

Holy Cross College (Autonomous), Nagercoil
Kanyakumari District, Tamil Nadu.
Accredited with A⁺ by NAAC - IV cycle – CGPA 3.35

Affiliated to
Manonmaniam Sundaranar University, Tirunelveli



Semester I & II

Guidelines & Syllabus

DEPARTMENT OF MATHEMATICS



2023-2026

(With effect from the academic year 2023-2024)

**Issued from
THE DEANS' OFFICE**

Vision

To empower women globally competent with human values and ethics acquiring

academic and entrepreneurship skills through holistic education.

Mission

1. To create opportunities which will ensure academic excellence in critical thinking, humanistic and scientific inquiry.
2. To develop application-oriented courses with the necessary input of values.
3. To create a possible environment for innovation, team spirit and entrepreneurial leadership.
4. To form young women of competence, commitment and compassion.

Programme Educational Objectives (PEOs)

PEOs	Upon completion of B.Sc. degree programme, the graduates will be able to	Mission addressed
PEO 1	apply appropriate theory and scientific knowledge to participate in activities that support humanity and economic development nationally and globally, developing as leaders in their fields of expertise.	M1 & M2
PEO 2	inculcate practical knowledge for developing professional empowerment and entrepreneurship and societal services.	M2, M3, M4 & M5
PEO 3	pursue lifelong learning and continuous improvement of the knowledge and skills with the highest professional and ethical standards.	M3, M4, M5 & M6

Programme Outcomes (POs)

POs	Upon completion of B.Sc. Degree Programme, the graduates will be able to:	PEOs Addressed
PO1	obtain comprehensive knowledge and skills to pursue higher studies in the relevant field of science.	PEO 1
PO2	create innovative ideas to enhance entrepreneurial skills for economic independence.	PEO2
PO3	reflect upon green initiatives and take responsible steps to build a sustainable environment.	PEO 2
PO4	enhance leadership qualities, team spirit and communication skills to face challenging competitive examinations for a better developmental career.	PEO 1 & PEO 3
PO5	communicate effectively and collaborate successfully with peers to become competent professionals.	PEO 2 & PEO 3
PO6	absorb ethical, moral and social values in personal and social life leading to highly cultured and civilized personality	PEO 2 & PEO 3
PO7	participate in learning activities throughout life, through self-paced and self-directed learning to develop knowledge and skills.	PEO1 & PEO 3

Programme Specific Outcomes (PSOs)

PSO	Upon completion of B.Sc. Mathematics, the graduates will be able to:	Mapping with POs
PSO – 1	acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.	PO1
PSO – 2	understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.	PO6
PSO - 3	apply Mathematical theories and principles accurately, precisely and effectively including higher research and extensions	PO3 &PO7
PSO – 4	prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions	PO5 &PO6
PSO – 5	create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations	PO2 &PO4

Mapping of PO'S and PSO'S

POs	PSO1	PSO 2	PSO3	PSO4	PSO5
PO 1	S	M	M	M	M
PO 2	M	M	M	M	S
PO 3	M	M	S	M	M
PO4	M	M	M	M	S
PO5	M	M	M	S	M
PO6	M	S	M	S	M
PO7	M	M	S	M	M

Strong -S (3), Medium – M (2), Low – L (1)

Eligibility Norms for Admission

Those who seek admission to B.Sc. Mathematics must have passed the Higher Secondary Examinations conducted by the Board of Higher Secondary Examination, TamilNadu with Mathematics as one of the subjects or any other examination recognized and approved by the Syndicate of Manonmaniam Sundaranar University, Tirunelveli.

Duration of the Programme : 3 Years

Medium of Instruction : English

Passing Minimum

A minimum of 40% in the external examination and an aggregate of minimum 40% is required. There is no minimum pass mark for Continuous Internal Assessment (CIA).

Components of the B.Sc. Mathematics Programme

Core Courses	Core-Theory papers	14 x 100	1400
	Project	1x100	100
	Discipline Specific Elective Theory Papers	4 x 100	400
	Total Marks		1900
Elective Courses	Theory	4 x 100	400
	Practical	2x100	200
	Total Marks		600
Total Marks			2500

Course Structure Distribution of Hours and Credits

Curricular Courses

Course	S I	S II	S III	S IV	S V	S VI	Total	
							Hours	Credits
Part I –Language	6 (3)	6 (3)	6 (3)	6 (3)	-	-	24	12
Part II -English	6 (3)	6 (3)	6 (3)	6 (3)	-	-	24	12
Part-III								
Core Course	4 (4) 4 (4)	4 (4) 4 (4)	4 (4) 4 (4)	4 (4) 4 (4)	5 (4)+ 5 (4)+ 5 (4)+ 5 (4)	6(5)+ 6(4)+ 6(4)	70	61
Core Project								
Elective /Discipline Specific Elective Courses	6 (5)	6 (5)	6 (5)	6 (5)	4(3) 4 (3)	5(3) 5(3)	42	32
Part IV								
Non-major Elective	2 (2)	2 (2)	-	-	-	-	4	4
Skill Enhancement Course	-	2 (2)	1 (1) 2 (2)	1 (1) 2 (2)	-		8	8

Foundation Course	2(2)	-	-	-	-	-	2	2
Value Education	-	-	-	-	2 (2)	-	2	2
Summer Internship /Industrial Training	-	-	-	-	(2)	-	-	2
Environmental Studies	-	-	1	1 (2)	-	-	2	2
Extension activity	-	-	-	-	-	(1)	-	1
Professional Competency Skill						2 (2)	2	2
Total	30 (23)	30 (23)	30 (22)	30 (24)	30 (26)	30 (22)	180	140

Co-curricular Courses

Course	S I	S II	S III	S IV	S V	S VI	Total
LST (Life Skill Training)	-	(1)	-	(1)			2
Skill Development Training (Certificate Course)	(1)						1
Field Project		(1)					1
Specific Value-added Course	(1)		(1)				2
Generic Value-added Course				(1)		(1)	2
MOOC		(1)		(1)		(1)	3
Student Training Activity: Clubs & Committees / NSS				(1)			1
Community Engagement Activity: RUN				(1)			1
Human Rights Education					(1)		1
Gender Equity Studies						(1)	1
Total							15

Total number of Compulsory Credits = Academic credits + Non-academic credits: 140 + 15

Courses Offered

Semester I

Course	Course Code	Title of the Course	Credits	Hours/Week
Part I	TU231TL1 FU231FL1	Language: Tamil French	3	6
Part II	EU231EL1	English	3	6
Part III	MU231CC1	Core Course I: Algebra & Trigonometry	4	4
	MU231CC2	Core Course II: Differential Calculus	4	4
	MU231EC1	Elective Course I: Allied Mathematics I- Algebra and Differential Equations	5	6

Part IV	MU231NM1	Non Major Elective NME I: Mathematics For Competitive Examinations- I	2	2
	MU231FC1	Foundation Course: Bridge Mathematics	2	2
		Total	23	30

Semester II

Course	Course Code	Title of the Course	Credits	Hours/Week
Part I	TU232TL1 FU232FL1	Language: Tamil French	3	6
Part II	EU232EL1	English	3	6
Part III	MU232CC1	Core Course III: Coordinate and Spatial Geometry	4	4
	MU232CC2	Core Course IV: Integral Calculus	4	4
	MU232EC1	Elective Course II: Vector Calculus and Fourier Series	5	6
Part IV	MU232NM1	Non-major Elective NME II: Mathematics for Competitive Examinations- II	2	2
	MU232SE1	Skill Enhancement Course SEC I: Introduction to Computational Mathematics	2	2
		Total	23	30

Co-curricular Courses

Part	Semester	Code	Title of the Course	Credit
Part V	I & II	UG232LC1	Life Skill Training I: Catechism	1
		UG232LM1	Life Skill Training I: Moral	
	I	UG231C01 UG231C--	Skill Development Training (SDT) Certificate Course	1
	II	MU232FP1	Field Project	1
	I & III	MU231V01- MU231V--/ MU233V01 – MU233V--	Specific Value-added Course	1+1
	II, IV & VI	-	MOOC	1+1+1
	III & IV	UG234LC1	Life Skill Training II: Catechism	1
		UG234LM1	Life Skill Training II: Moral	
	IV & VI	UG234V01- UG234V--/ UG236V01-	Generic Value-added Course	1 +1

		UG236V--		
	I - IV	UG234ST1	Student Training Activity – Clubs & Committees / NSS	1
	IV	UG234CE1	Community Engagement Activity - RUN	1
	V	UG235HR1	Human Rights Education	1
	VI	UG236GS1	Gender Equity Studies	1
			Total	15

Specific Value-added Course

S. No.	Course code	Title of the course	Total hours
I	MU231V01	Web Designing using HTML	30

Examination Pattern

Each paper carries an internal component.

There is a passing minimum for external component.

A minimum of 40% in the external examination and an aggregate of 40% is required.

a. Part I – Tamil, Part II – English, Part III - (Core Course/ Elective Course)

Ratio of Internal and External= 25:75

Continuous Internal Assessment (CIA)

Internal Components and Distribution of Marks

Components	Marks
Internal test (2) (40 marks)	10
Quiz (2) (20 marks)	5
Assignment: (Model Making, Exhibition, Role Play, Seminar, Group Discussion, Problem Solving, Class Test, Open Book Test etc. (Minimum three items per course should be included in the syllabus & teaching plan) (30 marks)	10
Total	25

Question Pattern

Internal Test	Marks	External Exam	Marks
Part A 4 x 1 (No choice)	4	Part A 10 x 1 (No choice)	10
Part B 3 x 4 (Internal choice)	12	Part B 5 x 6 (Internal choice)	30
Part C 3 x 8 (Internal choice)	24	Part C 5 x 12 (Internal choice)	60
Total	40	Total	100

Lab Course:

Ratio of Internal and External= 25:75

Total: 100 marks

Internal Components and Distribution of Marks

Internal Components	Marks
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Performance of the Experiments	10
Regularity in attending practical and submission of records	5
Record	5
Model exam	5
Total	25

Question pattern

External Exam	Marks
Major Practical	75
Minor Practical / Spotters /Record	
Total	75

Core Project

Ratio of Internal and External = 25:75

Components	Marks
Internal	25
External	
Report	40
Viva voce	35

Part - IV

i. Non-major Elective, Foundation Course, Skill Enhancement Course, Value Education, Professional Competency Skill

Ratio of Internal and External = 25: 75

Internal Components and Distribution of Marks

Components	Marks
Internal test (2)	10
Quiz (2)	5
Assignment: (Model Making, Exhibition, Role Play, Album, Group Activity (Mime, Skit, Song) (Minimum three items per course)	10
Total	25

Question Pattern

Internal Test	Marks	External Exam	Marks
Part A 2 x 2 (No Choice)	4	Part A 5 x 2 (No Choice)	10
Part B 3 x 4 (open choice Three out of Five)	12	Part B 5 x 5 (open choice any Five out of Eight)	25
Part C 1 x 9 (open choice One out of Three)	9	Part C 5 x 8 (open choice any Five out of Eight)	40
Total	25	Total	75

ii. Environmental Studies

Internal Components

Component	Marks
Project Report	15

Viva voce	10
Total	25

Question Pattern

Internal Test	Marks	External Exam	Marks
Part A 2 x 2 (No Choice)	4	Part A 5 x 2 (No Choice)	10
Part B 3 x 4 (Open choice Three out of Five)	12	Part B 5 x 5 (Open choice any Five out of Eight)	25
Part C 1 x 9 (Open choice One out of Three)	9	Part C 5 x 8 (Open choice any Five out of Eight)	40
Total	25	Total	75

iii. Summer Internship/Industrial Training

Components	Marks
Industry Contribution	50
Report & Viva-voce	50

Co-Curricular Courses:

- i. **Life Skill Training: Catechism & Moral, Human Rights Education & Gender Equity Studies**

Internal Components

Component	Marks
Project - Album on current issues	25
Group Song/ Mime/ Skit	25
Total	50

External Components

Component	Marks
Quiz	20
Written Test: Open choice – 5 out of 7 questions (5 x 6)	30
Total	50

- ii. **Skill Development Training (SDT) - Certificate Course:**

Components	Marks
Attendance & Participation	50
Skill Test	50

- iii. **Field Project:**

Components	Marks
Field Work	50
Report & Viva-voce	50

- iv. **Specific Value-Added Courses & Generic Value-Added Courses:**

Components	Marks
Internal	25
External	75

- v. **Community Engagement Activity: Reaching the Unreached Neighbourhood (RUN)**

Components	Marks
Attendance & Participation	50
Field Project	50

- vi. **Student Training Activity: Clubs and Committees**

Compulsory for all I & II year students (1 credit).

Component	Marks
Attendance	25
Participation	25
Total	50

Outcome Based Education (OBE)

Programme	Assessment	Lower Order Thinking			Higher order thinking	Total number of questions
		K1	K2	K3	K4, K5, K6	

(i) 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

(ii) Weightage of K – Levels in Question Paper Number of questions for each cognitive level:

	Part	A	B	C	A	B	C	A	B	C	A	B	C	
I UG	Internal	2	2		1	1	1	1	-	2	-	-	-	10
	External	5	2	1	3	2	2	2	1	2	-	-	-	20
II UG	Internal	1	-	1	1	2		1	-	1	1	1	1	10
	External	5	1	1	4	1	1	-	3	1	1	-	2	20
III UG	Internal	1	1	-	-	1	-	1	-	1	2	1	2	10

Evaluation

- The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points.
- Evaluation of each course shall be done by Continuous Internal Assessment (CIA) by the course teacher as well as by an end semester examination and will be consolidated at the end of the semester.
- There shall be examinations at the end of each semester, for odd semesters in October/November; for even semesters in April/ May.
- A candidate who does not pass the examination in any course(s) shall be permitted to reappear in such failed course(s) in the subsequent examinations to be held in October/ November or April/May. However, candidates who have arrears in practical examination shall be permitted to reappear for their areas only along with regular practical examinations in the respective semester.
- Viva-voce: Each project group shall be required to appear for Viva -voce examination in defence of the project.
- The results of all the examinations will be published in the college website.

Conferment of Bachelor's Degree

A candidate shall be eligible for the conferment of the Degree of Bachelor of Arts / Science / Commerce only if the minimum required credits for the programme thereof (140 + 18 credits) is earned.

Grading System

For the Semester Examination:

Calculation of Grade Point Average for End Semester Examination:

$$\text{GPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the course}}{\text{Sum of the credits of the courses (passed) in a semester}}$$

For the entire programme:

$$\text{CGPA} = \frac{\text{Cumulative Grade Point Average (CGPA) } \sum_n \sum_i C_{ni} G_{ni} / \sum_n \sum_i C_{ni}}{\text{Sum of the credits of the courses of the entire programme}}$$

Where

- C_i - Credits earned for course i in any semester
 G_i - Grade point obtained for course i in any semester
 n - semester in which such courses were credited

Final Result

Conversion of Marks to Grade Points and Letter Grade

Range of Marks	Grade Points	Letter Grade	Description
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
40-49	4.0-4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

Overall Performance

CGPA	Grade	Classification of Final Result
9.5-10.0	O+	First Class – Exemplary*
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.0 and above but below 5.0	C	Third Class
0.0 and above but below 4.0	U	Re-appear

*The candidates who have passed in the first appearance and within the prescribed semester are eligible for the same.

SEMESTER I
CORE COURSE I: ALGEBRA & TRIGONOMETRY

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU231CC1	4	-	-	-	4	4	60	25	75	100

Pre-requisite:

Students should know the basic concepts of Algebra & Trigonometry.

Learning Objectives:

1. To understand the basic ideas on the theory of equations, Matrices.
2. To get the knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.

Course Outcomes

On the successful completion of the course, student will be able to:		
1.	classify and solve reciprocal equations	K2
2.	find the sum of binomial, exponential and logarithmic series	K1
3.	find eigen values, eigen vectors, verify cayley — hamilton theorem and diagonalize a given matrix	K1
4.	expand the powers and multiples of trigonometric functions in terms of sine and cosine	K2
5.	determine relationship between circular and hyperbolic functions and the summation of trigonometric series	K3

K1 - Remember; **K2** - Understand; **K3** - Apply

Units	Contents	No. of Hours
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
II	Summation of Series: Binomial— Exponential —Logarithmic series (Theorems without proof) — Approximations - related problems.	12
III	Characteristic equation — 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, related problems.	12
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 $\cos^n\theta, \sin^n\theta, \sin^n\theta \cos^n\theta$, Expansions of $\tan(\theta_1 + \theta_2 + \dots + \theta_n)$ -related problems.	12
V	Hyperbolic functions — Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities-related problems.	12

Self-study	Definitions and Formulae
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Text Books

1. T.K. Manicavachagom Pillai, T. Natarajan and K.S.Ganapathy (2015)*Algebra, Volume I*, Chennai, S. Viswanathan Pvt. Ltd.

2. S. Arumugam and A. Thangapandi Isaac (2006). *Theory of Equations and Trigonometry* Palayamkottai: New Gamma Publishing House.

Reference Books

1. W.S. Burnstine and A. W. Panton (2016), *Theory of equations*, Wentworth Press.
2. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005.
3. David C. Lay, (2007) *Linear Algebra and its Applications*, 3rd Ed., Pearson Education Asia, Indian Reprint.
4. C. V. Durell and A. Robson, (2003), *Advanced Trigonometry*, Courier Corporation.
5. J. Stewart, L. Redlin, and S. Watson, (2012), *Algebra and Trigonometry*, Cengage Learning.

Web Resources

1. <https://nptel.ac.in>
2. https://rodrigopacios.github.io/mrpacios/download/Thomas_Calculus.pdf
3. <https://www.dbraulibrary.org.in/RareBooks/An%20Introduction%20to%20the%20Modern%20Theory%20of%20Equations.pdf>
4. <https://pdfcoffee.com/qdownload/c-v-durell-a-robson-advanced-trigonometry-2003pdf-pdf-free.html>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2	3	2	3	2	2	2	2
CO2	3	2	3	3	3	2	2	3	2	2	2	2
CO3	3	2	3	3	3	2	2	3	2	2	2	2
CO4	3	2	3	3	2	2	2	3	2	2	2	2
CO5	3	2	3	3	3	2	2	3	2	2	2	2
TOTAL	15	10	15	15	13	11	10	15	10	10	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	3	2	2	2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER I
CORE COURSE II: DIFFERENTIAL CALCULUS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU231CC2	4	-	-	-	4	4	60	25	75	100

Pre-requisite:

Standard XII Mathematics.

Learning Objectives:

1. Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates, and solving related problems.
2. The basic skills of differentiation, successive differentiation, and their applications.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	recall the definitions and basic concepts of Differential Calculus.	K1
2	understand the concepts of Differentiation, Partial Differentiation, Envelope & Curvature.	K2
3	determine Partial derivatives of a function of two variables and use Lagrange's method of undetermined multipliers.	K2
4	distinguish between partial and ordinary differential equations.	K3
5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates.	K3

K1 - Remember; **K2** - Understand; **K3** – Apply

Units	Contents	No. of Hours
I	Successive Differentiation Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product.	12
II	Partial Differentiation Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient.	12
III	Partial Differentiation (Continued) Homogeneous functions – Partial derivatives of a function of two variables – Lagrange's method of undetermined multipliers.	12
IV	Envelope Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.	12
V	Curvature Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involute – Radius of Curvature in Polar Co-ordinates.	12

Self Study	Radius of Curvature in Polar Co-ordinates.
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Text Books

1. Narayanan S and Manicavachagom Pillai T.K (2015). *Calculus*. Chennai: S. Viswanathan (Printers & Publications) Pvt. Ltd.
2. S. Arumugam and A. Thangapandi Isaac (2011). *Calculus*. Palayamkottai: New Gamma Publishing House.

Reference Books

1. R. Courant and F. John (1989). *Introduction to Calculus and Analysis*. New York: Springer.
2. T. Apostol, *Calculus*, Volumes I and II. John New York: Wiley & Sons.
3. S. Goldberg, *Calculus and Mathematical Analysis*
4. H. Anton, I. Birens and S. Davis (2002). *Calculus*. United States of America: John Wiley & Sons, Inc.
5. G.B. Thomas and R.L. Finney (2010). *Calculus*. Delhi: Pearson Education.
6. M.J. Strauss, G.L. Bradley and K. J. Smith (2007). *Calculus*. Delhi: Pearson Education.

Web Resources

1. <https://nptel.ac.in>
2. <https://www.uou.ac.in/sites/default/files/slm/MSCZO-501.pdf>
3. <https://manoa.hawaii.edu/exploringourfluidearth/biological/invertebrates/structure-and-function>
4. <https://www.zoologytalks.com/category/structure-and-functions-of-invertebrates/>
5. <https://www.bilasagirlscollege.ac.in/newsData/D54.pdf>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2	3	3	2	3	2	2	2
CO2	3	2	3	2	3	2	3	2	2	2	2	2
CO3	3	2	3	2	3	2	3	3	2	3	2	2
CO4	3	2	3	2	2	2	3	2	2	2	2	2
CO5	3	2	3	2	3	3	3	3	2	3	2	2
TOTAL	15	10	15	10	13	12	15	12	11	12	10	10
AVERAGE	3	2	3	2	2.6	2.4	3	2.4	2.2	2.4	2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER I
ELECTIVE COURSE I: ALLIED MATHEMATICS-I
ALGEBRA AND DIFFERENTIAL EQUATIONS

Course Code	L	T	P	Credits	Inst. Hours	Total Hours	Marks		
							CIA	External	Total
MU231EC1	5	1	-	5	6	90	25	75	100

Pre-requisite:

Students should know the basic concepts of Algebra & Trigonometry.

Learning Objectives:

1. To understand the basic ideas on the theory of equations, Matrices.
2. To get the knowledge to find expansions of trigonometry functions, solve theoretical and applied problems

Course Outcomes

On the successful completion of the course, student will be able to:		
1	recall the methods of finding the solutions of algebraic equations, differential equations and various formulae of laplace transform	K1
2	understand the theory of algebraic equations, eigen values, differential equations and laplace transform	K2
3	simplify algebraic expressions using various methods, find eigen values, solve initial value problems for odes and find inverse laplace transform	K2
4	analyse various types of first-order odes, relate laplace transform and inverse laplace transform and formulate algebraic equations from real world problems.	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze;

Units	Contents	No. of Hours
I	Theory of Equations – Formation of Equations – Relation between roots and coefficients–Reciprocal equations.	18
II	Transformation of Equations–Approximate solutions to equations – Newton’s method and Horner’s method.	18
III	Matrices–Characteristic equation of a matrix –Eigen values and Eigen vectors – Cayley Hamilton theorem and simple Problems.	18
IV	Differential equation of first order but of higher degree – Equations solvable for x, y –Partial differential equations–formations– solutions –Standard form $Pp+Qq=R$.	18
V	Laplace transformation–Inverse Laplace transform.	18

Self study	Definitions and Formulae
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Text Book

Dr.S. Arumugam & Isaac–Allied Mathematics Paper-I, New Gamma Publishing House (2012),

PalayamKottai.

Reference Books

1. 1 Narayanan.S and T.K. Manikavachagam Pillai-Differential Equations and its applications, S.Viswanathan Printers Pvt.Ltd,2006.
2. T.Veerarajan-AlgebraandTrigonometry-YesDeePublishing Pvt.Ltd.,(2009)

Web Resources

- 1.<https://nptel.ac.in>
- 2.<https://ocw.mit.edu/courses/res-18-009-learn-differential-equations-up-close-with-gilbert-strang-and-cleve-moler-fall-2015/pages/differential-equations-and-linear-algebra/>
- 3.<https://www.khanacademy.org/math/differential-equations>
- 4.<https://www.khanacademy.org/math/differential-equations>
- 5.https://en.wikipedia.org/wiki/Algebraic_differential_equation

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2	3	2	3	2	2	2	2
CO2	3	2	3	3	3	2	2	3	2	2	2	2
CO3	3	2	3	3	3	2	2	3	2	2	2	2
CO4	3	2	3	3	2	2	2	3	2	2	2	2
TOTAL	15	10	15	15	13	11	10	15	10	10	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	3	2	2	2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER – I
NON-MAJOR ELECTIVE NME - I
MATHEMATICS FOR COMPETITIVE EXAMINATIONS I

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU231NM1	2	-	-	-	2	2	30	25	75	100

Pre-requisite:

Students should have basic knowledge on Mathematical calculations.

Learning Objectives:

1. To understand the problems asked in various competitive examinations and identify the method to solve them.
2. To develop numerical aptitude by practicing different types problems.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	understand the problems and remember the methods to solve problems.	K1 & K2
2	grasp the simplest method to solve problems.	K2
3	apply suitable mathematical method and get solutions to simple real life problems.	K3

K1 - Remember; K2 - Understand; K3 - Apply

Units	Contents	No. of Hours
I	Simplification: BODMAS rule – Using basic formulae – Problems with sets. Averages: Finding average income, average expenditure, average age, average speed and average score. (Chapter 4 and Chapter 6).	6
II	Ratio and proportion: Comparison of two ratios – Compounded Ratio – Mean, Third and Fourth Proportional – Real life problems (Chapter 13)	6
III	Percentages: Percentage on numbers – Population – Depreciation. Partnership: Ratio of division of gains – Investments made in same time and Investments made in different time. (Chapter 11 and Chapter 14).	6
IV	Profit and Loss: Gain – Loss –Selling similar items – Problems on trader professes to sell his goods. (Chapter 12).	6
V	Problems on numbers: Framing and solving equations involving unknown numbers - Problems involving ratios and fractions. (Chapter 7).	6

Text Book:

Aggarwal, R.S (2017). *Quantitative Aptitude* (Revised Edition). S. Chand and Company LTD.

Self study	Percentages
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Reference Books

1. Guha, A. 2011. *Quantitative Aptitude for Competitive Examinations* (4th Edition). Published by McGraw Hill Education (India) Pvt. Ltd.
2. Aggarwal, R.S (2022). *Quantitative Aptitude* (Revised Edition). S. Chand and Company LTD.
3. Arun Sharma. 2008. *Objective Mathematics* (2nd Edition). Tata McGraw-Hill Publishing Company Limited.
4. Chauhan, R.S. 2011. *Objective Mathematics*. Unique Publisher.
5. Goyal, J. K. Gupta, K. P. 2011. *Objective Mathematics* (6th Revised Edition). Pragati Prakashan Educational Publishers.
6. Immaculate, M. (2009). *Mathematics for Life*. Nanjil offset Printers.

Web Resources

1. [Simplification - Shortcuts & Tricks for Placement Tests, Job Interviews & Exams - YouTube](#)
2. [Averages - Shortcuts & Tricks for Placement Tests, Job Interviews & Exams - YouTube](#)
3. [Percentage - Shortcuts & Tricks for Placement Tests, Job Interviews & Exams - YouTube](#)
4. [Partnership - Shortcuts & Tricks for Placement Tests, Job Interviews & Exams - YouTube](#)
5. [Aptitude Made Easy - Profit & Loss – Basics and Methods, Profit and loss shortcuts, Math tricks - YouTube](#)

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	1	3	3	1	3	3	3	2	3	3
CO2	2	3	1	3	3	2	3	3	3	2	3	3
CO3	2	3	1	3	3	2	3	3	3	3	3	3
TOTAL	6	9	3	9	9	5	9	9	9	7	9	9
AVERAGE	2	3	1	3	3	1.6	3	3	3	2.3	3	3

3 – Strong, 2- Medium, 1- Low

SEMESTER – I
FOUNDATION COURSE - BRIDGE MATHEMATICS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU231FC1	2	-	-		2	2	30	25	75	100

Pre-requisite:

Students should know 12th Standard Mathematics.

Learning Objectives:

1. To bridge the gap and facilitate transition from higher secondary to tertiary education.
2. To instill confidence among stakeholders and inculcate interest for Mathematics.

Course Outcomes

On the successful completion of the course, student will 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.	K2 & K3
2	find the various sequences and series and solve the problems related to them. Explain the principle of counting.	K1 & K3
3	find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations.	K2 & K3
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.	K2 & K3
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.	K3

K1-Remember K2- Understand K3 - Apply

Units	Contents	No. of Hours
I	Algebra Binomial theorem, General term, middle term, problems based on these concepts	6
II	Analysis Sequences and series (Progressions). Fundamental principle of counting. Factorial n.	6
III	Combinatorics Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.	6
IV	Trigonometry Introduction to trigonometric ratios, proof of $\sin(A+B)$, $\cos(A+B)$, $\tan(A+B)$ formulae, multiple and sub multiple angles, $\sin(2A)$, $\cos(2A)$,	6

	tan(2A) etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule	
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

Self Study	Definitions, Formulae, Applications
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Text books

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

Web Resources

1. <https://nptel.ac.in>
2. <https://www.khanacademy.org/>
3. <https://www.bytelearn.com/>
4. <https://mathworld.wolfram.com/>
5. <https://byjus.com/>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	1	1	2	1	2	2	2	2	1	1
CO2	2	1	1	1	2	1	2	2	2	2	1	1
CO3	2	1	1	1	2	1	2	2	2	2	1	1
CO4	2	1	1	2	2	1	2	1	2	1	1	2
CO5	2	1	1	2	2	1	2	2	1	1	2	2
TOTAL	10	5	5	7	12	5	10	9	9	8	6	7
AVERAGE	2	1	1	1.4	2	1	2	1.8	1.8	1.6	1.2	1.4

3 - Strong, 2- Medium, 1- Low

SEMESTER – I

SPECIFIC VALUE-ADDED COURSE –WEB DESIGNING USING HTML

Course Code	Credit	Total Hours	Total Marks
MU231V01	1	30	100

Pre-requisite:

Basic knowledge of Matrices and Programming languages.

Learning Objectives:

1. To understand the importance of the web as a medium of communication.
2. To create an effective web page with graphic design principles.

Course Outcomes

On the successful completion of the course, student will be able to:

1	define modern protocols and systems used on the web (such as HTML, HTTP)	K2
2	employ fundamental knowledge on web designing with makeup language	K3
3	gain strong knowledge in HTML	K2
4	use critical thinking skills to design and implement an interactive websites with regard to issues of usability, accessibility and internationalism	K4
5	to pursue future courses in website development and design	K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze

Units	Contents	No. of Hours
I	Introduction to HTML – Designing a Home Page-History of HTML – HTML Generations –HTML Documents – Anchor Tag – Hyper Links –Sample HTML Documents.	6
II	Head and Body Sections – Header Sections – Title –Prologue – Links – Colorful Web Page – Comment Lines – Some Sample HTML Documents.	6
III	Designing the Body Section- Heading Printing-Aligning the Headings – Horizontal Rule – Paragraph – Tab Setting -Images and Pictures-Embedding PNG Format Images.	6
IV	Ordered and Unordered Lists – Lists – Unordered Lists –Headings in a List – Ordered Lists-Nested Lists.	6
V	Table Handling -Tables -Table Creation in HTML - Width of the Table and Cells-Cells Spanning Multiple Row/Columns Coloring Cells - Column Specification – Some Sample Tables.	6

Self study	Sample HTML Documents
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Text book

Xavier,C. World Wide Web Design with HTML.T ata Mc gram Hill
Publishing Company Limited.
Chapters 4: Sections: 4.1– 4.7
Chapters5: Sections: 5.1 – 5.7;
Chapters6: Sections :6.1 -6.7;
Chapters7: Sections: 7.1 – 7.5;
Chapters8: Sections: 8.1 – 8.7

ReferenceBooks:

1. Castro., Elizabeth.,& Hyslop.(2013).HTML5,AndCSS:VisualQuick start Guide.(Eight Edition). Peachpit Press.
2. Devlin.,&Ian.(2011).HTML5Multimedia:DevelopAndDesign.PeachpitPress.
3. Felke.,& Morris.(2013). Basics of Web Design : HTML5 &CSS3.(2nd Edition).Addition-Wesley.
4. Felke.,& Morris.(2014). -Web Development & Design Foundations WithHTML5.(7th Edition).Addition-Wesley.
5. John Duckett.(2011).HTML and CSS :Design and Build Website.(Edition).Johnwiley and sons.

Web Resources

1. <https://www.computerhope.com/starhtml.htm>
2. <https://www.geeksforgeeks.org/design-a-web-page-using-html>
3. <https://www.youtube.com/watch?v=PgAZ8KzfhO8>
4. <https://www.youtube.com/watch?v=qXXknB5bePU>
5. https://www.digitalocean.com/community/tutorial_series/how-to-build-a-website-with-html

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2	3	2	3	2	2	3	2
CO2	3	3	2	2	3	2	2	3	2	2	3	2
CO3	3	3	2	3	2	2	2	3	2	3	3	2
CO4	3	3	2	2	2	3	2	3	2	2	3	2
CO5	3	3	3	3	3	2	2	3	2	3	3	3
TOTAL	15	15	11	12	12	12	10	15	10	12	15	11
AVERAGE	3	3	2.2	2.4	2.4	2.4	2	3	2	2.4	3	2.2

3 – Strong, 2- Medium, 1- Low

SEMESTER II

CORE COURSE III: COORDINATE AND SPATIAL GEOMETRY

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU232CC1	4	-	-	-	4	4	60	25	75	100

Pre-requisite

Familiarity with algebraic expressions, equations, and solving for variables, basic geometry concepts and knowledge of trigonometry

Learning Objectives

1. To analyze characteristics and properties of two and three dimensional geometric shapes.
2. To develop mathematical arguments about geometric relationships.
3. To solve real world problems on geometry and its applications.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	recall the definitions and formulae of key concepts in coordinate and spatial geometry	K1
2.	describe the relationships between geometric shapes and their equations and summarize the properties of different transformations on the coordinate plane	K2
3.	solve real world problems involving lines, planes and spheres using analytical geometry concepts	K3
4.	analyze the properties of equations of lines, planes and spheres	K4
5.	evaluate complex problems that require the application of coordinate and spatial geometry concepts.	K5

K1 - Remember; **K2** - Understand; **K3**– Apply **K4**– Analyze **K5**–Evaluate

Units	Contents	No. of Hours
I	Pole, Polar - Conjugate Points and Conjugate Lines – Diameters – Conjugate Diameters of an Ellipse - Semi Diameters- Conjugate Diameters of Hyperbola. Chapter 7: 7.1 - 7.3; Chapter 8:8.1 - 8.5	12
II	Polar Coordinates - General Polar Equation of Straight Line – Polar Equation of a Circle, Equation of a Straight Line, Circle, Conic – Equation of Chord, Tangent, Normal - Equations of the Asymptotes of a Hyperbola. Chapter 10 : 10.1 - 10.8	12
III	System of Planes - Length of the Perpendicular – Orthogonal Projection Chapter 2: 2.1 - 2.10	12
IV	Representation of Line – Angle Between a Line and a Plane – Coplanar Lines – Shortest Distance between two Skew Lines – Length of the Perpendicular – Intersection of three Planes. Chapter 3: 3.1 - 3.8.	12
V	Equation of a Sphere - General Equation - Section of a Sphere by a	12

	Plane - Equation of the Circle - Tangent Plane - Angle of Intersection of two Spheres - Condition for the Orthogonality - Radical Plane. Chapter 6 : 6.1 - 6.8	
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Self-study	Co-planar Lines, Shortest distance between two Skew Lines, Length of the Perpendicular, Intersection of three Planes
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Text Books

1. Durai Pandian P, *Analytical Geometry of 2D*, 2012, Muhil publishers (Unit 1 &2)
2. Shanthi Narayan and Mittal P. K, *Analytical Solid Geometry of 3D*, Uttar Pradesh: S Chand and Co. Pvt. Ltd. (Unit 3 - 5)

Reference Books

1. Loney S. L., 2023. *The elements of Coordinate Geometry*, (7th Edition), ArihantPrakashan, Meerut.
2. Jain P. K and Khali Ahmed, 2021. *Textbook of Analytical Geometry of Two Dimensions*, (3rd Edition), New Age International Pvt. Ltd.
3. William F. Osgood and William C. Graustein, 2016. *Plane and Solid Analytic Geometry*, Macmillan Company, New York
4. Utpal Chatterjee and Nandini Chatterjee, 2016. *Advanced Analytical Geometry of Two and Three Dimensions*, Academic Publishers.
5. Vittal P. R., 2013. *Analytical Geometry 2D and 3D*, (1st Edition) Pearson Education, India.

Web Resources

1. <http://mathworld.wolfram.com>
2. <https://nptel.ac.in>
3. <http://www.univie.ac.at/future.media/moe/galerie.html>
4. <https://ia800504.us.archive.org/11/items/elementsofcoordi00lone/elementsofcoordi00lone.pdf>
5. <https://archive.org/details/elementarytreati033329mbp/page/n23/mode/2up>
6. https://rodrigopacios.github.io/mrpacios/download/Thomas_Calculus.pdf

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	1	1	-	3	3	2	-	-
CO2	3	3	3	3	2	2	-	3	3	2	-	-
CO3	3	3	3	3	3	2	-	3	3	2	-	-
CO4	3	3	3	3	3	2	-	3	3	3	-	-
CO5	3	3	3	3	2	2	-	3	3	2	-	-
TOTAL	15	14	14	14	11	9	-	15	15	11	-	-
AVERAGE	3	2.8	2.8	2.8	2.2	1.8	-	3	3	2.2	-	-

3 – Strong, 2- Medium, 1- Low

SEMESTER II
CORE COURSE IV: INTEGRAL CALCULUS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU232CC2	4	-	-	-	4	4	60	25	75	100

Pre-requisite: 12th Standard Mathematics

Learning Objectives

1. Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals.
2. Knowledge about Beta and Gamma functions and skills to determine Fourier series expansions.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae.	K1
2.	evaluate double and triple integrals and problems using change of order of integration.	K2
3.	solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution.	K3
4.	explain beta and gamma function and to use them in solving problems of integration.	K2
5.	explain Geometric and Physical applications of integral calculus.	K2

K1 - Remember; **K2** - Understand; **K3** – Apply

Units	Contents	No. of Hours
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. Calculus – Chapter 2: 2.8	12
II	Double Integrals –definition of double integrals-evaluation of double integrals - double integrals in polar coordinates – Change of order of integration. Calculus – Chapter 3: 3.1, 3.2	12
III	Triple integrals - applications of multiple integrals -volumes of solids of revolution – areas of curved surfaces – Change of variables. Calculus – Chapter 3: 3.3, 3.4	12
IV	Beta and Gamma functions – definitions – recurrence formula of Gamma functions – properties of Beta and Gamma functions – relation between Beta and Gamma functions - Applications. Calculus, Volume II – Chapter 7: 2.1, 2.2, 2.3	12
V	Fourier Series – Definition, The Cosine and Sine Series, Half range Fourier Cosine and Sine Series. Calculus – Chapter 5	12

Self-study	Relation between Beta and Gamma functions- Applications.
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Textbooks

1. Arumugam S & Thangapandi Isaac A, 2014. *Calculus*, New Gamma Publishing House, Palayamkottai.
2. Narayanan S & Manicavachagom Pillay T. K, 2009. *Calculus*, Volume II, S. Viswanathan (Printers and Publishers) Pvt. Ltd.

Reference Books

1. Anton H, Birens I and Davis S, 2002. *Calculus*, John Wiley and Sons, Inc.
2. Thomas G. Band Finney R. L, 2007. *Calculus*, Pearson Education.
3. Chatterjee D, *Integral Calculus and Differential Equations*, Tata-McGraw Hill Publishing Company Ltd.
4. Dyke P, 2001. *An Introduction to Laplace Transforms and Fourier Series*, Second edition, Springer Undergraduate Mathematics Series.
5. Sharma A. K, 2005. *Text Book of Integral Calculus*, Discovery Publishing House Pvt. Ltd., New Delhi.

Web Resources

1. <https://nptel.ac.in>
2. <https://www.freebookcentre.net/maths-books-download/Integral-Calculus-Miguel-A.-Lerma.html>
3. <https://3lihandam69.files.wordpress.com/2018/10/calculus-10th-edition-anton.pdf>
4. <http://www.sufwan.com/wp-content/uploads/CalculusAndAnalyticalGeometry/Calculus-Book-Thomas Finney.pdf>
5. <http://ndl.ethernet.edu.et/bitstream/123456789/55096/1/Tsuneo%20Arakawa.pdf>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2	3	2	3	2	2	2	2
CO2	3	2	3	3	3	2	2	3	2	2	2	2
CO3	3	2	3	3	3	2	2	3	2	2	2	2
CO4	3	2	3	3	2	2	2	3	2	2	2	2
CO5	3	2	3	3	3	2	2	3	2	2	2	2
TOTAL	15	10	15	15	13	11	10	15	10	10	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	3	2	2	2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER – II
ELECTIVE COURSE – II : VECTOR CALCULUS AND FOURIER SERIES

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU232EC1	5	1	-		5	6	90	25	75	100

Pre-requisite:

Students should know the basic principles of calculus, differentiation and integration

Learning Objectives:

1. To understand the concepts of vector differentiation and vector integration.
2. To apply the concepts in their respective disciplines.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	remember the formulae of vector differentiation, integration and Fourier series	K1
2	understand various theorems related to vector differentiation, integration and Beta, Gamma functions	K2
3	solve problems on vector differentiation, integration, Beta, Gamma functions and Fourier series	K3
4	compare double and triple integrals, line, surface integrals, Beta, Gamma functions and Fourier series for Even and odd functions	K2

K1–Remember **K2** - Understand **K3** - Apply

Units	Contents	No. of Hours
I	Vector differentiation – Gradient – Divergence and curl – Directional Derivative – Normal to a surface - Solenoidal, irrotational and harmonic vectors. Allied Mathematics Paper-II- Chapter 5: sections 5.3, 5.4	18
II	Evaluation of double and triple integrals Allied Mathematics Paper-II- Chapter 6: sections 6.1, 6.2	18
III	Vector integration - Work done by a force - Evaluation of line integrals and surface integrals - Green's and Stokes theorems (Statement only) with problems. Allied Mathematics Paper-II- Chapter 7: sections 7.1-7.3	18
IV	Beta and Gamma Function Calculus - Chapter:4	18
V	Fourier series–Even and odd functions–Half range Fourier series. Calculus - Chapter:5	18

Self Study	Evaluation of line integrals and surface integrals
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Text books

1. Arumugam. S, Thangapandi Issac. A, 2012, Allied Mathematics Paper-II, New Gamma Publishing House, Palayamkottai,.
2. Arumugam. S, Thangapandi Issac. A, 2014, Calculus, New Gamma Publishing House, Palayamkottai,.

Reference Books

1. Arumugam. S, Thangapandi Issac. A, (2017), Analytical Geometry 3D & Vector Calculus, New Gamma Publishing House, Palayamkottai.
2. Susan.J.C, (2012), Vector Calculus(4th Edition), Pearson Education, Boston.
3. Murray Spiegel-Vector analysis –Schaum Publishing company, New York (2009).
4. Manicavachagom Pillai. T.K, (2012), Calculus(VolIII), S. Vishvanathan Printer and Publisher PVT.LTD
5. DuraiPandian,P.,&LaxmiDuraiPandian.(1986). VectorAnalysis. EmeraldPublishers.

Web Resources

1. <https://nptel.ac.in>
2. <https://www.youtube.com/watch?v=rKQP7f2tUw>
3. <https://www.youtube.com/watch?v=D2eHgZ4kMHU>
4. <https://www.youtube.com/watch?v=r6sGWTCMz2k>
5. <https://www.youtube.com/watch?v=x04dnqg-iPw>
6. https://www.youtube.com/watch?v=Z8D_TEs9-zg

**MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	3	3	1	2	3	3	3	2	2
CO2	3	2	1	3	3	1	2	3	3	3	2	2
CO3	3	2	1	3	3	1	2	3	3	3	2	2
CO4	3	2	1	3	3	1	2	3	3	3	3	2
TOTAL	12	8	4	12	12	4	8	12	12	12	9	8
AVERAGE	3	2	1	3	3	1	2	3	3	3	2.25	2

3 – Strong, 2- Medium, 1- Low

SEMESTER – II
Non-Major Elective Course II
Mathematics for Competitive Examinations II

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU232NM1	2	-	-	-	2	2	30	50	50	100

Pre-requisite:

Students should have basic knowledge on Mathematical calculations.

Learning Objectives

- To understand the problems stated in various competitive examinations and realize the approach to get solution.
- To acquire skill in solving quantitative aptitude by simple methods.

Course Outcomes

On the successful completion of the course, student will be able to:		
1.	understand the problems and remember the methods to solve problems.	K2
2.	identify the appropriate method to solve problems.	K1
3.	apply the best mathematical method and obtain the solution in short.	K3
4.	apply fundamental mathematical concepts to calculate simple interest, compound interest	K3
5.	develop problem-solving skills and critical thinking by effectively solving real-world scenarios involving financial calculation	K2

K1 - Remember; **K2** - Understand; **K3** - Apply

Units	Contents	No. of Hours
I	Simple Interest: Finding simple interest, principal amount. Compound Interest: Annual compound interest, Half-yearly compound interest – Quarterly Compound interest. (Chapter 22 and Chapter 23).	6
II	Time and work: Work sharing – Individual work – Combined work – Time taken for work.(Chapter17)	6
III	Time and Distance: Comparing speed –Average speed- Distance travelled by vehicles – Travelling Time(Chapter 18).	6
IV	Chain Rule: Direct Proportion – Indirect Proportion(Chapter 15).	6
V	Pipes and Cisterns: Filling the tank and emptying the tank. (Chapter 16)	6

Self-study	Chain Rule – Direct Proportion
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Text book

Aggarwal, R.S (2017). *Quantitative Aptitude* (Revised Edition). S. Chand and Company LTD.

Reference Books

- Guha, A. 2011. *Quantitative Aptitude for Competitive Examinations* (4th Edition). Published by McGraw Hill Education (India) Pvt. Ltd.
- Aggarwal, R.S (2022). *Quantitative Aptitude* (Revised Edition). S. Chand and

Company LTD.

3. Immaculate, M. 2009. *Mathematics for Life*. Published by Nanjil offset Printers.
4. Arun Sharma. 2008. *Objective Mathematics* (2nd Edition). Tata McGraw-Hill Publishing Company Limited.
5. Chauhan, R.S. 2011. *Objective Mathematics*. Unique Publisher.
6. Goyal, J. K. Gupta, K. P. 2011. *Objective Mathematics* (6th Revised Edition). Pragati Prakashan Educational Publishers.

Web Resources

1. [Aptitude Made Easy - Compound interest – Basics and Methods, shortcuts, Math tricks - YouTube](#)
2. [Aptitude Made Easy - Simple Interest – Part 1, Basics and Methods, Shortcuts, Tricks - YouTube](#)
3. [Time and Distance LESSON #1\(Introduction\) - YouTube](#)
4. [Speed, Distance & Time - Shortcuts & Tricks for Placement Tests, Job Interviews & Exams - YouTube](#)
5. [Pipes and Cisterns - Shortcuts & Tricks for Placement Tests, Job Interviews & Exams - YouTube](#)

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	1	3	3	1	3	3	3	2	3	3
CO2	2	3	1	3	3	2	3	3	3	2	3	3
CO3	2	3	1	3	3	2	3	3	3	3	3	3
CO4	2	3	1	3	3	2	3	3	3	2	3	3
CO5	2	3	1	3	3	1	3	3	3	2	3	3
TOTAL	10	15	5	15	15	8	15	15	15	11	15	15
AVERAGE	2	3	1	3	3	1.6	3	3	3	2.2	3	3

3 – Strong, 2- Medium, 1- Low

SEMESTER – II
SKILL ENHANCEMENT COURSE -SEC-I:
INTRODUCTION TO COMPUTATIONAL MATHEMATICS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
MU232SE1	2	-	-	-	2	2	30	25	75	100

Prerequisites: Students should have basic knowledge on Mathematical calculations.

Learning Objectives

- 1) To study and design mathematical models for the numerical solution of scientific problems
- 2) To acquire the skills and confidence to learn new mathematical knowledge as becomes necessary in the course of a lifetime.

Course Outcomes

On the successful completion of the course, student will be able to:		
CO1	gain an appreciation for the role of computers in mathematics, science, and engineering as a complement to analytical and experimental approaches.	K1 & K2
CO2	acquire a strong foundation in numerical analysis, enabling students to evaluate and analyze numerical solutions for mathematical problems.	K2
CO3	use and evaluate alternative numerical methods for the solution of systems of equations.	K3
CO4	foster critical thinking skills in assessing computational methods for problem solving.	K3
CO5	apply mathematical concepts to practical problems through computational approaches.	K3

K1 - Remember; **K2** - Understand; **K3** - Apply

Unit	Contents	No. of Hours
I	Errors in Numerical Calculations: Computer and Numerical Software-Computer Languages- Software Packages – Mathematical Preliminaries-Errors and their computations - A general error formula. Chapter1: 1.1-1.4	6
II	Solution of Algebraic and Transcendental Equations: Introduction-Bisection method - Method of False Position. Chapter 2: 2.1- 2.3	6
III	Interpolation: Finite differences - Forward Differences - Backward Differences - Central Differences. Chapter 3: 3.1- 3.3.3	6
IV	Numerical Differentiation and Integration: Errors in Numerical Differentiation-Cubic Splines Method- Differentiation formulae with function values- Trapezoidal Rule Chapter 6: 6.1-6.2; 6.4.1	6
V	Numerical Linear Algebra: Triangular Matrices- LU Decomposition of a Matrix-Vector and Matrix Norms- Solutions of linear systems	6

	Direct Method-Gauss Elimination Method. Chapter 7: 7.1-7.5.1	
TOTAL		30

Self-study	Triangular Matrices
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Text Book

Sastry S. S, 2015, Introductory Methods of Numerical Analysis, Fifth Edition, PHI Learning Pvt. Ltd., New Delhi,.

Reference Books

1. Jain M. K, Iyengar S. R. K., Jain R. K, 2012, Numerical Methods for Scientific and Engineering Computation, Second Edition, Wiley Eastern Ltd, New Delhi.
2. Veda Murthy V. N, Iyengar S. N, 2008, Numerical Methods, Second Reprint, Vikas Publishing house PVT. Ltd.
3. Shankar Rao G, 2007, Mathematical Methods, I.K. International Publishing House Pvt., New Delhi.
4. Mollah S.A., 2011, Numerical Analysis and Computational Procedures, Fourth Edition, Books and Allied (P) Ltd.
5. Gupta B. D., 1989, Numerical Analysis, Konark Publishers Pvt. Ltd.,

Web Resources

- 1) <https://nptel.ac.in/courses/127/106/127106019/>
- 2) <https://nptel.ac.in/courses/111/107/111107105/>
- 3) <https://nptel.ac.in/courses/111/107/111107062/>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME-SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	2	2	3	3	3	3	3	3	3
CO2	3	1	1	3	3	1	3	3	3	3	3	3
CO3	3	1	1	2	2	1	2	2	1	2	2	3
CO4	3	1	1	3	3	1	3	3	3	3	3	3
CO5	3	1	1	3	3	1	3	3	3	3	2	3
TOTAL	15	5	5	13	13	7	14	14	13	14	13	15
AVERAGE	3	1	1	2.6	2.6	1.4	2.8	2.8	2.6	2.8	2.6	3

3 – Strong, 2- Medium, 1- Low

SEMESTER I & II
Life Skill Training I: Catechism
Course Code: UG232LC1

Hours	Credit	Total Hours	Total Marks
1	1	30	100

Objectives:

1. To develop human values through value education
2. To understand the significance of humane and values to lead a moral life
3. To make the students realize how values lead to success

Course Outcome	Upon completion of this course the students will be able to
CO-1	understand the aim and significance of value education
CO-2	develop individual skills and act confidently in the society
CO-3	learn how to live lovingly through family values
CO-4	enhance spiritual values through strong faith in God
CO-5	learn good behaviours through social values

Unit I

Value Education:

Human Values – Types of Values – Growth – Components – Need and Importance

Bible Reference: Matthew: 5:3-16

Unit II

Individual Values: Esther

Vanishing Humanity – Components of Humanity – Crisis – Balanced Emotion – Values of Life

Bible Reference: Esther 8:3-6

Unit III

Family Values: Ruth the Moabite

Respecting Parents – Loving Everyone – Confession – True Love

Bible Reference: Ruth 2:10-13

Spiritual Values: Hannah

Faith in God – Wisdom – Spiritual Discipline – Fear in God – Spiritually Good Deeds

Bible Reference: 1 Samuel 1:24-28

Unit IV

Social Values: Deborah

Good Behaviour – Devotion to Teachers – Save Nature – Positive Thoughts – The Role of Youth in Social Welfare

Bible Reference: Judges 4:4-9

Unit V

Cultural Values: Mary of Bethany

Traditional Culture – Changing Culture – Food – Dress – Habit – Relationship – Media – The Role of Youth

Bible Reference: Luke 10:38-42

Text Book

Humane and Values. Holy Cross College (Autonomous), Nagercoil

The Holy Bible

SEMESTER I & II
Life Skill Training I: Moral
Course Code: UG232LM1

Hours	Credit	Total Hours	Total Marks
1	1	30	100

Objectives:

4. To develop human values through value education
5. To understand the significance of humane and values to lead a moral life
6. To make the students realize how values lead to success

Course Outcome	Upon completion of this course the students will be able to
CO-1	understand the aim and significance of value education
CO-2	develop individual skills and act confidently in the society
CO-3	learn how to live lovingly through family values
CO-4	enhance spiritual values through strong faith in God
CO-5	learn good behaviours through social values

Unit I

Value Education:

Introduction – Limitations – Human Values – Types of Values – Aim of Value Education – Growth – Components – Need and Importance

Unit II

Individual Values:

Individual Assessment – Vanishing Humanity – Components of Humanity – Crisis – Balanced Emotion – Values of Life

Unit III

Family Values:

Life Assessment – Respecting Parents – Loving Everyone – Confession – True Love

Unit IV

Spiritual Values:

Faith in God – Wisdom – Spiritual Discipline – Fear in God – Spiritually Good Deeds

Social Values:

Good Behaviour – Devotion to Teachers – Save Nature – Positive Thoughts – Drug Free Path – The Role of Youth in Social Welfare

Unit V

Cultural Values:

Traditional Culture – Changing Culture – Food – Dress – Habit – Relationship – Media – The Role of Youth

Text Book

Humane and Values. Holy Cross College (Autonomous), Nagercoil