interest **(6 Hours)**

Simple Interest-Compound Interest-Some Problems.

Total Lecture Hours-30

COURSE OUTCOME

The Students will be able to

1. Compute HCF and LCM effectively and easily.
2. Understand about Ratio and Proportion.
3. Solve the problems related to Coding and Decoding.
4. Justify the Logical Reasoning.
5. Calculate Simple and Compound interest.

TEXT BOOK

1.TNPSC Group–IV Exam. Sakthi Publishing House.

REFERENCE BOOK(S)

1. Avani Madasamy.S,Way to Success - 75,000 Questions & Answers from 6th to 12th Std & Degree Syllabus of TNPSC(CCSE) Group 1,2,2A, 3,4,8,VAO,TNUSRB,TET,TRB,&all Exams 2020 - 21 in English Medium Hardcover – 1 January 2018.
2. Dr.Lal, Jain & Dr.K.C.Vashistha,2012. Teaching & Research Aptitude – Upkar Prakashan, Agra - 2.
3. Harpreet Kaur. Oxford NTA UGC Paper I for NET/SET/JRF - Teaching and Research Aptitude Madan. KVS,NTAUGCNET/SET/JRF:Teaching & Research AptitudePaper1.
4. Bharatiya Mathematicians,Sharda Sanskrit Sansthan,Varanasi.
5. Aggarwal.R.S. 2017 Quantitative Aptitude for Competitive Examinations. S. Chand and company limited, Ram Nagar, New Delhi- 110 055.

E_RESOURCES

1. https://www.careerpower.in
2. https://www.adda247.com

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	2	3	2	3	3	2	1	2	3	3	2	1
CLO2	2	2	3	1	3	3	2	3	3	1	3	2	1
CLO3	3	2	3	3	3	3	1	2	3	2	3	2	1
CLO4	1	2	3	2	3	3	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	2	2	3	1	3	2	1

Strong: 3 Medium: 2 Low: 1