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.

B.Sc., MATHEMATICS
CHOICE BASED CREDIT SYSTEM– LEARNING OUTCOMES BASED CURRICULUM FRAME WORK (CBCS–LOCF)
(For the candidates admitted in the academic year 2023–2024)

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 10th & 12th 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-3 (Best 2 out of 3)	=	50%
Seminar	=	10%
Attendance	=	10%

Question Paper Pattern

Part A:

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

Part A 2 (5X2=10 marks)
 Short Answers
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** questions from each unit (5x5 =25)							25
PART -C (3 out of 5) (10 Marks) **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 **PART**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
PART –A (One Mark, No choice) (10x1 =10)	10						10
(2-Marks, No choice) (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:

$$GPA = \dfrac{\sum_{i=1}^{n} C_i G_i}{\sum_{I=1}^{n} C_i}$$	$$WAM\,(Weighted\,Average\,Marks) = \dfrac{\sum_{i=1}^{n} C_i M_i}{\sum_{I=1}^{n} C_i}$$
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

To provide quality basic education that is equitably accessible to all and lay the foundation for lifelong learning and service for the common good.

MISSION

The aim of education is to cultivate personality integration and to promote quality in higher education and to give overall development to student community.

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 media in 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 and to 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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B.Sc., MATHEMATICS
CHOICE BASED CREDDIT SYSTEM – LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS – LOCF)
(For the candidates admitted in the academic year 2023 – 2024)
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	L	T	P	O/S	Credit	Exam Hours	CIA	ESE	Total
I	I	Language Course-I	U23LC101	Pothutamil- I	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-I	U23ELC101	General English-I	6	5	1	-	-	3	3	25	75	100
	III	Core Course-I	U23MA101	Algebra & Trigonometry	5	4	1	-	-	5	3	25	75	100
		Core Course-II	U23MA102	Differential Calculus	4	3	1	-	-	4	3	25	75	100
		Allied Course-I	U23APY101	Allied Physics- I	3	2	1	-	-	2	3	25	75	100
		Allied Practical I	U23APY102P	Allied Physics Practical - I	2	1	-	1	-	--	--	---	--	--
	IV	Non Major Elective-I		Non Major Elective-I	2	1	1	-	-	2	3	25	75	100
		Foundation Course	U23FCMA11	Foundation Course –FC	2	1	1	-	-	2	3	25	75	100
			TOTAL		30	22	7	1	-	21	-	-	-	700
II	I	Language Course- II	U23LC202	Tamil	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-II	U23ELC202	English	6	5	1	-	-	3	3	25	75	100
	III	Core Course–III	U23MA203	Analytical Geometry (Two & Three Dimensions)	5	4	1	-	-	5	3	25	75	100
		Core Course -IV	U23MA204	Integral Calculus	4	3	1	-	-	4	3	25	75	100
		Allied Practical -I	U23APY102P	Allied Physics Practical - I	2	1	-	1	-	2	3	25	75	100
		Allied Course-II	U23APY203	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	U23SEMA21	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	L	T	P	O/S	Credit	Exam Hours	CIA	ESE	Total
III	I	Language Course- III		Language	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-III		English	6	5	1	-	-	3	3	25	75	100
	III	Core Course -V		Vector Calculus and 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		Allied Computer Science-I	3	2	1	-	-	2	3	25	75	100
		Allied Practical -II		Allied Computer Science Practical I	2	1	-	1	-	--	--	--	--	--
	IV	Skill Enhancement Course –II		Skill Enhancement Course –II (Entrepreneurial Based)	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course –III		Skill Enhancement Course - III	2	1	1	-	-	2	3	25	75	100
			TOTAL		**30**	**22**	**7**	**1**		**21**		-	-	**700**
IV	I	Language Course- IV		Language	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-IV		English	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		Allied Computer Science Practical I	2	1	-	1	-	2	3	25	75	100
		Allied Course-IV		Allied Computer Science II	3	2	1	-	-	2	3	25	75	100
	IV	Skill Enhancement Course–IV		Skill Enhancement Course –IV	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course –V		Skill Enhancement Course - V	2	1	1	-	-	2	3	25	75	100
			TOTAL		**30**	**22**	**7**	**1**	**-**	**23**	-	-	-	**800**
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	4	2	-	2	-	3	3	25	75	100
		Elective Course–II		Optimization Techniques	4	3	1	-	-	3	3	25	75	100
	IV	Environmental Studies		Environmental Studies	2	1	-	-	1	2	3	25	75	100

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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**	**21**	**5**	**2**	**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	4	3	-	1	-	3	3	25	75	100
		Elective Course -IV		Graph Theory and Applications	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	Extension activity		Extension activity	-	-	-	-	-	1	-	-	-	-
		Gender Studies		Gender Studies	1	1	-	-	-	1	3	25	75	100
			TOTAL		**30**	**16**	**5**	**5**	**4**	**25**	-	-	-	**800**
			GRAND TOTAL		**180**					**141**	-	-	-	**4500**
	*Extra Credit			MOOC/SWAYAM/NPTEL (Atleast one)						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		Core Course –Theory	14	62
4		Core Project	1	05
5	III	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		Non-Major Elective	2	04
9		Foundation Course – FC	1	02
10		Skill Enhancement Course	5	10
11	IV	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	U23NMEMA11	Business Mathematics I
II	IV	NME-II	U23NMEMA22	Business Mathematics II

EXTRA CREDIT COURSE -VALUE ADDED COURSE OFFERED BY THE DEPARTMENT

Semester	Course	Course Code	Title of The Paper
I	VAC-I	U23MAVA1	Data analysis using MS - Excel
II	VAC-II	U23MAVA2	SPSS

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DEPARTMENT OF MATHEMATICS
B.Sc., MATHEMATICS

Semester: I- CC-I : Algebra and Trigonometry

Ins. Hrs./Week: 5   **Course Credit: 5**   **Course Code: U23MA101**

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.   **(12 Hours)**

Unit II: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems.   **(12 Hours)**

Unit III: 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.   **(12 Hours)**

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.   **(12 Hours)**

Unit V: Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.   **(12 Hours)**

Total Lecture Hours - 60

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 a given 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., 2012. 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 : Chap. 6 : Sec. 16,17,19,30 of (1)
UNIT II : Chap. 3 : Sec. 1,1.1,1.2,6 to 10,14 of (1)
      Chap. 4 : 2,3,5,6,7,11 of (1)
UNIT III : Chap. 2 : Sec. 8,16 of (2)
UNIT IV : Chap. 1 : Sec. 1.2 to 1.4 of (3)
UNIT V : Chap. 2: Sec. 2.1,2,2,
     Chap. 3 & Chap. 4 : Sec. 4.1,4.2

REFERENCE BOOK(S)

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.

E- RESOURCES

1. https://nptel.ac.in

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: I-CC- II: Differential Calculus

Ins. Hrs./Week: 4   **Course Credit**: 4   **Course Code**: U23MA102

UNIT-I: Successive Differentiation: **(15 Hours)**

Introduction (Review of basic concepts) – The nth derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the nth derivative of a product .

UNIT-II: Partial Differentiation: **(15 Hours)**

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

UNIT-III: Partial Differentiation (Continued):   **(15 Hours)**

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

UNIT-IV: Envelope: **(15 Hours)**

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

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

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

Total Lecture Hours - 75

COURSE OUTCOME

The students should be able to
1. Find 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 to use the Lagrange's method of undetermined multipliers
4. Find the envelope of a given family of curves
5. Find the evolutes and involutes and to 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   : Chap III
UNIT II : Chap. VIII: Sec 1.1 to 1.5
UNIT III : Chap. VIII : Sec. 1.6,1.7,4,5

UNIT IV : Chap. X : Sec. 1.1 to 1.4

UNIT V : Chap X : Sec. 2.2 to 2.6

REFERENCE BOOK(S)

1. 1. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York, Inc., 1989.
2. T. Apostol, Calculus, Volumes I and II.
3. S. Goldberg, Calculus and mathematical analysis.
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.
    M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

E-RESOURCES

1. https://nptel.ac.in

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SENGAMALATHAYAAREDUCATIONALTRUSTWOMEN'SCOLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: I-FC: Foundation Course

Ins. Hrs./Week: 2   **Course Credit**: 2   **Course Code**: U23FCMA11

UNIT-I: Algebra: Binomial theorem, General term, middle term, problems based on these concepts   **(6 Hours)**

Unit II: Sequences and series (Progressions). Fundamental principle of counting. Factorial n.   **(6 Hours)**

Unit III: Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.   **(6 Hours)**

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   **(6 Hours)**

Unit V: 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.   **(6 Hours)**

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 principle of 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

E-RESOURCES:
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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2023 – 2024)
DEPARTMENT OF MATHEMATICS
NON MAJOR ELECTIVES

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

Ins. Hrs./Week: 2   **Course Credit**: 2   **Course Code**:U23NMEMA11

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 – Arguments – Joint Denial.

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 - Difference of two sets - Symmetric Difference - Algebra of Sets – Duality – Partition of a set – Regrouping of the Sets – Number of Elements in a Finite Set.

UNIT - III: Logarithms   (6 Hours)

Introduction - 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 – Combinations – Complementary Theorems – Restricted Combinations - Combinations of Things not all Different.

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

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

Total Lecture Hours- 30

COURSE OUTCOME

The students will 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. To 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, 2017. Business Mathematics, Revised Edition. Sultan Chand & Sons, Educational Publishers, New Delhi.

   UNIT I   Chapter 1   : Sec. 1.1 to 1.12

   UNIT II   Chapter 2   : Sec. 2.1 to 2.17

   UNIT III   Chapter 7   : Sec. 7.1 to 7.6

   UNIT IV   Chapter 9   : Sec. 9.1 to 9.11

   UNIT V   Chapter 12 : Sec. 12.1 to 12.6

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/

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

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

Ins. Hrs./Week: 5   **Course Credit**: 5   **Course Code**: U23MA203

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

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

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

Polar coordinates - . Equation of a straight line - Crcle - The chord joing the points - Polar eqaution of a conic.

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

System of Planes - Angle between the planes -Length of the perpendicular.

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.

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 spher.

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. Find 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. Explain in detail the system of Straight lines
5. Explain in detail the system of Spheres

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

UNIT- I   Chapter VIII : Sec.1 to 7 of (1)
UNIT- II   Chapter IX : Sec.1 to 9 of (1)
UNIT- III   Chapter II : Sec. 1 to 10 of (2)
UNIT- IV   Chapter III : Sec. 1 to 7 of (2)
UNIT-V   Chapter IV: Sec. 1 to 8 of (2)

REFERENCE BOOKS:

1. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
1. Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961.
2. Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010.
3. William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006.
4. John F. Randelph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969.
5. Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.

E-RESOURCES

1. https://nptel.ac.in

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: II-CC- IV: Integral Calculus

Ins. Hrs./Week: 4   **Course Credit**: 4   **Course Code**: U23MA204

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.   **(12 Hours)**

UNIT-II: Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Change of order of integration.   **(12 Hours)**

UNIT-III: Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces–change of variables - Jacobian.   **(12 Hours)**

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.   **(12 Hours)**

UNIT-V: Geometric Applications of Integral calculus.   **(12 Hours)**

Total Lecture Hours - 60

COURSE OUTCOME

The students should be able to
1. Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae
2. Evaluate double and triple integrals and problems using change of order of integration
3. Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution
4. Explain beta and gamma functions and to 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	Full
UNIT - IV	Chapter 7	: Sec. 2.1,2.2,2.3,3,4,5,6
UNIT - V	Chapter 2	: Full

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

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2023 – 2024)
DEPARTMENT OF MATHEMATICS
NON MAJOR ELECTIVES

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

Ins. Hrs./Week: 2   **Course Credit**: 2   **Course Code**: U23NMEMA22

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

Introduction – Directed Line – Quadrants and Coordinates – Coordinates of Mid-Points – Distance between two points - Section Formula – External Division – Coordinates of Centroid – Area of a Triangle – Collinearity of Three Points – Area of a Quadrilateral – Locus of a Point – The Straight Line – Slope or Gradient of a Straight line – Different forms of equations of a straight line – General equation of a straight line – Intersecting Lines – Concurrent Lines – Angle between two straight lines – Tangent and Normal.

UNIT – II   **(6 Hours)**

Circle – Equation of circle – Different forms of Circle – General equation of Circle – Equation of tangent to Circle - Equation of a Normal to Circle - Equation of tangent to Circle in slope form Ellipse – parabola – Standard equations of Parabola – Forms of a Parabola – Equation of the Tangent - Equation of the Normal.

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

Vectors – Types of Vectors – Operations on Vectors – Addition – Properties of Operation of Addition – Subtraction – Multiplication by a Scalar – Orthonormal Bases – Product of two Vectors – Scalar Product or Dot Product of two vectors – Properties of scalar product – Vector Product or Cross Product – Properties of Vector product.

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 - Sarrus diagram - Properties of Determinants - Expansion of the determinants - Minors of a Matrix - Adjoint of a Square Matrix - Inverse of a Matrix.

Total Lecture Hours – 30

COURSE OUTCOME

The students will be able to
1. To 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. D.C.Sancheti and V.K.Kapoor, 2017. Business Mathematics, Revised Edition. Sultan Chand & Sons, Educational Publishers, New Delhi.

   UNIT - I   Chapter 15 : Sec. 15.1 to 15.21

   UNIT - II   Chapter 15 : Sec. 15.22 to 15.36

   UNIT - III   Chapter 19 : Sec. 19.1 to 19.13

   UNIT - IV   Chapter 20 : Sec. 20.1 to 20.10

   UNIT - V   Chapter 20 : Sec. 20.11 to 20.22

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

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2023 – 2024)
DEPARTMENT OF MATHEMATICS
UG - SKILL ENHANCEMENT COURSE - I

Semester II: Mathematics for Competitive Examinations

Ins. Hrs: **2**   **Credit : 2**   **Course Code**: U23SEMA21

UNIT- I: HCF and LCM   **(6 Hours)**
Highest common Factor (HCF) –Lowest Common Multiple (LCM)

UNIT- II: Ratio And Proposition   **(6 Hours)**

Ratio - Proposition – Some Problems

UNIT- III: Reasoning   **(6 Hours)**
Coding and Decoding Test -Some Examples.

UNIT- IV: Simple Interest and Compound Interest   **(6 Hours)**
Simple Interest - Compound Interest - Some Problems

UNIT- V: Reasoning continued   **(6 Hours)**
Logical Reasoning –Puzzles –Dice

                                                          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 Proposition
    3. Solve the problems related to Coding And Decoding.
    4. .Calculate Simple and Compound interest.
    5. Justify the Logical Reasoning.
TEXT BOOKS

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

UNIT- I   Chapter 6 : Sec. 9, 10 & 11 of (1)
UNIT- II   Chapter 6 : Sec. 12, 13 & 14 of (1)
UNIT- III   Chapter 6 : Sec. 15,16 & 17 of (1)
UNIT- IV   Chapter 6 : Sec. 18,19, 20,21 & 24 of (1)
UNIT-V   Chapter 5: Sec. 1 to 18 of (2)

REFERENCE BOOK(S)

1. <u>Avani Madasamy</u>.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 – UpkarPrakashan,Agra- 2.
3. Harpreet Kaur. Oxford NTA UGC Paper I for NET/SET/JRF - Teaching and Research AptitudeMadan. KVS, NTA UGC NET/SET/JRF:Teaching & Research Aptitude Paper 1.
4. BharatiyaMathematicians,ShardaSanskritSansthan,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

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Semester: I- AC-I : Statistics

Ins. Hrs./Week: 3   **Course Credit: 2**   **Course Code: U23AMA101**

UNIT-I : Introduction on Statistics   (8 Hours)

Origin and development of statistics- Scope of statistics- Limitations of statistics- Frequency distribution in statistics - Graphical representation of statistical data.

UNIT-II : Measures of central tendency   (10 Hours)

Introduction on Measures of central tendency-Arithmetic Mean – Median – Mode – Definitions – Properties – Merits and Demerits of Mean, Median and Mode – Problems to find Mean, Median and Mode.

UNIT-III : Measures of central tendency Continued...   (6 Hours)

Geometric Mean – Harmonic Mean - Geometric Mean of the combined group – Merits & Demerits of Geometric mean - Merits & Demerits of Harmonic mean – Solved Problems

UNIT-IV : Measures of Dispersion   (11 Hours)

Introduction on Measures of Dispersion- Definition- Objectives- Properties- Methods of measuring dispersion- Range- Quartile deviation- Mean deviation- Standard deviation-

UNIT-V : Correlation and Regression   (10 Hours)

Introduction on Correlation – Definition-Properties of Simple Correlation – Karl Pearson's Correlation Coefficients – Limits of Correlation Coefficients - Simple Problems – Regression: Definition - Properties - Regression coefficients - Simple Problems only.

Total Lecture Hours- 45

COURSE OUTCOME

The students should be able to
1. Describe the concepts, principles, tools and techniques in statistics.
2. Gain knowledge on the determination of measures of central tendency.
3. Determine the measures of dispersion.
4. Compute correlation coefficient and the regression coefficient.
5. Understand the basic concept, properties and moments of binomial distribution.

TEXT BOOK(S)

1. Gupta S.C and Kapoor V.K. 2002, Fundamentals of Mathematical Statistics. Sultan Chand & Sons, New Delhi.

UNIT- I	Chapter 1	:	Sec.1.1 to 1.4
	Chapter 2	:	Sec. 2.1 to 2.3
UNIT- II	Chapter 2	:	Sec. 2.4 to 2.7
UNIT -III	Chapter 2	:	Sec. 2.8, 2.9
UNIT -IV	Chapter 2	:	Sec. 2.13 to 2.14
UNIT -V	Chapter 10	:	Sec. 10.1 to 10.4 (10.4.1)
	Chapter 11	:	Sec. 11.1, 11.2 (11.2.1 & 11.2.3)

REFERENCE BOOK(S)

1. Freund J.E. 2001. Mathematical Statistics. Prentice Hall of India., New Delhi.
2. Goon A.M. Gupta M.K. and Dos Gupta B. 1991. Fundamentals of Statistics, Volume I. World Press, Calcutta.
3. Gupta S.P. 1994. Statistical Methods. Sultan Chand & Sons, New Delhi.
4. Kapil Sharma. 2011. Statistical Methods. ABO Publishers, Jaipur, India.
5. Pillai R.S.N and Bagavathi. 2003. Practical Statistics. S Chand & Company Ltd. New Delhi.

E- RESOURCES

1. https://www.math.arizona.edu/~jwatkins/statbook.pdf
2. http://www.cimt.org.uk/cmmss/S1/Text.pdf
3. https://stat.ethz.ch/~geer/mathstat.pdf
4. https://mason.gmu.edu/~jgentle/books/MathStat.pdf
5. http://fstroj.uniza.sk/kam/orsansky/pdf/eng/basicsofstatisticalmethods.pdf

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SENGAMALA THAYAAR EDUCATIONALTRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS - II
(For CS & BCA)

Semester: I- AC-II: Numerical Analysis

Ins. Hrs./Week: 4   **Course Credit: 2**   **Course Code: U23AMA102**

UNIT-I: Solutions of Algebraic and Transcendental Equations   (8 Hours)
Introduction on Algebraic and Transcendental Equations - The Solution of Algebraic and Transcendental Equations -Bisection method, Steps for finding roots of equations using bisection method-Newton Raphson method-Theory and problems.

UNIT-II:Interpolation   (10 Hours)
Introduction on Interpolation -   Finite differences - Formula for finding Forward differences-Formula for finding Backward differences -Some basic problems-Formula for finding Newton's forward and backward Interpolation -Problems based on Newton forward and backward interpolation -Lagrange's Interpolation formula -Theory and problems

UNIT-III: Numerical Integration   (11 Hours)
Basic Formulae on Integration-Numerical Integration: Trapezoidal Rule - Simpson's 1/3 Rule, Simpson's 3/8-Rule.

UNIT-IV: Solutions of Linear Systems   (10 Hours)
Formulation of Linear Systems - Solutions of linear systems- Theory and problems of linear systems using Gauss Elimination Method – Theory and problems of linear systems using Gauss Jacobi Method –Theory and problems of linear systems using Gauss Seidel Method.

UNIT-V: Numerical Solution of Ordinary Differential Equations   (6 Hours)
Formation of Ordinary Differential Equations - Method of finding Solution of ordinary differential equations by Taylor's Series -Formula for Euler's method- Runge Kutta Second and Fourth order method, Theory and Problems.

Total Lecture Hours- 45

COURSE OUTCOME
The students should be able to
1. Gain knowledge about Algebraic and Transcendental Equations.
2. Analyze the Polynomial interpolation problems.
3. Understand the concepts of numerical differentiation and integration.
4. Develop the knowledge on the theory, problems and solutions of linear systems.
5. Integrate the concept of numerical solutions of ordinary differential equations.

TEXT BOOK(S)
1. Sastry S.S. 2006. A First Course in Introductory Methods of Numerical Analysis, Fourth Edition, PHI Learning Private Limited, New Delhi.

UNIT- I   Chapter 2   :   Sec. 2.1, 2.2 , 2.5
UNIT- II   Chapter 3   :   Sec. 3.1, 3.3(3.3.1&3.3.2), 3.6, 3.9.1
UNIT -III   Chapter 5   :   Sec. 5.4 (5.4.1, 5.4.2, 5.4.3)
UNIT -IV   Chapter 6   :   Sec. 6.3, 6.3.2, 6.4
UNIT- V   Chapter 7   :   Sec. 7.1, 7.2, 7.4, 7.5

REFERENCE BOOK(S)

1. Arumugam S, Thangapandi issac and Somasundaram A. 2012. Numerical Methods. Scitech Publications, Chennai.
2. David Kincaid, Ward Cheney. 1991. Numerical Analysis. Brooks/Cole Publishing Company, USA.
3. Jain M.K, Iyengar S.R.K and Jain R.K. 2001. Numerical Methods for Scientific and Engineering Computation. New Age International Private Limited, Bangalore.
4. Mathew J.H. 1992. Numerical Methods for Mathematics, Science and Engineering. Prentice Hall, New Delhi.
5. Veerarajan T and Ramachandran T. 2008. Numerical Methods with programming in C. MC Graw Hill Education, New York.

E- RESOURCES

1. http://www.math.iitb.ac.in/~baskar/book.pdf
2. http://spartan.ac.brocku.ca/~jvrbik/MATH2P20/notes.pdf
3. https://www.math.ust.hk/~machas/numerical-methods.pdf
4. https://rahulpatel121.files.wordpress.com/2018/07/s-s-sastry-introductory-methods-o-numerical-analysis-2012-phi-learning-pvt-ltd.pdf
5. https://authors.library.caltech.edu/25061/1/NumMethChE84.pdf

SENGAMALA THAYAAR EDUCATIONALTRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2023 – 2024)
DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS -III
(For CS & BCA)

Semester: II- AC – III : Operations Research

Ins. Hrs./Week: 3   **Course Credit: 2**   **Course Code: U23AMA203**

UNIT–I : Operations Research   (10 Hours)
Introduction of Operations Research - Basics of Operations Research – Operations Research& Decision making – Role of Operations Research – Mathematical Formulation of Linear Programming Problem - Graphical solution of two variables – Matrix form of linear programming problem.

UNIT – II : Simplex Method   (9 Hours)
Simplex Method– Basic Definitions - Simplex Method Algorithm - Simplex Method for less than or equal to (<=), equal to (=) and greater than or equal to (>=) constraints – Big M Method - Big M Method Algorithm – Problems.

UNIT –III : Transportation Problem and Assignment problem   (9 Hours)
Transportation Problem –Introduction and mathematical formulation of Transportation Problem – To find the initial basic feasible solution using (i) North West Corner Method (ii) Least Cost Method (iii) Vogel's Approximation Method - Unbalanced Transportation problem-Assignment Algorithm – Formulation of Assignment Problem - Unbalanced Assignment problem.

UNIT –IV : Sequencing Problem   (8 Hours)
Sequencing Problem– Definition - Processing of n jobs through two machines – Processing of n jobs through two machines algorithm - Processing of n jobs through three machines – Processing of two jobs through n machines – Processing of two jobs through n machines algorithm - Related Problems in all the above.

UNIT –V : Networks   (9 Hours)
Networks – Immediate Predecessor -Immediate Successor– Dummy activity – Critical Path - Fulkerson's rule - Measure of activity – PERT computation – Earliest Time – Latest Time - Total Float – Free Float – Independent Float - CPM computation - Resource scheduling.

Total Lecture Hours – 45

COURSE OUTCOME
The students should be able to
1. Understand the advantages and limitations of operation research.
2. Gain knowledge on the simplex method and algorithms.
3. Solve the transportation and assignment problems.
4. Describe the sequencing problems.
5. Summarize the concept of Network scheduling by CPM and PERT.

TEXT BOOKS
1. Kalavathy S. 2013. Operations Research, Fourth Edition. Vikas Publishing House Pvt. Ltd, Chennai.

UNIT -I	Chapter 1	Full
	Chapter 2	: Sec. 2.1, 2.2
	Chapter 3	: Sec 3.1 to 3.3
UNIT -II	Chapter 4	Full
	Chapter 5	: Sec. 5.1, 5.2
UNIT –III	Chapter 8	: Sec. 8.1 to 8.4
	Chapter 9	: Sec. 9.3 to 9.5
UNIT –IV	Chapter 14	: Sec. 14.1 to 14.3, 14.5
UNIT –V	Chapter15	: Sec. 15.1 to 15.8

REFERENCE BOOK(S)
1. Hamdy A. Taha. 2005. Operations Research, 7th Edition. Prentice Hall of India Private Limited, New Delhi.
2. Kanti Swarup, Gupta P.K, Man Mohan. 2014. Operations Research, Fourteenth Edition. Sultan Chand & Sons, New Delhi.
3. Prem Kumar Gupta and Hira D.S. 1976. Operations Research - An Introduction. Sultan Chand, New Delhi.
4. Sharma J.K. 2001. Operations Research. MacMillan India Ltd, New Delhi.
5. Sundaresan V, Ganapathy Subramanian. K.S and Ganesan K. 2002. Resource Management Techniques. A.R.Publications, Chennai.

E_RESOURCES
1. http://ebooks.lpude.in/commerce/bcom/term_5/DCOM303_DMGT504_OPERATION_RESEARCH.pdf
2. http://www.ggu.ac.in/download/class-note14/operation%20research07.04.14.pdf
3. file:///C:/Users/Commerce2/Downloads/Operations%20Research%20(%20PDFDrive%20).pdf
4. https://www.google.co.in/books/edition/_/6khDDAAAQBAJ?hl=en
5. https://www.researchgate.net/publication/333748649_Chapter_-1_Operations_Research

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(For the Candidates admitted in the academic year 2023 – 2024)

DEPARTMENT OF MATHEMATICS

ALLIED MATHEMATICS - I

(For Physics & Chemistry)

Semester: I-AC-I : Calculus

Ins. Hrs. / Week: 3　　　　**Course Credit: 2**　　　　**Course Code: U23AMM101**

UNIT– I : Successive Differentiation　　　　　　　　　　　　**(9 Hours)**

Basic Formulae on Differentiation - Successive Differentiation – Definition with Examples - n^{th} derivative of standard functions (Derivation not needed) - Trigonometrical tranformation - Formation of equations involving derivatives - Leibnitz Theorem (proof not needed) and its applications - Simple problems.

UNIT– II : Curvature　　　　　　　　　　　　　　　　　　**(8 Hours)**

Total differential coefficients (proof not needed) – Definition - Curvature and Radius of curvature in Cartesian only (proof not needed) – Centre of curvature (proof not needed) – Definition with Examples - Related problems.

UNIT – III : Evaluation of Integrals　　　　　　　　　　　　**(9 Hours)**

Evaluation of Integrals of types

1) $\int \frac{px+q}{ax^2+bx+c}\, dx$　　　2) $\int \frac{px+q}{\sqrt{ax^2+bx+c}}\, dx$

3) $\int \frac{dx}{a+b\cos x}$　　　　　4) $\int \frac{dx}{a+b\sin x}$

Integration by trigonometric substitution

1) $\int \sqrt{a^2-x^2}\, dx$　2) $\int \sqrt{a^2+x^2}\, dx$　3) $\int \sqrt{x^2-a^2}\, dx$

UNIT– IV : Reduction Formula　　　　　　　　　　　　　　**(9 Hours)**

General Properties of Definite Integrals - Integration by Parts.

Reduction Formula (when n is a positive integer) for

1) $\int e^{ax}x^n\, dx$　　　　　2) $\int \sin^n x\, dx$　　　3) $\int \cos^n x\, dx$

UNIT –V : Double Integrals　　　　　　　　　　　　　　　**(10 Hours)**

Double Integrals –Definition with Examples - Changing the order of Integration – Triple Integrals (Cartesian only) – Definition with Examples – Related Problems.

Total Lecture Hours- 45

COURSE OUTCOME

The students should be able to

1. Analyze the concept of successive Differentiation.
2. Determine the notation of curvature and radius of curvature.
3. Solve the problems in integration using various methods.
4. Analyze the concept of properties of definite integrals, integration by parts and reduction formulae.
5. Describe the concept of double and triple integrals.

TEXT BOOK(S)

1. Narayanan S. and Manicavachagam Pillai T.K. 2003. Calculus Volume I. S.Viswanathan (Printers & Publishers) Pvt. Limited, Chennai.
2. Narayanan S. and Manicavachagam Pillai T.K. 2011. Calculus. Volume II. S.Viswanathan (Printers & Publishers) Pvt. Limited, Chennai.

UNIT - I   Chapter 3   :   Sec. 1.1 to 1.6, 2.1, 2.2 of [1]
UNIT - II   Chapter 8   :   Sec. 1.3 to 1.5 &
                Chapter 10   :   Sec. 2.1 to 2.3 of [1]
UNIT - III   Chapter 1   :   Sec. 7.3, 7.4, 8, 9of [2]
UNIT - IV   Chapter 1   :   Sec. 11,12, 13.1, 13.3, 13.4 of [2]
UNIT - V   Chapter 5   :   Sec. 2.1, 2.2, 4 of [2]

REFERENCE BOOK(S)

1. Arumugam S. and Issac. 2013. Calculus Volume I. New Gamma Publishing House, Palayamkottai.
2. Khanna M.L. 1994. Integral Calculus. 19th Edition. Jai Prakash Nath & Co. Meerut.
3. Hari Krishnan. 2013. Calculus. Atlantic Publishers & Distributions Pvt. Ltd., Chennai.
4. Singh U.P., Srivastava R.J., and Siddiqui N.H. 2003. Calculus. Dominant Publishers and Distributors, New Delhi.
5. Shanthi Narayan and Mittal P.K. 2005. Integral Calculus. S.Chand and Company Ltd., New Delhi.

E_RESOURCES

1. file:///C:/Users/ELCOT/Downloads/AnElementaryTreatiseontheDifferentialandIntegralCalculus_10449393.pdf
2. http://djm.cc/library/Elements_Differential_Integral_Calculus_Granville_edited_2.pdf
3. https://www.slideserve.com/jerod/hyperbolic-functions?fitview=true#ssShare
4. https:// www.slideshare.net/informaticaacademy/ successive differentiation
5. http://www.math.odu.edu/~jhh/counter10.html

Semester: I – AC – II : Algebra and Analytical Geometry (3D)
Ins. Hrs./Week: 4   **Course Credit: 2**   **Course Code: U23AMM102**

UNIT-I: Binomial and Exponential Series   (7 Hours)

Introduction about Binomial and Exponential Series - Binomial Theorem to evaluate summation of series - Approximate value of the series – Exponential Theorem (Proof not needed) -Summation of the series - Related Problems.

UNIT–II: Matrices   (9 Hours)

Non-Singular, Symmetric, Skew Symmetric, Orthogonal, Hermitian, Skew Hermitian and Unitary matrices - Solutions of simultaneous equations – Characteristic equation, Eigen values, Eigen vectors – Cayley Hamilton's Theorem (proof not needed) related problems only - Related Problems.

UNIT–III: The Plane   (11 Hours)

General equation – The equation of the plane passing through the points – Angle between the planes – Equation of a plane through the line of intersection of two planes– length of the perpendicular.

UNIT-IV: The Straight Line   (8 Hours)

Intersection of two planes - Symmetrical form of the equations of the line - Equation of a straight line passing through two points – Plane and Straight line – Angle between the Plane and the Line.

UNIT–V: The Sphere   (10 Hours)

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

Total Lecture Hours - 45

COURSE OUTCOME

The students should be able to
1. Examine the binomial theorem and its summation and approximations.
2. Analyze the types of matrices and its definitions and compute the Eigen value and Eigen vector.
3. Apply the angle between planes, bisector planes, perpendicular distance from a point to a plane and intersection of two lines.
4. Compute the angle between a line and a plane, length of perpendicular from a point to a line.
5. Describe the equation of a Sphere passing through the circle and tangent of the plane to the Sphere.

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., 2012. Algebra, Volume II, S.Viswanathan Pv.t Limited, Chennai.
3. Manicavachagam Pillai T.K., Natarajan T., 2008. Analytical Geometry (3D), S.Viswanathan Pvt. Limited, Chennai.

UNIT- I   Chapter 3 : Sec. 10 and 14 &
            Chapter 4 : Sec. 2,3 of [1]
UNIT- II   Chapter 2 : Sec. 1 to 13 and 16, 16.3 of [2]
UNIT- III   Chapter 2 : Sec. 2.1 – 2.10 [3]
UNIT- IV   Chapter 3 : Sec. 3.1 to 3.6 [3]
UNIT- V   Chapter 4: Sec. 4.1 to 4.8 [3]

REFERENCE BOOK(S)

1. Jain P.K.1991. A Textbook of Analytical Geometry of Three Dimensions, Second Edition. New Age International Private Limited, New Delhi.
2. Sannu Rahi. 2009. Algebra, Tata McGraw Hill Publishing Company Limited, New Delhi.
3. Shanti Narayan, P.K. Mittal. 2016. Analytical Solid Geometry. S.Chand & Company Private limited, New Delhi.
4. Vaishtha A.R. 1990. Analytical Solid Geometry. Krishna Prakashan Media Pv.t Ltd., New Delhi.
5. William H. McCrea. 2012. Analytical Geometry of Three Dimensions. Dover Publications, New York.

E-RESOURCES

1. https://www.google.com/amp/s/dokumen.tips/amp/documents/free-download-here-manickavasagam-pillai-volume-1pdf-free-download-here-algebra.html
2. https://www.academia.edu/19646465/Analytical_solid_geometry_Shanti_Narayan
3. http://fhscastormath.weebly.com/uploads/1/2/4/7/12476962/chapter11_precal.pdf
4. https://ncert.nic.in/textbook/pdf/lemh205.pdf
5. https://pdfbookslibs.com/a-textbook-of-analytical-geometry-of-three-dimensions-2nd.pdf

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DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS - III
(For Physics & Chemistry)

Semester: II – AC – III: Trigonometry and Fourier series

Ins.Hrs./Week: 3   **Course Credit: 2**   **Course Code: U23AMM203**

UNIT-I : Demovier's Theorem for Rational Number **(12 Hours)**
Introduction on Number System - Expansion of sin nθ, cosnθ, tan nθ (n being a positive integer) – Related Problems–Expansion of $\sin^n\theta$, $\cos^n\theta$ – Related Problems – Expansion of sinθ, cosθ and tan θ in terms of powers of θ – Related Problems.

UNIT –II : Hyperbolic Functions **(10 Hours)**
Introduction on Hyperbolic functions – Results – Related Problems – Relation between Hyperbolic and Circular functions–Related Problems–Expansion of Inverse Hyperbolic functions–Related Problems–Separation of real and imaginary parts–Related Problems.

UNIT –III : Logarithm of a Complex Number **(8 Hours)**
Introduction - Logarithm of a complex number – Related Problems – Summation of a series – Related Problems – Difference Method – Related Problems – Angles in Arithmetic Progression method – Related Problems.

UNIT- IV : Fourier series **(9 Hours)**
Fourier Series – Definition – Related Problems – Fourier Series Expansion of Periodic Functions with period 2π– Definition – Related Problems – Odd and Even Functions – Definition– Properties of Odd and Even Functions – Related Problems.

UNIT –V : Half Range Fourier series **(6 Hours)**
Half range sine series – Definition – Related Problems - Half range cosine series – Definition – Related Problems.

Total Lecture Hours-45

COURSE OUTCOME
The students should be able to
1. Examine the expansion of sinnθ and cosnθ and its related problems.
2. Analyze the hyperbolic functions and its relation between hyperbolic and circular functions.
3. Describe the summation of series and its methods.
4. Apply the concept of Fourier series and familiarizes with odd, even Fourier series with their periodic functions.
5. Analyze the half range sine and cosine functions and its change of interval.

TEXT BOOKS
1. Arumugam S, Thangapandi Issac A and Somasundaram A. 1999. Trigonometry and Fourier Series. New Gamma Publications, Palayamkkottai.
2. Narayanan S and Manicavachagam Pillay. T.K 2014. Calculus Volume III. Viswanathan Publishing Company, Chennai.

UNIT-I   Chapter 1   : Sec. 1.2 to 1.4 of [1]
UNIT-II   Chapter 2   : Sec. 2.1 and 2.2 of [1]
UNIT-III   Chapter 3 : Sec 3.1 of [1]
                   Chapter 4 : Sec. 4.1&4.2 of [1]
UNIT- IV   Chapter 6 : Sec. 1 to 3 of [2]
UNIT- V   Chapter 6 : Sec. 4 & 5 of [2]

REFERENCE BOOK(S)
1. Dyke P.G 2001. An Introduction to Laplace Transforms and Fourier Series. Spinger – Verlag, London.
2. Gelfand I.F. and Saul M. 2012. Trigonometry. Spinger – Verlag, London.
3. Jain S.K. 2001. Fourier Series and Fourier Transforms. Sarup and Sons, New Delhi.
4. Rawat K.S. 2005. Trigonometry. Sarup and Sons, New Delhi.
5. Robert T Seeley. 2006. An Introduction to Fourier Series and Integrals. Dover Publications, New York.

E-RESOURCES
1. https://orion.math.iastate.edu/butler/PDF/trig_notes.pdf
2. http://users.auth.gr/~siskakis/GelfandSaul-Trigonometry.pdf
3. https://lib.alfaisal.edu/pdf/AlgebraAndTrigonometry-LR.pdf
4. https://math.mit.edu/~gs/cse/websections/cse41.pdf
5. https://fenedebiyat.siirt.edu.tr/dosya/personel/uygulamali-matematik-siirt-201935221347541.pdf

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