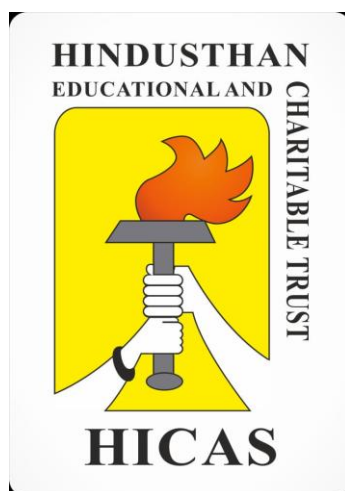


**LEARNING OUTCOMES–BASED
CURRICULUM FRAMEWORK (LOCF)**

in the

UNDERGRADUATE PROGRAMME IN MATHEMATICS

**FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2021 - 2022 AND
ONWARDS**



HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
(Affiliated to Bharathiar University and Accredited by
NAAC) COIMBATORE-641028
TAMILNADU, INDIA.

Phone: 0422-4440555

Website: www.hicas.ac.in

PREAMBLE

The BSc Mathematics Programme is expected to develop the ability to think critically, logically and analytically and hence use mathematical reasoning in everyday life. Pursuing a degree in mathematics will introduce the students to a number of interesting and useful ideas in preparations for a number of mathematics careers in education, research, government sector, business sector and industry. The programme covers the full range of mathematics, from Classical Calculus to modern Cryptography, Information Theory, and Network Security. At the end of the program, the student empowers with the skills and knowledge leading to enhanced career opportunities in industry, commerce, education, finance and research.

VISION

To center stage Mathematical knowledge in the curriculum instill analytical and logical thinking among students and promote Mathematical thought as an important area of human thought. We envision world with flexible problem solving global leaders dedicated to conscientiously increase the understanding of Mathematics.

MISSION

Our mission is to flourish intuitive learners in fostering every perspective of elegant ambience in order to be an upper hand in every field of Mathematics and to provide an environment where students can learn and become competent users of mathematics and mathematical application. Moreover, this programme will contribute to the development of students as mathematical thinkers, enabling them to become lifelong learners, to continue, to grow in their chosen professions and to function as productive citizens.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1: Acquire knowledge in functional areas of Mathematics and apply in all the fields of learning.

PEO 2: Employ mathematical ideas encompassing logical reasoning, analytical, numerical ability, theoretical skills to model real-world problems and solve them.

PEO 3: Recognise the need for lifelong learning and demonstrate the ability to explore some mathematical content independently.

PEO 4: To prepare the students to communicate mathematical ideas effectively and develop their ability to collaborate both intellectually and creatively in diverse contexts.

PEO 5: Rewarding careers in Education, Industry, Banks, MNCs and pursue higher studies

PROGRAMME OUTCOME (PO)

PO1: DISCIPLINARY KNOWLEDGE: Students are empowered with analytical and logical skills-to formulate results and construct mathematical argument.

PO2: PROBLEM SOLVING AND ANALYSING: Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.

PO3: ENVIRONMENT SUSTAINABILITY AND ETHICS: Ability to organize, analyze and interpret data accurately in both academic and non -academic context.

PO4: MODERN TOOL USAGE: An ability to apply knowledge of Mathematics and Computer Science and acquire required programming skills, formulate and solve practical problems.

PO5: CO-OPERATIVE TEAM WORK & COMMUNICATIVE SKILLS: Demonstrate effective communication of mathematical ideas and creative thinking skills to facilitate solving real world problems as a team and independently.

PO6: SELF DIRECTED / LIFE LONG LEARNING: Identify the area of interest for extended learning from the understanding gained from the domain and allied areas of Mathematics.

PO7: ENHANCING RESEARCH CULTURE: Ability to pursue advanced studies and research in pure and applied mathematical science.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Maintain a core of mathematical and technical knowledge that is adaptable to changing technologies and provides a solid foundation for extended learning.

PSO2: Identify the applications of Mathematics in other disciplines and society.

PSO3: Develop an in-depth knowledge in Mathematics appreciating the connections between theory and its applications.

PSO4: Demonstrate their mathematical modeling ability, problem solving skills, creative talent and power of communication necessary for various kinds of employment.

PSO5: Students are equipped to appear competitive examinations.

**HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS),
COIMBATORE-641028**

SCHEME OF EXAMINATIONS - CBCS & LOCF PATTERN

(For the Students admitted from the Academic year 2021-2022 and Onwards)

UG PROGRAMME

Programme: B.Sc

Branch: MATHEMATICS

Part	Course Code	Course Type	Course Title	Credit points	Lecture Hours/Week		Exam Duration (hours)	MAX. MARKS		
					Theory	Practical		I.E.	E.E	Total
Semester - I										
I	21LAT01/ 21LAH01/ 21LAM01/ 21LAF01	MIL	Tamil-I/ Hindi-I/ Malayalam – I/ French-I	4	6		3	30	70	100
II	21ENG01	AECC	English – I	4	6		3	30	70	100
III	21MAU01	DSC	Core –I Algebra and Trigonometry with GEOGEBRA	4	6		3	30	70	100
III	21MAU02	DSC	Core-II- Calculus with SCILAB	4	6		3	30	70	100
III	21MAU03	GE	Allied-I Mathematical Statistics I with LIBRE OFFICE	4	5		3	30	70	100
IV	21MAUE01	AEE	Open Elective - I	2	3		3	100	-	100
IV	21GSU01	AECC	Environmental Studies	1	2		2	50	-	50
IV	21MAUV01	SEC	VAC-I Life Skills-I @ / Communicative English	1*	2		2	50	-	50**
IV	-	SEC	SDR- Student Development Report	Assessment will be in the Fifth Semester						
V	-	AECC	Extension Activities NSS/NCC/SPORTS/YRC /SIS/SA	Assessment will be in the Fourth Semester						
Total				23	36			300	350	650
Semester - II										
I	21LAT02/ 21LAH02/ 21LAM02/ 21LAF02	MIL	Tamil-II/Hindi-II/ Malayalam-II/ French-II	4	6		3	30	70	100
II	21ENG02	AECC	English – II	4	6		3	30	70	100
III	21MAU04	DSC	Core -III Analytical Geometry of 3D with GEOGEBRA	4	4		3	30	70	100
III	21MAU05	DSC	Core -IV- Multivariate Calculus and Fourier Series with SCILAB	4	4		3	30	70	100
III	21MAU06	DSC	Core -V- Practical I GEOGEBRA, SCILAB, LIBRE OFFICE – LAB	2		4	3	40	60	100
III	21MAU07	GE	Allied-II Mathematical Statistics II with LIBRE OFFICE	4	5		3	30	70	100
III	21MAU08	DSE	Electives -I/ DSE-I	3	3		3	30	70	100

III	21MAU09	SEC	Internship / Industrial Visit / Mini Project	1	-	-		100		100
IV	21MAUV0 2	SEC	VAC-II/Life Skills-II @ / Language	1*	2		2	50	-	50**
IV	21MAUJ0 1	SEC	Aptitude / Placement Training	Grade *	2		2	50		50**
Total				26	32	4		320	480	800
Semester - III										
III	21MAU10	DSC	Core -VI- Statics	5	5		3	30	70	100
III	21MAU11	DSC	Core -VII- Differential equations and Laplace Transforms	5	5		3	30	70	100
III	21MAU12	DSC	Core -VIII- C Programming	4	4		3	30	70	100
III	21MAU13	DSC	Core -IX- Practical II – C Programming – LAB	3		5	3	40	60	100
III	21MAU14	GE	Allied-III Principles of Accountancy	4	5		3	30	70	100
III	21MAU15	DSC	Core -X- Discrete Mathematics	4	4		3	30	70	100
IV	21MAUE0 2	AEE	Open Elective-II	2	3		3	100		100
IV	21GSU02	AECC	Human Rights	1	2		2	50		50
IV	21MAUJ0 2	SEC	Aptitude / Placement Training	Grade *	2		2	50		50**
IV	21MAUJ0 3	SEC	Online Course	-	1			-	-	C/NC [‡]
Total				28	31	5		340	410	750
Semester - IV										
III	21MAU16	DSC	Core -XI– Dynamics	5	5		3	30	70	100
III	21MAU17	DSC	Core -XII - Real Analysis I	5	5		3	30	70	100
III	21MAU18	DSC	Core -XIII- Python Programming	5	5		3	30	70	100
III	21MAU19	DSC	Core -XIV- Practical III - Python Programming- LAB	2		4	3	40	60	100
III	21MAU20	GE	Allied-IV Financial Accounting	4	5		3	30	70	100
III	21MAU21	DSC	CORE-XV- Complex Analysis I	4	5		3	30	70	100
III	21MAU22	SEC	Internship / Institutional Training / Mini-Project	1	-		-	100	-	100
IV	21MAUV0 3	ACC	VAC–III	1*	2		2	50	-	50**
IV	21MAUJ0 4	SEC	Aptitude / Placement Training	Grade *	2		2	50		50**
IV	21MAUJ0 5	SEC	Online Course	-	1		-	-	-	C/NC [‡]
IV	21GSU03	AECC	Internet Security	1	2		2	50	-	50
V	21GSU04	AECC	Extension Activities NSS/NCC/SPORTS/YRC /SIS/SA#	2	-		-		-	C/NC [‡]
Total				29	32	4		340	410	750
Semester - V										
III	21MAU23	DSC	Core -XVI- Real Analysis II	5	6		3	30	70	100
III	21MAU24	DSC	Core -XVII- Complex Analysis II	5	6		3	30	70	100
III	21MAU25	DSC	Core -XVIII- Modern Algebra	5	6		3	30	70	100
III	21MAU26	DSC	Core -XIX- Integral	4	6		3	30	70	100

			Tranforms							
III	21MAU27	DSE	Electives II / DSE-II	3	3		3	30	70	100
IV	21MAUE03	AEE	Open Elective-III	2	3		3	100	-	100
IV	21GSU05	AECC	General Awareness	1	1		2	50	-	50
IV	21GSU06	AECC	Law of Ethics	1	-		2	50	-	50
IV	21MAUV04	ACC	VAC-IV	1*	2		2	50	-	50**
IV	21MAUJ06	SEC	Aptitude / Placement Training	Grade *	2		2	50	-	50**
IV	21MAUJ07	SEC	Online Course	-	1		-	-	-	C/NC [‡]
IV	21MAUJ08	SEC	SDR- Student Development Report	2*	-	-	-	-	-	-
Total				26	36			350	350	700
Semester - VI										
III	21MAU28	DSE	Electives / DSE-III	3	3		3	30	70	100
III	21MAU29	DSE	Electives/ DSE-IV	3	3		3	30	70	100
III	21MAU30	SEC	Project Work /Student Research / Paper	3	3		-	40	60	100
III	21MAU31	DSC	Self-Study Course	3	-	-	3	30	70	100
Total				12	9			130	270	400

- denotes Extra credits which are not added with total credits.
- **denotes Extra marks which are not added with total marks.
- **VAC**-Value Added Course(Extra Credit Courses)
- *Grades depends on the marks obtained
- [‡] C-Completed/ NC- Not Completed

Range of Marks	Equivalent remarks
80 and above	Exemplary
70-79	Very good
60-69	Good
50-59	Fair
40-49	Satisfactory
Below 40	Not Satisfactory=Not completed

- Part IV & V not included in total marks and CGPA calculation.
- **I.E**-Internal Exam
- **E.E**-External Exam
- **J**-Job Oriented Course
- **E**-Open Elective Papers

PASSING MINIMUM

- Passing Minimum for UG 40% and for PG 50 %
- For UG : 35 % (25 marks) in EE and 40 % in Total Marks
- For PG 50 % (30 marks) in EE and 50 % in Total Marks

ABSTRACT FOR SCHEME OF EXAMINATION

(For the candidates admitted during the academic year 2021 - 2022 and onwards)

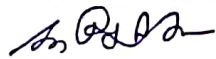
Part	Course	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages/ (MIL)	2	4	8	100	200
Part II	English/AECC-I	2	4	8	100	200
Part III	Core /DSC	19	4/5	79	100	1900
	Self-Study Course / DSC	1	3	3	100	100
	Allied /GE	4	4	16	100	400
	Electives/DSE	4	3	12	100	400
	Project /SEC	1	3	3	100	100
	<i>Internship/Institutional Training/Mini-Project (Summer Courses #)</i>	2	1	2	100	200
Part IV	Open Electives /AEE	3	2	6	100	300
	AECC –EVS/HR/IS/GA/LE	5	1	5	50	250
	<i>Value Added Course</i>	2	1	2*	50	100**
	Aptitude / Placement Training / SEC	4	Grade*	Grade*	50	200**
	Online courses / SEC	3	-	-	-	C/NC
	Life Skills / SEC	2	1	2*	50	100**
	<i>SDR- Student Development Report</i>	1	2	2*	-	-
Part V	Extension Activities NSS / NCC/Sports/ YRC / SIS / SA -AECC	1	-	2	-	C/NC
	Total			144 (6 Extra Credits)		4050 + (400**)

List of Open Elective Papers	
Open Electives	Yoga for Human Excellence Human Health & Hygiene Indian Culture and Heritage Indian Constitution and Political System Consumer Awareness and Protection Professional Ethics and Human Values Human Rights, Women's Rights & Gender Equality Disaster Management Green Farming Corporate Relations start a Business? Research Methodology and IPR General Studies for Competitive Examinations IIT JAM Examination (for Science only) CUCET Examination
VAC Papers	
Courses offered by the Departments to other Programmes	

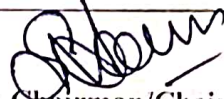
Note: VAC / JOC courses can be added along with the above open electives

List of Elective Papers/ DSE
(Can choose any one of the paper as electives)


	Course Code	Title
Electives/ DSE-I	21MAU08A	Elective I : A) Numerical Methods – I
	21MAU08B	Elective I : B) Astronomy
Electives/ DSE-II	21MAU27A	Elective II : A) Numerical Methods – II
	21MAU27B	Elective II : B) Graph Theory
Electives/ DSE-III	20MAU28A	Elective III : A) Operations Research – I
	20MAU28B	Elective III : B) Fuzzy sets and Fuzzy logic
Electives/ DSE-IV	20MAU29A	Elective IV : A) Operations Research – II
	20MAU29B	Elective IV : B) Number Theory



Syllabus Coordinator



BOS-Chairman/Chairperson



Academic Council – Member Secretary



PRINCIPAL

Co-ordinator
Academic Audit Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

PRINCIPAL
Hindusthan College of Arts and Science
Hindusthan Gardens, Behind Nava India
Coimbatore - 641 028.

Regulations

1. Internship / Institutional Training / **Mini-Project** is related to the discipline can be permitted to complete during the end of I and III semesters for minimum seven days each and permitted to submit a report.

Internship / Institutional Training	Not more than seven days
Mini project	Depends on the departments

2. Project work is considered as a special course involving application of knowledge in problem solving / analyzing /exploring a real-life situation. A Project work may be given in lieu of a discipline specific elective paper.

3. **FAST TRACK SYSTEM:**

Two core courses DSE- III & DSE- XIV are the subjects which are to be related with NPTEL courses.

The Students have the options of taking two subjects of the sixth semester of **B.Sc MATHEMATICS** programme through NPTEL / Swayam portal from the list given or offered by NPTEL and approved by the department for which credit transfer is permitted. The students should inform the department prior to the registration of the course and get due approval for the same. If the student completes these courses before the start of the sixth semester, the student can be considered for a fast track programme, and do the project work alone during the sixth semester apart from the self study paper. Once the student submits the successful course completion credentials as required by the college for the NPTEL/SWAYAM online courses, then the credit transfer will be considered for qualifying the degree.

4. **If the students who are all completed the NPTEL courses before semester -V, they can avail exemption from appearing exams of DSC- XVIII & DSC- XIX in Fast track scheme.**
5. NSS / NCC/Sports/YRC / SIS / SA is mandatory for all students as per New Education Policy and the students must attend the allocated hours within two years and complete the programme. They will be evaluated during the end of second year (Fourth Semester) and also a certificate will be issued.
6. SDR – Student Development Report to be received by the department from the students till

end of the fifth semester. (Evidences of Curriculum activities and Co-curriculum activities)

7. For online courses minimum of 2 certificates in any of the online platform is mandatory.

Extension Activities

NSS – National Service Scheme, as enrolled member with the College Unit.

NCC – National Credit Corps, as enrolled member with the College Unit.

SPORTS – Sports & Games Participation with College Team

YRC/RRC–Youth Red Cross / Red Ribbon Club, as enrolled member with the College Unit.

Rotaract Club - Rotaract Club, as enrolled member with the College Unit.

SIS – Special Interest Subjects, as approved by the Academic Council

SA – Social Activity for not less than 50 hours with NGGO like Aram Foundation / Shanthi Social Service / Siruthuli / Kulangal Pathukappu Amaipu /Old age Home / Nature Foundation / etc.

SEC-Skill Enhancement Course (Life Skills/ Aptitude/Placement Training/online course/Internship/SDR)

ECC- Ability Enhancement Compulsory Course (Environmental Studies/ Human Rights/Internet Security/ General Awareness/ Law of Ethics/Extension Activities)

UG Courses- Scheme of Evaluation (Internal & External Components)

(For the students admitted during the academic year 2021-2022 and onwards)

1. Internal Marks for all UG

Components	Marks
Test I	5
Test II	5
Model Exam	10
Assignment	5
Attendance*	5
TOTAL	30

*Split-up of Attendance Marks

- ♣ 75-79 - 1 marks
- ♣ 80-84 - 2 marks
- ♣ 85-89 - 3 marks
- ♣ 90-94 - 4 marks
- ♣ 95-100 - 5 marks

2. a) Components for Practical I.E.

Components	Marks
Test -I	20
Test - II	20
Total	40

b) Components for Practical E.E.

Components	Marks
Experiments	50
Record	5
Viva	5
Total	60

3. Institutional/ Industrial Training, Mini Project and Major Project Work

Institutional / Industrial Training (I.E)		Mini Project (I.E)	Major Project Work		
Component	Marks	Marks	Component	Marks	Total Marks
Work diary	25	-	I.E		
Report	50	50	a)Attendance	10	
Viva-voce	25	50	b)Review/Work diary*	30	40
Total	100	100	E.E** a) Final report	40	
			b)Viva-voce	20	60
			Total		100

*Review is for Individual Project and Work Diary is for Group Projects
(group consisting of minimum 3 and maximum 5)

**Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

4. Guidelines for Internet Security/Human Rights/Law of Ethics/Environmental studies (Part IV)

Components	Marks
Two Tests (each 2 hours) of 20 marks each [4 out of 7 descriptive type questions 4 x 5 = 20 Marks]	40
Two assignments (2 x 5)	10
Total	50

5. Guidelines for General Awareness (Part IV)

Components	Marks
Two Tests (each 2 hours) of 25 marks each [50 objective type questions $50 \times 1/2 = 25$ Marks]	50

6. Guidelines for Open Elective (Part IV)

No of Activities	Marks
Two Tests (each 3 hours) of 50 marks each [5 out of 8 descriptive type questions $5 \times 10 = 50$ Marks]	100

7. Value Added Courses / Aptitude/Placement courses:

Components	Marks
Two Test (each 1 hour) of 25 marks each QP is objective pattern ($25 \times 1 = 25$)	50
Total	50

Guidelines:

1. The passing minimum for these items should be 40%
2. If the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent Semesters
3. Item No's:4,5,6 and 7 are to be treated as 100% Internal papers.
4. For item No.07, Tests conducted through online modules (Google Form/any other)

UG PATTERN
QUESTION PAPER PATTERN FOR CIA I and CIA II EXAM

Reg.No:-----

Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
----- **DEGREE CIA-I/CIA-II EXAMINATIONS** -----20---
(----- SEMESTER)

BRANCH: -----

SUBJECT NAME: -----

Time: Two Hours

Maximum:50 Marks

SECTION - A (6 x 1 = 6 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No: 1 to 6: Multiple choice/Fill up the blanks /True or False questions)

SECTION - B (4x 5 = 20 marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No: 7 to 10 Either Or type)

SECTION - C (2x12 = 24 marks)

Answer any **TWO** Questions out of **THREE** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No: 11 to 13)

QUESTION PAPER PATTERN FOR MODEL/END SEMESTER EXAMINATION

Reg.No:-----

Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
----- **DEGREE MODEL EXAMINATIONS** -----20-----
(-----SEMESTER)

BRANCH : -----

SUBJECT NAME:-----

Duration: Three Hours

Maximum: 70 Marks

SECTION - A (10x1=10 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No 1 to 10 Multiple choice/Fill up the blanks /True or False questions)

(Two questions from each unit)

SECTION - B (5x6=30 Marks)

Answer **ALL** Question

ALL Questions Carry **EQUAL** Marks

(Q.No 11 to 15 Either or type)

(One question from each Unit)

SECTION- C (3x10=30 Marks)

Answer any **THREE** Questions out of **FIVE** Questions

ALL Questions carry **EQUAL** Marks

(Q.No 16 to 20) (One question from each Unit)

For UG (Question paper pattern) (Max. 70 marks)

Sec-A (10x1=10marks)	All Questions will be in K1 Level
Sec-B (5x6=30marks) Either or type	4 Questions will be in K1 Level, 3 Questions will be in K2, K3 each
Sec-C (3x10=30marks) Any 3 out of 5 questions	2 Questions will be in K2, 3 Questions will be in K3 & K4 level

Course Code:	21MAU01	ALGEBRA AND TRIGONOMETRY WITH GEOGEBRA						Batch:	2021–2022 and Onwards
								Semester:	I
Hrs/Week:	6	L	6	T	–	P	–	Credits:	4

COURSE OBJECTIVE:

1. To enable the students to learn about the convergence and divergence of the series.
2. To gain knowledge on Binomial, Exponential and Logarithmic series.
3. To enable the students to learn about the Roots of equation.
4. To find solutions of a trigonometric equations.
5. To recognize logarithm on complex quantities and summation of trigonometric series.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand and Solve the problems related to convergence, divergence of the series and Analyze Cauchy's root test.	K2,K3& K4
CO2	Recall the concept of Binomial, Exponential, and Logarithmic series and categorize the series.	K1 & K4
CO3	Analyze the roots of higher degree algebraic and transcendental equations.	K4
CO4	Summarize the expansion of trigonometric functions and hyperbolic functions and Calculate problems based on it.	K2 & K4
CO5	Examine the summation of trigonometric series.	K4

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze

SYLLABUS

21MAU01	ALGEBRA AND TRIGONOMETRY WITH GEOGEBRA	Sem: I
Unit No.	Topics	Hours
I	Convergence and Divergence of series: Infinite series – Geometric series – some general theorems concerning infinite series – The series is convergent when ‘k’ is greater than unity and divergent when ‘k’ equal to or less than unity – Cauchy’s condensation test – D’Alembert’s Ratio Test –Cauchy’s Root test –Raabe’s test – Absolute convergence – Choosing which Convergence Test to Apply to 8 series.	15
II	Binomial, Exponential and Logarithmic Series: Binomial Theorem for a rational index – Application of the Binomial Theorem to the summation of the series – Exponential limit – The Exponential theorem – Summation – The Logarithmic Series – Euler’s constant – Summation – Applications of Binomial Theorem.	14
III	Theory of equations: Roots of equation – Relations between the roots and coefficients of equation – symmetric function of roots – Transformation of equations – Reciprocal equations – To increase or decrease the roots of a given equation by a given quantity – Removal of terms – Descarte’s rule of signs – Rolle’s theorem – Multiple roots – Horner’s method and Newton’s Approximation– Application of Rolle’s Theorem.	14
IV	Trigonometry: Hyperbolic functions –Separation of real and imaginary parts of $\sin(\alpha + i\beta)$, $\sin h(\alpha + i\beta)$, $\tan h(\alpha + i\beta)$, $\tan^{-1}(\alpha + i\beta)$ – Applications of Hyperbolic functions.	15
V	Resolution into Factors: Logarithm of complex Quantities: To find the logarithm of $x + iy$ – General value of logarithm of $x+iy$. Summation of trigonometric series : Method of differences – Sum of sine series and cosine series in A.P – Summation of series by using complex quantities – Real life Applications of Logarithm.	14

GEOGEBRA problems related to ALGEBRA AND TRIGONOMETRY have been included in Practical–I (21MAU06) and **questions related to GEOGEBRA excluded in ALGEBRA AND TRIGONOMETRY (21MAU01) in the questions.**

Questions related to Applications have been included in internal only and excluded in semester questions.

Note: Distribution of marks: Problems 80 %, Theory 20 %

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

For Unit – I, II, III :

1. **T.K.Manicavachagom Pillay ,T.Natarajan and K.S.Ganapathy**, “Algebra – Volume I”,AnandaBook Depot, Reprint – 2018.

Unit – I : Chapter 2 : Section: 2.8 – 2.24

Unit – II : Chapter 3: Sections: 3.5, 3.6,3.10 and 3.14
Chapter 4: Sections: 4.1, 4.2, 4.3, 4.3.1, 4.5 to 4.11

Unit – III : Chapter 6: Sections: 6.1 to 6.12, 6.15 to 6.19, 6.24 to 6.26 and 6.30

For Unit – IV, V :

2. **S.Narayanan and T.K.ManicavachagomPillay**, “Trigonometry”, Ananda Book Depot, Reprint – 2018.

Unit – IV : Chapter 4 : Sections: 1,2

Unit – V : Chapter 5 : All Sections ,Chapter 6 : Sections:1,2,3

REFERENCE BOOKS

1. **Sudhir K. Pundir** ,”Classical Algebra”, CBS Publishers and Distributors, 1st Edition,2015.

2. **Robert E Mayer**, “Schaum's outline of Trigonometry”, Tata McGraw–Hill publishing company, 5th Edition, 2013.

WEB RESOURCES

Web Links:

1. <http://nptel.ac.in/courses/122101003/downloads/Lecture-44.pdf>
2. <https://www.pdfdrive.net/calculus-early-transcendentals-8th-ed-2015pdf-e27097109.html>

Application Links :

Unit – I : 1. <https://youtu.be/0wefqjpQyKM>

Unit – II : 1. <https://youtu.be/LITTastgIEM>

2. <https://youtu.be/UQm9JaY7MLQ>

Unit – III : 1. <https://youtu.be/7aMdyLmDz9Y>

2. <https://youtu.be/bUxcziPZ4IA>

Unit – IV : 1. https://youtu.be/GOo2gC7S_T4

Unit – V : 1. <https://youtu.be/1dUSNdZspQc>


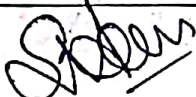
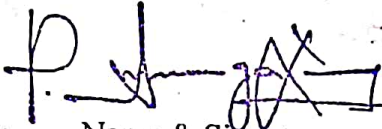
MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO4	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S
CO3	S	M	M	S	S	S	S
CO4	S	S	S	M	S	M	M
CO5	S	S	S	S	S	S	S

S-Strong, M- Medium, L - Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Ms.P.Rekha Name & Signature of the Staff	 Dr.S.Anuradha Name & Signature	 Name-& Signature

Dr. S. ANURADHA,
 M.Sc., M.B.A., M.Phil., PGDCA., Ph.D.,
 Professor & Head,
 PG & Research Dept. of Mathematics,
 Hindusthan College of Arts & Science,
 Coimbatore - 641 028

Co-ordinator
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 Coimbatore-641 028.

Course Code:	21MAU02	CALCULUS WITH SCILAB					Batch:	2021–2022 and Onwards	
							Semester:	I	
Hrs/Week:	6	L	6	T	–	P	–	Credits:	4

COURSE OBJECTIVE:

1. To understand the idea of Curvature.
2. To gain the knowledge about special case of Asymptotes.
3. To evaluate special functions like Beta and Gamma functions.
4. To understand the basics of double and triple integrals.
5. To solve real world integration problems such as rate of change, optimization, area and Volume.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the concepts of Evolutes, Involutives and Envelopes and examine pedal equation.	K2 & K4
CO2	Remember the concepts of asymptotes and Identify the special cases.	K1 & K4
CO3	Analyze special functions like beta and gamma to evaluate definite integrals and use computational tools like SCILAB.	K3 & K4
CO4	Solve and Examine double and triple integral problems.	K3 & K4
CO5	Apply the concept of change of variables in double and triple integrals.	K3
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU02	CALCULUS WITH SCILAB	Sem: I
Unit No.	Topics	Hours
I	Curvature : Curvature– Circle, Radius and Centre of curvature – Cartesian and Polar co-ordinates of the radius of curvature – The co-ordinates of the centre of curvature – Envelope, Evolute and Involute – Pedel equation of a curve – Real life applications of radius of curvature.	15
II	Asymptotes: Definition –Equation of asymptotes of a plane algebraic curve – Asymptotes parallel to the axis – Special cases– Asymptotes by inspection, Intersections of a curve with its Asymptotes– Application of Vertical and Horizontal Asymptotes.	14
III	Integration: Integration of irrational functions – Properties of definite integrals – Integration by parts – Definition of Beta and Gamma function –Properties – Relation and Application– Use of integration with real life examples.	15
IV	Double Integrals: Definition of double integrals and triple integrals–Evaluation of double integrals –Evaluation of triple integrals– Applications of Double Integrals.	14
V	Multiple Integrals: Change of Variables –Jacobian – Change of variable in double and triple integrals – Transformations - Applications of Triple Integrals.	14

SCILAB Problems related to CALCULUS have been included in Practical–I (21MAU06) and **questions related to SCILAB excluded in CALCULUS (21MAU02) in the questions.**
Questions related to Applications have been included in internal only and excluded in semester questions.

Note: Distribution of marks: Problems 80 %, Theory 20%

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

For Unit – I & II :

1. *T.K.Manicavachagam Pillay and S.Narayanan, “Calculus”, Volume - I, S.Viswanathan Printers & Publishers, 2002, Re-print 2011.*

Unit – I : Chapter : 10 Section : 2.1 – 2.8

Unit – II : Chapter : 11 Section : 1, 2, 3, 4, 6, 7

For Unit – III, IV & V :

2. *T.K.Manicavachagam Pillay and S.Narayanan, “Calculus”, Volume – II, S.Viswanathan Printers & Publishers, 2000, Re-print 2011.*

Unit – III : Chapter : 1 Section : 8, 11, 12, Chapter : 7 Section : 2.1, 3, 4, 5, 6

Unit – IV : Chapter : 5 Section : 1, 2.1, 2.2, 4

Unit – V : Chapter : 6 Section : 1.1, 1.2, 2.1, 2.2, 2.3, 2.4

REFERENCE BOOKS

1. *Tom M. Apostol, “Calculus - Volume-1 & 2” John Wiley and Sons, 2nd Edition, 2016.*

2. *James Stewart, “Calculus: Early Transcendentals” Thomson book USA, 6th Edition, 2008.*

WEB RESOURCES

Web Link:

1. <https://www.khanacademy.org/math/multivariable-calculus/integrating-multivariable-functions/line-integrals-vectors/v/line-integrals-and-vector-fields>

Application Links :

Unit – I : 1. <https://bit.ly/3zkTqtP>

2. <https://youtu.be/IAb98ZgSjNw>

Unit – II : 1. <https://youtu.be/BX4Qqh39KFg>

2. <https://www.vedantu.com/maths/asymptotes>

Unit – III : 1. <https://youtu.be/RkEI8FcRMNo>

2. <https://youtu.be/NuHnu3H02Ac>

Unit – IV : 1. <https://youtu.be/fMgIphRYWqo>

Unit – V : 1. https://youtu.be/cFSRXum_3Es

2. <https://youtu.be/lo1MtN50GyY>

3. <https://youtu.be/bMqc95KOCiA>

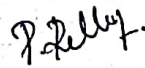
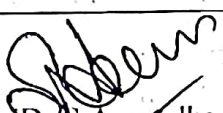
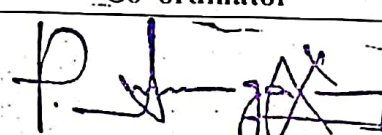
MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	M	S	S	S	S	S
CO2	S	M	S	S	S	S	S
CO3	S	L	S	S	M	S	M
CO4	S	M	S	S	S	S	S
CO5	S	M	S	S	S	M	S

S – Strong, M – Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Ms. P. Rekha Name & Signature of the Staff	 Dr. S. Anuradha Name & Signature	 Name & Signature

Dr. S. ANURADHA,
 M.Sc., M.B.A., M.Phil., PGDCA, Ph.D.,
 Professor & Head,
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 Coimbatore - 641 028

Co-ordinator
 Curriculum Development Cell
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 Coimbatore-641 028.

Course Code:	21MAU03	ALLIED:MATHEMATICAL STATISTICS– I WITH LIBRE OFFICE						Batch:	2021–2022 and Onwards
								Semester:	I
Hrs/Week:	5	L	5	T	–	P	–	Credits:	4

COURSE OBJECTIVE:

1. To understand axiomatic approach of Probability, Conditional Probability and Baye's theorem.
2. To discuss the types of random variables and understand the measures of Central Tendency.
3. To gain the concept in Mathematical Expectations and its properties.
4. To acquire the knowledge about Binomial and Poisson Distributions.
5. To study Normal Distribution and their applications.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Apply the basic concepts of Probability and Examine the theorems.	K3 & K4
CO2	Identify the appropriate probability distribution for a given discrete or continuous random variable and its properties to calculate probabilities.	K1 & K4
CO3	Illustrate the Mathematical Expectations.	K4
CO4	Solve the mean and variance of the Binomial and Poisson distributions and distinguish.	K3 & K4
CO5	Analyze the mean and variance of the Normal distribution.	K4
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU03	ALLIED:MATHEMATICAL STATISTICS– I WITH LIBRE OFFICE	Sem: I
Unit No.	Topics	Hours
I	<p>Probability: Axiomatic Approach to Probability – Random Experiment, Sample space and Elementary Events – Algebra of events – some theorems on Probability – Multiplicative Theorems of Probability – Independent events – Multiplicative Theorems of Probability for Independent events – Baye’s Theorem – Application of Baye’s Theorem in Real Life.</p>	12
II	<p>Random Variables and Distribution Functions: Introduction –Distribution Function – Discrete Random Variable– Continuous Random Variable: Probability Density Function – Various measures of Central Tendency – Dispersion, Skewness and Kurtosis for Continuous Probability Distributions – Continuous Distribution Functions – Applications of Random Variables.</p>	12
III	<p>Mathematical Expectations: Introduction – Mathematical Expectation or Expected value of a random variable – Expected value of function of a random variables – Properties of Expectations – Properties of variance – Moment Generating function – Cumulants – Properties of cumulants – Properties of characteristics of functions – Chebychev’s inequality – Covariance – Application of Expected Value.</p>	12
IV	<p>Binomial Distribution: Moments of Binomial Distribution – Recurrence relation for the Moments of Binomial Distribution – Mean Deviation about Mean of Binomial Distribution– Mode of Binomial Distribution – MGF of Binomial Distribution – Additive property – Characteristics functions – Cumulants of the Binomial Distribution. Poisson Distribution: The Poisson process – Moments – Mode –Recurrence relation – MGF – Characteristics functions – Cumulants – Additive property – The Application of Binomial Distribution.</p>	12
V	<p>Normal Distribution: Introduction – Mode – Median – MGF – Cumulant generating Functions – Moments – Points of inflection – Mean Deviation about Mean – Applications of the Normal Distribution.</p>	12

LIBRE OFFICE Problems related to MATHEMATICAL STATISTICS – I have been included in Practical–I (21MAU06) and questions related to LIBRE OFFICE excluded in MATHEMATICAL STATISTICS – I (21MAU03) in the questions.

Questions related to Applications have been included in internal only and excluded in semester questions.

Note: Distribution of marks: Problems 70 %, Theory 30%

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1. **S.C.Gupta & V.K.Kapoor**, “*Fundamentals of Mathematical Statistics*”, Sultan & sons publications, Re-print – 2014.

Unit – I : Chapter 3: Sections: 3.8.1, 3.8.2, 3.8.6, 3.9.1, 3.9.2, 3.9.3, 3.10 to 3.13 (Theory only)
Chapter 4: Section: 4.2

Unit – II : Chapter 5: Sections: 5.1, 5.2, 5.3, 5.4.1, 5.4.2, 5.4.3

Unit – III : Chapter 6: Sections : 6.1 to 6.6 Chapter 7: Sections : 7.1, 7.2, 7.3.1, 7.5

Unit – IV : Chapter 8: Sections : 8.4.1, 8.4.2, 8.4.4 – 8.4.9, 8.5.1 – 8.5.8

Unit – V : Chapter 9: Sections : 9.1, 9.2.3 – 9.2.7, 9.2.9, 9.2.10

REFERENCE BOOKS

1. **R.S.N.Pillay and V.Bagavathi**, “*Statistics*”, Sultan Chand, 2008.

2. **Gupta. S.P**, “*Statistical Methods*”, Sultan Chand, 3rd edition, 2005.

WEB RESOURCES

Web Links:

1. <https://www.tutorialspoint.com/statistics/index.htm>
2. <https://nptel.ac.in/courses/111/105/111105041/>
3. <http://www.comfsm.fm/~dleeling/statistics/text.html>
4. <http://www.comfsm.fm/~dleeling/statistics/text.html>

Application Links :

- | | | |
|-------------------|--|--|
| Unit – I | : 1. https://youtu.be/gaF0Dnv2sRk | 2. https://youtu.be/yewZbdj7GuM |
| Unit – II | : 1. https://youtu.be/A4V0I8Acg5g | 2. https://youtu.be/uVGFHqeqI-A |
| Unit – III | : 1. https://youtu.be/EzU7L9RK-yQ | 2. https://youtu.be/nqPS29IvnHk |
| Unit – IV | : 1. https://youtu.be/VQtNQS77JRE | 2. https://youtu.be/TGder_gdRTE |
| Unit – V | : 1. https://youtu.be/R1XNpNrImfo | |


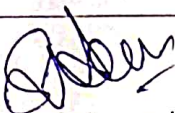
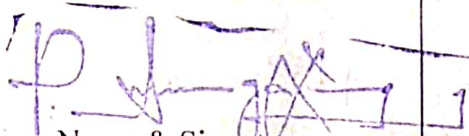
MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	M	S	S	S	M	S
CO3	S	L	S	M	S	S	S
CO4	S	S	S	S	S	S	M
CO5	S	S	S	S	S	S	S

S – Strong, M – Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Ms.P.Rekha Name & Signature of the Staff	 Dr.S.Anuradha Name & Signature	 Name & Signature

Dr. S. ANURADHA,
 M.Sc., M.B.A., M.Phil., PGDCA., Ph.D.,
 Professor & Head,
 PG & Research Dept. of Mathematics,
 Hindusthan College of Arts & Science,
 Coimbatore - 641 028

Co-ordinator
 Curriculum Development Cell
 Hindusthan College of Arts & Science
 Coimbatore-641 028.

Course Code:	21MAU04	ANALYTICAL GEOMETRY OF 3D WITH GEOGEBRA						Batch:	2021–2022 and Onwards
								Semester:	II
Hrs/Week:	4	L	4	T	–	P	–	Credits:	4

COURSE OBJECTIVE:

1. To enhance the students to understand the fundamentals of Analytical Geometry.
2. To acquire the knowledge about the equation of shortest distance between skew lines.
3. To understand the concepts of equation of sphere and its properties.
4. To impart the knowledge about the cone and cylinder.
5. To study the concepts of Conicoids.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recall and analyze the concepts of fundamentals of analytic geometry.	K1 & K4
CO2	Classify the analytical concepts of three dimensions and Illustrate the problems.	K2 & K4
CO3	Examine the equation of sphere and its properties.	K4
CO4	Use the concepts of cone, cylinder and Analyze its properties.	K3 & K4
CO5	Apply the concepts of Conicoids and Calculate the problems.	K3 & K4
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU04	ANALYTICAL GEOMETRY OF 3D WITH GEOGEBRA	Sem: II
Unit No.	Topics	Hours
I	Basics and Fundamentals of Analytical Geometry: Polar Co-ordinates – Straight lines – Circle – Chord – Polar equation of Conic – Asymptotes of the conic – Some properties of the general Conic – Real life applications of Analytical Geometry.	10
II	Analytical Geometry of three dimensions: Straight lines : Equation of a straight line – Conditions for various situations of a line – Angle between a plane and a line – Shortest distance between two skew lines – Line intersecting a given a line – Lines of intersection of three plane – Sums – Shortest distance between two lines in 3D.	10
III	Sphere: Equation of a sphere – Standard equation of a sphere–Results based on the properties of a sphere – Tangent plane to a Sphere – Radical plane – Equations of a Circle – Equations $S + \lambda P = 0$ and $S + \lambda S' = 0$ – Sums – What is a tangent plane.	10
IV	Cone and Cylinder: Cone – Equation of a Cone – Cone whose vertex is at the origin – Quadratic Cone with vertex is at the origin – General quadric cone – Right Circular Cone – Cylinder – Equation of a Cylinder–Right Circular Cylinder – Sums – Enveloping cone.	9
V	Conicoids: Conicoids – Nature of Conicoids – Standard equation of a central Conicoids – Enveloping Cone – Tangent plane – Conditions for tangency – Director sphere and Director plane – Conditions for tangency and its applications.	9

GEOGEBRA Problems related to ANALYTICAL GEOMETRY OF 3D have been included in Practical-I (21MAU06) and **questions related to GEOGEBRA excluded in ANALYTICAL GEOMETRY OF 3D (21MAU04) in the questions.**

Questions related to Applications have been included in internal only and excluded in semester questions.

Note: Distribution of marks: Problems 80%, Theory 20%

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

For Unit I :

1. *T.K.Manicavachagam Pillay & T.Natarajan, “Analytical Geometry 2D”, S.Viswanathan Printers and publishers,Reprint 2000.*

Unit– I : Chapter9 : Sections : 1 to 15

For Units II to V :

2. *P.Duraipandian, Laxmi Duraipandian and D.Muhilan, “Analytical Geometry 3D”, Emerald Publishers, Reprint 2000.*

Unit – II : Chapter 4: Sections : 4.1, 4.2, 4.3, 4.6 to 4.8, 4.11

Unit – III : Chapter 5: Sections : 5.1 to 5.8

Unit – IV : Chapter 6: Sections : 6.1 to 6.7, 6.13

Unit – V : Chapter 6: Sections : 6.9 to 6.13

REFERENCE BOOKS

1. *T.K. Manicavachagam Pillay and Natarajan, “Analytical Geometry”, S.Viswanathan, Printers and Publishers,2001.*

2. *A. R. Vasistha and J.N. Sharma, “Analytical Geometry 3D”, Krishna Prakashan media Pvt.Ltd.*

WEB RESOURCES

Web Links :

1. <http://sigc.edu/department/maths/studymet/AnalyticalGeometry3DIntegralCalculus.pdf>

2. <https://brilliant.org/wiki/3d-coordinate-geometry-equation-of-a-plane/>

3. <https://nptel.ac.in/courses/111/106/111106097/>

Application Links :

Unit – I : 1. <https://youtu.be/W1Vz5qpNLNk>

2. <https://www.cuemath.com/learn/mathematics/conics-in-real-life/>

Unit – II : 1. <https://youtu.be/6vpXM1dskmY> 2. https://youtu.be/cQAb9b_4lXY

Unit – III : 1. https://youtu.be/cHNT7_F8m1Y 2. <https://youtu.be/cbVsAChDICE>

Unit – IV : 1. <https://youtu.be/HupllksOfdA>

Unit – V : 1. <https://youtu.be/UZzupngsyZw>

2. <https://www.biyanicolleges.org/central-conicoids-tangent-plane-and-normal/>

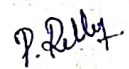
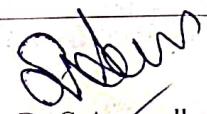
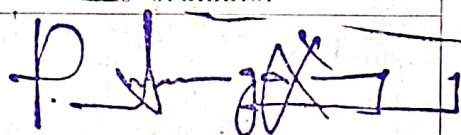
MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	L	S	S	S	S	S
CO2	S	S	M	S	S	S	S
CO3	S	S	M	S	S	M	S
CO4	S	M	S	M	S	S	S
CO5	S	L	S	S	S	S	M

S – Strong, M – Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Ms.P.Rekha Name & Signature of the Staff	 Dr.S.Anuradha Name & Signature Dr. S. ANURADHA, M.Sc.,M.B.A.,M.Phil.,PGDCA.,Ph.D., Professor & Head, PG & Research Dept. of Mathematics, Hindusthan College of Arts & Science, Coimbatore - 641 028	 Name & Signature

Co-ordinator
 Curriculum Development Cell
 Hindusthan College of Arts & Science,
 Coimbatore-641 028.

Course Code:	21MAU05	MULTIVARIATE CALCULUS AND FOURIER SERIES WITH SCILAB					Batch:	2021–2022 and Onwards	
							Semester:	II	
Hrs/Week:	4	L	4	T	–	P	–	Credits:	4

COURSE OBJECTIVE:

1. To find the solution of applications of multiple integrals.
2. To use reasoning skills to analyze and solve problems on volume of double and triple integrals.
3. To gain the knowledge about the differentiation of vectors.
4. To understand the concepts of Green's, Gauss Divergence and Stoke's theorems and its applications.
5. To study about the Fourier series and its applications.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Analyze the concepts of application of multiple integral.	K4
CO2	Understand the concepts of double and Triple integral and Calculate Problems based on its applications.	K2 & K4
CO3	Identify and apply Gradient, Divergence and Curl of Vectors.	K3 & K4
CO4	Define line, surface and volume integrals and Examine the related problems .	K1 & K4
CO5	Apply and Analyze the concepts of Fourier series.	K3& K4
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU05	MULTIVARIATE CALCULUS AND FOURIER SERIES WITH SCILAB	Sem: II
Unit No.	Topics	Hours
I	Multiple Integral : Double integral in Polar coordinates – Applications of Multiple Integrals.– Finding the Area of circles.	10
II	Triple integral : Volumes of solids of revolution – Volume as double and triple integrals– Areas of Curved surfaces – Volume between surfaces.	9
III	Vector Calculus : Differentiation of vectors – Vector functions – Limit, Derivative and Partial derivatives of vector functions – Gradient of a scalar point function – Divergence – Curl of a vector point functions– Simple Problems – Vector calculus and its applications.	10
IV	Integration of vectors : Line integral – Conservative field and scalar potential – Surface integral – Volume integral – Integral Theorems :Gauss divergence theorem – Green’s theorem in the plane – Stoke’s theorem – Statements only –Simple Problems – Line integrals in 3D.	9
V	Fourier Series : Definition – Finding Fourier coefficient for a given periodic function with period 2π – Odd and Even functions, Change of Interval – Real life Applications of Fourier Series.	10

SCILAB Problems related to MULTIVARIATE CALCULUS AND FOURIER SERIES have been included in Practical-I (21MAU06) and **questions related to SCILAB excluded in MULTIVARIATE CALCULUS AND FOURIER SERIES (21MAU05) in the questions.**

Questions related to Applications have been included in internal only and excluded in semester questions.

Note: Distribution of marks: Problems 80%, Theory 20 %

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

For Units I&II :

1. *S.Narayanan and T.K.Manicavachagom Pillay, "Calculus, Volume – II" , Viswanathan Publishers,2007.*

Unit I : Chapter 5: Sections : 3.1, 3.2, 5.1 – 5.4.

Unit II : Chapter 5: Sections : 6.1 – 6.3, 7.

For Units III& IV :

2. *P.Duraipandian , Laxmi Duraipandian, "Vector Analysis", Emerald Publishers Revised Edition,Reprint 2005.*

Unit III : Chapter 1 and 2

Unit IV : Chapter 3 : Sections: 3.1, 3.3, 3.5,3.6 , Chapter 4: Sections: 4.1,4.2,4.4,4.5

For Unit V :

3. *S.Narayanan and T.K.Manicavachagom Pillay, "Calculus, Volume – III", S.Viswanatham Printers, 2007.*

Unit V : Chapter 6 :1,2,3,6

REFERENCE BOOKS

1. *P.Kandasamy, K.Thilagavathi, "Mathematics for B.Sc. Branch I" , Volume I, II and IV, S.Chand and Company, 2004.*

2. *Dyke, "An Introduction to Laplace Transforms and Fourier Series", Springer International Edition, Indian Reprint 2005.*

WEB RESOURCES

Web Links:

1. <https://nptel.ac.in/courses/111105035/22>

2. <https://nptel.ac.in/courses/103103037/5>

3. https://www.math.ust.hk/~machas/differential_equations.pdf

4. https://WWW.math.psu.edu/shen_w/PDE/Notes PDF.pdf

Application Links :

Unit –I : 1. <https://youtu.be/t5xbCoyKAJI>

2. <https://youtu.be/FmhMUTmUjhM>

Unit –II : 1. <https://youtu.be/ZIn1rgZVPFW>

2. <https://youtu.be/3VLd0esBknI>

Unit –III : 1. https://youtu.be/tFE8_tljCMA

2. <https://youtu.be/fLIQbC8WIk8>

Unit –IV : 1. <https://youtu.be/NzepwkVoYMY>

2. <https://youtu.be/rj4RWIfGy7U>

Unit– V : 1. <https://youtu.be/PxbXRvujdQY>

2. <https://youtu.be/YjpAKUOeMd0>




MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	M	M	S	S
CO2	S	M	S	S	S	S	S
CO3	S	M	S	S	S	M	M
CO4	S	S	S	S	S	S	S
CO5	S	S	S	M	M	S	S

S – Strong, M – Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Ms.P.Rekha Name & Signature of the Staff	 Dr.S.Anuradha Name & Signature	 Name & Signature

Dr. S. ANURADHA,
 M.Sc., M.B.A., M.Phil., PGDCA., Ph.D.,
 Professor & Head,
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Co-ordinator
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 Hindusthan College of Arts & Science,
 Coimbatore-641 028.

Course Code:	21MAU06	PRACTICAL-I GEOGEBRA, SCILAB AND LIBRE OFFICE- LAB						Batch:	2021–2022 and Onwards
								Semester:	II
Hrs/Week:	4	L	–	T	–	P	4	Credits:	2

COURSE OBJECTIVE:

1. To gain the knowledge about Mathematical Software.
2. To provide fundamentals of Analytical Geometry and show their significant role through Mathematical software.
3. To acquire the knowledge about GEOGEBRA.
4. To gain knowledge of Multivariate Calculus and related formulae by using the Mathematical Software SCILAB.
5. To use computational tools of LIBRE OFFICE.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recall and use the concepts of algebra and calculus.	K1 & K3
CO2	Apply and analyze the math tools for graphing, geometry, 3D by GEOGEBRA.	K3 & K4
CO3	Understanding and Relate Linear algebra and Trigonometry concepts by Mathematical Software.	K2 & K4
CO4	Construct programs in SCILAB and analyze plot results.	K3 & K4
CO5	Utilize and point out computational tools of LIBRE OFFICE.	K3 & K4
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU06	PRACTICAL-I GEOGEBRA, SCILAB AND LIBRE OFFICE – LAB	Sem: II
Unit No.	Topics	Hours
I	<ol style="list-style-type: none">1. Calculate the product of all elements in the list of numbers raised to the value given in the list of frequencies for each one of them by GEOGEBRA.2. Calculate the weighted standard deviation of the given numbers by GEOGEBRA.3. Calculate the product moment correlation coefficient using the coordinates of the given points by GEOGEBRA.4. Find the rank of Matrix by GEOGEBRA.5. Compute the Fibonacci numbers by SCILAB.6. Visualize the solution, plot the function F(X) using SCILAB.7. Implement the algorithm to find the roots of a polynomial using SCILAB.8. Sort the elements of a vector in ascending or descending order using SCILAB.9. Perform frame movement by inserting clipart to illustrate running of a car automatically by LIBREOFFICE.10. Perform sorting on name, place and pin code of students database and list them in the sorted order by LIBREOFFICE.11. Using queries retrieve information from sales database which contains Trans-no, date, prod-id, prod name-qty, unit-price and region. List out records region wise, date-wise, product-wise by LIBREOFFICE.12. Create mailing labels for employee database by LIBREOFFICE.	36

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

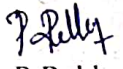
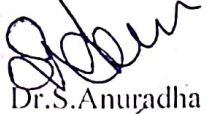
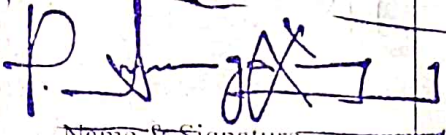
MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S
CO3	S	M	L	S	S	M	M
CO4	S	S	S	S	S	S	S
CO5	S	S	S	L	M	S	S

S – Strong, M – Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

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 Ms.P.Rekha Name & Signature of the Staff	 Dr.S.Anuradha Name & Signature	 Name & Signature

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Course Code:	21MAU07	ALLIED: MATHEMATICAL STATISTICS–IIWITH LIBRE OFFICE						Batch:	2021–2022 and Onwards
								Semester:	II
Hrs/Week:	5	L	5	T	–	P	–	Credits:	4

COURSE OBJECTIVE:

1. To acquire the concept of chi–square distribution.
2. To study about the relationship between t, F and distributions.
3. To learn about the theory of estimation.
4. To gain the knowledge about test of significance.
5. To study the concept of analysis of variance.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand and apply the concepts of chi–square distributions. Compare the distributions.	K2 , K3 & K4
CO2	Find and Relate the applications of χ^2 , t, F distributions.	K1 & K4
CO3	Examine the theory of estimations.	K4
CO4	Apply and Analyze the aspects of parametric testing techniques including single and multi- sample tests for mean and proportion.	K3 & K4
CO5	Analyze the concept of analysis of variance.	K4
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU07	ALLIED: MATHEMATICAL STATISTICS-II WITH LIBRE OFFICE	Sem: II
Unit No.	Topics	Hours
I	SAMPLING DISTRIBUTIONS: Introduction–Derivation of χ^2 distribution – Moment generating function of χ^2 – t distribution – F distribution – Applications of chi-square distribution.	12
II	APPLICATIONS OF SAMPLING DISTRIBUTIONS: Application of χ^2 distribution – Application of t – distribution – Application of F distribution – Relation between “t” and F distribution – Relation between F and χ^2 distribution – Application of t and F distributions.	12
III	THEORY OF ESTIMATION: Introduction – Characteristics of Estimators – Cramer – Rao Inequality – MVU and Blackwellisation theorem – Applications of characteristics of Estimators.	12
IV	LARGE SAMPLES: Introduction – Types of sampling–Parameter and Statistics – Test of significance – Procedure for testing of hypothesis–test of significance for large samples – Sampling of Attributes – Hypothesis Testing with practical examples.	12
V	Analysis of variance : Analysis of variance – one way classification – ANOVA table – Two way classification – ANOVA and its applications.	12

LIBRE OFFICE Problems related to MATHEMATICAL STATISTICS – II have been included in Practical-I (21MAU06) and **questions related to LIBRE OFFICE excluded in MATHEMATICAL STATISTICS – II (21MAU07) in the questions.**

Questions related to Applications have been included in internal only and excluded in semester questions.

Note: Distribution of marks: Problems 70 %, Theory 30 %

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

For Units I,II,III,IV :

1. **S.C.Gupta and V.K.Kapoor**”, *Fundamentals of Mathematical statistics*”, sultanchand and sons,2011.

Unit I : Chapter 15 : Sections: 15.1 to 15.3

Chapter 16 : Sections: 16.1, 16.2.1,16.2.2, 16.2.3, 16.5.1, 16.5.2,16.5.3

Unit II : Chapter 15 : Sections :15.6.1,15.6.2

Chapter 16 : Sections: 16.3.1,16.3.2, 16.3.3, 16.6, 16.7,16.8.

Unit III : Chapter 17 : Sections: 17.1,17.2,17.3,17.5

Unit IV : Chapter 14 : Sections: 14.1–14.7

For Unit V :

2. **S.P.Gupta**, ”*Statistical methods, Volume II*” sultan chand and sons, 2011.

Unit V : Chapter 5

REFERENCE BOOKS

1. **B.L,Agarwal,Basic** “*Statistics*”, *New Age International publishes,Chennai,2009.*

2. **S.P.Gupta**, “*Statistical Methods*”, *Sultan Chand and Sons,2011*

WEB RESOURCES

Web Links:

1. [https://www.tutorialspoint.com/statistics/chi_squared_distribution.htm#:~:text=The%20chi%20Squared%20distribution%20\(chi,case%20of%20the%20gamma%20distribution.](https://www.tutorialspoint.com/statistics/chi_squared_distribution.htm#:~:text=The%20chi%20Squared%20distribution%20(chi,case%20of%20the%20gamma%20distribution.)

2. <https://www.statisticshowto.com/probability-and-statistics/chi-square/>

Application Links :

Unit –I : 1. <https://youtu.be/0nLXTpjU52M>

2. <https://youtu.be/upU4JpSBAAs>

Unit –II : 1. <https://youtu.be/SvjVAeBCmAk>

2. <https://youtu.be/dIOmcDMNLAc>

Unit –III : 1. <https://youtu.be/Q1yu6TQZ79w>

Unit –IV : 1. <https://youtu.be/vLcA–IryGf4>

Unit –V : 1. <https://youtu.be/vXdXQvoMics>

2. <https://youtu.be/ITf4vHhyGpc>

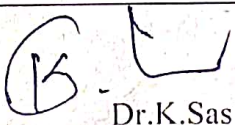

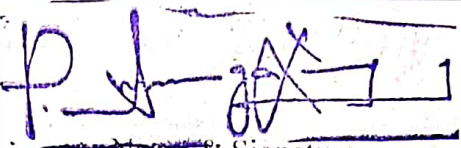
MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	M	M	S	S	S	S
CO2	S	S	M	S	S	S	S
CO3	S	S	S	M	S	S	S
CO4	S	M	S	S	S	M	M
CO5	S	M	M	S	S	S	S

S – Strong, M – Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Dr.K.Sasikala Name & Signature of the Staff	 Dr.S.Anuradha Name & Signature	 Name & Signature

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Course Code:	21MAU08 A	ELECTIVE – I : A) NUMERICAL METHODS – I						Batch:	2021–2022 and Onwards
								Semester:	II
Hrs/Week:	3	L	3	T	–	P	–	Credits:	3

COURSE OBJECTIVE:

1. It exposes the students to study numerical techniques to find solutions of numerical, algebraic transcendental equations.
2. To gain the knowledge solution of simultaneous linear equations.
3. Understand about finite differences and its applications.
4. Determine the knowledge about solving the linear equations numerically and finding interpolation by using difference formulae.
5. To study about relations between divided differences and forward differences to find interpolation.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recall and Examine the numerical solutions of algebraic and transcendental equations.	K1 & K4
CO2	Analyze the solution of simultaneous linear equations.	K4
CO3	Apply the finite difference concepts and Calculate the problems in finite difference.	K3 & K4
CO4	Apply the skills in finding interpolation of equal intervals and Illustrate the problems in it.	K3 & K4
CO5	Analyze the concepts of unequal intervals in interpolation.	K4
KI – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU08 A	ELECTIVE– I : A) NUMERICAL METHODS – I	Sem: II
Unit No.	Topics	Hours
I	The solution of numerical Algebraic and Transcendental Equations : Bisection method – Iteration method – Convergence condition – Regula Falsi Method – Newton-Raphson Method – Geometrical meaning of Newton’s Method – Convergence Criteria – Order of Convergence – Study of application of Newton Raphson Method.	7
II	Solution of simultaneous linear Algebraic Equations : Gauss Elimination method – Gauss Jordan method – Inversion of a matrix using Gauss Elimination method – Method of Triangularization – Gauss Jacobi method – Gauss Seidel method - Gauss Jordan Elimination with Traffic Flow.	7
III	Finite Differences: Differences – Operators – Forward and Backward difference tables – Differences of a polynomial – Factorial polynomial – Error propagation in difference table – Finite integration– Finite difference method (FDM) of discretization.	7
IV	Interpolation (for equal intervals) : Gregory – Newton’s Forward and Backward formulae – Central differences and central difference table – Gauss Forward and Backward formulae – Stirling’s formula –Advantages of central difference interpolation– Application of interpolation.	8
V	Interpolation (for unequal intervals) : Divided differences – Properties – Relations between divided differences and forward differences – Newton’s divided differences formula – Lagrange’s formula and inverse interpolation – Lagrange Interpolation and Its Applications.	7
Questions related to Applications have been included in internal only and excluded in semester questions.		

Note: Distribution of marks: Problems 80%, Theory 20 %

Teaching Methods: PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1. **Dr.P.Kandasamy, Dr.K.Thilagavathi and Dr.K.Gunavathi**, “Numerical methods“, S.Chand and Company Ltd, New Delhi, Revised Edition, 2007.

Unit– I :Chapter 3: Sections :3.1– 3.4

Unit–II : Chapter 4: Sections :4.1– 4.4, 4.8, 4.9

Unit–III :Chapter 5: Sections :5.1– 5.6

Unit–IV :Chapter 6: Sections :6.1– 6.3, Chapter 7: Sections : 7.1– 7.5

Unit–V : Chapter 8: Sections :8.1– 8.7

REFERENCE BOOKS

1. **M.K.Venkataraman**, “Numerical Methods in Science and Engineering”, National Publishing company, 5th Edition, 1999.
2. **K.SankaraRao**, “Numerical Methods for Scientists and Engineers”, 2nd Edition, 2004.

WEB RESOURCES

Web Links :

1. https://link.springer.com/chapter/10.1007/978-94-015-8308-4_31
2. <https://nptel.ac.in/courses/111/107/111107062/>

Application Links :

- Unit –I** : 1. <https://youtu.be/FpdVP8GAXsI>
- Unit –II** : 1. <https://youtu.be/Wa6kaCwyYRk>
- Unit –III** : 1. <https://youtu.be/V1cTuiR1Ogc>
- Unit –IV** : 1. <https://youtu.be/UfT4hjLL4eY>
- Unit –V** : 1. <https://youtu.be/4hwJhLGBlhU>

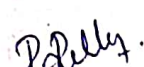
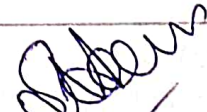

MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	M	M	S	S	S	S
CO2	S	S	M	S	M	S	S
CO3	S	S	S	S	S	M	M
CO4	S	M	S	M	S	S	S
CO5	S	M	M	S	S	S	S

S – Strong, M – Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

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 Ms.P.Rekha Name & Signature of the Staff	 Dr.S.Anuradha Name & Signature	 Name-& Signature

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 Coimbatore-641 028.

Course Code:	21MAU08 B	ELECTIVE– I : B) ASTRONOMY						Batch:	2021–2022 and Onwards
								Semester:	II
Hrs/Week:	3	L	3	T	–	P	–	Credits:	3

COURSE OBJECTIVE:

1. Communicate about celestial objects such as parent star, planets, dwarf planets, satellites etc.
2. To acquire the knowledge about celestial sphere.
3. Effect of the refraction phenomena for the celestial objects.
4. Understand Kepler's Three Laws of Planetary Motion.
5. Understand how the phase of the Moon is controlled by the relative positions of the Sun and Moon in the sky.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Define Celestial sphere and Analyze about celestial objects and its properties.	K1 & K4
CO2	Understand the Celestial sphere, Dip – Twilight and compare morning and evening stars.	K2 & K4
CO3	Classify and Compare the refraction phenomena for the celestial objects.	K2 & K4
CO4	Define and Analyze Kepler's Three Laws in the areas of planetary science.	K1 & K4
CO5	Apply the Techniques to explore the solar surface temperature and Analyze about the solar system.	K3 & K4
KI – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21MAU08B	ELECTIVE – I : B) ASTRONOMY	Sem: II
Unit No.	Topics	Hours
I	Celestial Sphere : Relevant properties of sphere and formulae in spherical trigonometry (no proof, no problems) – Celestial sphere and diurnal motion – Celestial co-ordinates –sidereal time– Earth and Celestial Sphere.	8
II	Celestial sphere (Contd) : Morning and Evening Stars – Circumpolar Stars – Diagram of the celestial sphere – Zones of earth – Perpetual day – Dip of horizon – Twilight– The beauty of the geocentric model.	7
III	Refraction : Refraction – Laws of refraction – Tangent formula – Cassini’s formula – Horizontal refraction – Geocentric parallax – Horizontal parallax – Reflection, refraction and dispersion examples in daily life.	7
IV	Kepler’s Law : Kepler’s laws – Verification of 1 st and 2 nd laws in the case of earth – Anomalies – Kepler’s equation – Seasons – Causes – Kinds of years – Kepler's Laws and How Newton Got Cool.	7
V	Solar System : Moon – Sidereal and Synodic Months – Elongation – Phase of Moon – Eclipses–Umbra and Penumbra – Lunar and Solar Eclipses – Ecliptic limits – Maximum and minimum number of eclipses near a node and in a year – Saros.7 Modern Ways to use Solar Panels in everyday life.	7
Questions related to Applications have been included in internal only and excluded in semester questions.		

Note: Distribution of marks: Problems 20%, Theory 80 %

Teaching Methods: Power Point Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1. S.Kumaravel and Susheela Kumaravel, “Astronomy”, 8th Edition, SKV Publications, 2004.

Unit –I	: Sections : 39–79
Unit –II	: Sections : 80–90,106–116
Unit –III	: Sections : 117–144
Unit –IV	:Sections : 146–162,173–178
Unit –V	:Sections :229–241,256–275

REFERENCE BOOKS

1. John Duncan, "Astronomy", Paragon Publishers.

WEB RESOURCES

Web Links:

1. <https://solarsystem.nasa.gov/asteroids-comets-and-meteors/overview/>
2. <https://www.britannica.com/science/Keplers-laws-of-planetary-motion>

Application Links :

- Unit -I : 1. <https://youtu.be/QGRqcGmZqIM>
 Unit -II : 1. <https://youtu.be/zlhUuphIUol>
 Unit -III : 1. <https://youtu.be/tGHYVZjHCis>
 Unit -IV : 1. https://youtu.be/zNeFI_JCXIY
 Unit -V : 1. <https://youtu.be/PpulC4F4hQw>

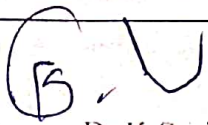
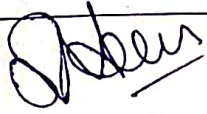
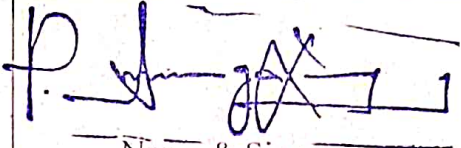
MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	M	S	S	M	S	S
CO3	S	M	S	M	S	S	S
CO4	M	S	S	S	S	M	M
CO5	S	S	S	S	S	S	S

S - Strong, M - Medium, L - Low

ASSESSMENT PATTERN (if deviation from common pattern)

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