

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

in the

UNDERGRADUATE PROGRAMME IN MATHEMATICS

**FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2022 - 2023**



HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

**(Affiliated to Bharathiar University and Accredited by
NAAC) COIMBATORE-641028**

TAMILNADU, INDIA.

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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 and theoretical skills to model real-world problems and solve them.

PEO 3: Recognize 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: Students are empowered with analytical and logical skills-to formulate results and construct mathematical argument.

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

PO3: Demonstrate effective communication of mathematical ideas and creative thinking skills to facilitate solving real world problems as independently.

PO4: An ability to apply knowledge of Mathematics and acquire required programming skills, formulate and solve practical problems as a team and independently.

PO5: Perform professionally with social, ethical responsibility as an individual as well as in multifaceted teams with positive attitude.

PO6: Identify the area of interest for extended learning from the understanding gained from the domain and allied areas of Mathematics.

PO7: 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 2022-2023)

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	22LAT01/ 22LAH01/ 22LAM01/ 22LAF01	MIL	Tamil –I/ Hindi –I/ Malayalam – I/ French –I	4	6		3	50	50	100
II	22ENG01	AECC	English – I	4	6		3	50	50	100
III	22MAU01	DSC	CORE – I – Calculus – I with SCILAB	4	6		3	50	50	100
III	22MAU02	DSC	CORE – II – Analytical Geometry of 3D with GEOGEBRA	4	6		3	50	50	100
III	22MAU03	DSC	CORE–III – Mathematical Statistics – I with LIBRE OFFICE	4	5		3	50	50	100
IV	22MAUE01	AEE	Open Elective – I	2	3		3	100	-	100
IV	22GSU01	AECC	Environmental Studies	1	2		2	50	-	50
IV	22MAUV01	SEC	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			400	250	650
Semester - II										
I	22LAT02/ 22LAH02/ 22LAM02/ 22LAF02	MIL	Tamil –II / Hindi –II / Malayalam –II / French –II	4	6		3	50	50	100
II	22ENG02	AECC	English – II	4	6		3	50	50	100
III	22MAU04	DSC	CORE – IV – Calculus – II with SCILAB	4	4		3	50	50	100
III	22MAU05	DSC	CORE – V – Differential Equations and Laplace Transforms	4	4		3	50	50	100
III	22MAU06	DSC	CORE –VI – Practical I – GEOGEBRA, SCILAB, LIBRE OFFICE	2		4	3	50	50	100
III	22MAU07	DSC	CORE –VII – Mathematical Statistics – II with LIBRE OFFICE	4	5		3	50	50	100

III	22MAU08	DSE	Elective – I	3	3		3	50	50	100
III	22MAU09	SEC	Internship / Industrial Visit / Mini Project	1	-			100		100
IV	22MAUV02	SEC	Life Skills – II – Language	1*	2		2	50	-	50**
IV	22MAUJ01	SEC	Aptitude / Placement Training	Grade*	2		2	50		50**
Total				26	32	4		450	350	800
Semester - III										
I	22LAT03/ 22LAH03/ 22LAM03/ 22LAF03	MIL	Tamil –III / Hindi –III / Malayalam –III/ French –III	4	6		3	50	50	100
II	22ENG03	AECC	Functional English – I	4	6		3	50	50	100
III	22MAU10	DSC	CORE – VIII – Statics	4	4		3	50	50	100
III	22MAU11	DSC	CORE – IX – C Programming	4	4		3	50	50	100
III	22MAU12	DSC	CORE – X – Practical II – C Programming	4		4	3	50	50	100
III	22MAU13	GE	Allied – I – Principles of Accountancy	4	4		3	50	50	100
IV	22MAUE02	AEE	Open Elective – II	2	3		3	100		100
IV	22GSU02	AECC	Human Rights	1	2		2	50		50
IV	22MAUJ02	SEC	Aptitude / Placement Training	Grade*	2		2	50		50**
IV	22MAUJ03	SEC	Online Course	-	1			-	-	C/NC [≠]
Total				27	32	4		450	300	750
Semester - IV										
I	22LAT04/ 22LAH04/ 22LAM04/ 22LAF04	MIL	Tamil –IV / Hindi –IV/ Malayalam –IV/ French –IV	4	6		3	50	50	100
II	22ENG04	AECC	Functional English – II	4	6		3	50	50	100
III	22MAU14	DSC	CORE – XI – Dynamics	5	5		3	50	50	100
III	22MAU15	DSC	CORE – XII – Python Programming	4	4		3	50	50	100
III	22MAU16	DSC	CORE – XIII – Practical III – Python Programming	4		4	3	50	50	100
III	22MAU17	GE	Allied II – Financial Accounting	4	4		3	50	50	100
III	22MAU18	SEC	Internship / Institutional Training / Mini-Project	1	-		-	100	-	100
IV	22MAUV03	ACC	VAC – I	1*	2		2	50	-	50**
IV	22MAUJ04	SEC	Aptitude / Placement Training	Grade*	2		2	50		50**
IV	22MAUJ05	SEC	Online Course	-	1		-	-	-	C/NC [≠]
IV	22GSU03	AECC	Internet Security	1	2		2	50	-	50
V	22GSU04	AECC	Extension Activities NSS/NCC/SPORTS/YRC/ SIS/SA#	2	-		-		-	C/NC [≠]
Total				29	32	4		450	300	750
Semester - V										
III	22MAU19	DSC	CORE – XIV – Real Analysis	5	6		3	50	50	100

III	22MAU20	DSC	CORE – XV – Complex Analysis	5	6		3	50	50	100
III	22MAU21	DSC	CORE – XVI – Linear Algebra	5	6		3	50	50	100
III	22MAU22	DSC	CORE – XVII – Operations Research	5	6		3	50	50	100
III	22MAU23	DSE	Elective – II	3	3		3	50	50	100
IV	22MAUE03	AEE	Open Elective – III	2	3		3	100	-	100
IV	22GSU05	AECC	General Awareness	1	1		2	50	-	50
IV	22GSU06	AECC	Law of Ethics	1	-		2	50	-	50
IV	22MAUV04	ACC	VAC – II	1*	2		2	50	-	50**
IV	22MAUJ06	SEC	Aptitude / Placement Training	Grade*	2		2	50	-	50**
IV	22MAUJ07	SEC	Online Course	-	1		-	-	-	C/NC [‡]
IV	22MAUJ08	SEC	SDR- Student Development Report	2*	-	-	-	-	-	-
Total				27	36			450	250	700
Semester - VI										
III	22MAU24	DSE	Elective – III	3	5		3	50	50	100
III	22MAU25	DSE	Elective – IV	3	5		3	50	50	100
III	22MAU26	DSC	CORE – XVIII – Self-Study Course	3	-		3	50	50	100
III	22MAU27	SEC	Project Work /Student Research / Paper	3	3		-	50	50	100
Total				12	13			200	200	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)
- Grade - 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% (Both Internal and External)

ABSTRACT FOR SCHEME OF EXAMINATION

(For the candidates admitted during the academic year 2022- 2023)

Part	Course	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages/ (MIL)	4	4	16	100	400
Part II	English/AECC-I	4	4	16	100	400
Part III	Core /DSC	17	4/5	71	100	1700
	Self-Study Course / DSC	1	3	3	100	100
	Allied /GE	2	4	8	100	200
	Electives/DSE	4	3	12	100	400
	Project /SEC	1	3	3	100	100
	<i>Internship/Institutional Training/Mini-Project</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 & VAC / JOC	
Open Electives	<p>Yoga for Human Excellence</p> <p>Human Health & Hygiene</p> <p>Indian Culture and Heritage</p> <p>Indian Constitution and Political System</p> <p>Consumer Awareness and Protection</p> <p>Professional Ethics and Human Values</p> <p>Human Rights, Women's Rights & Gender Equality</p> <p>Disaster Management</p> <p>Green Farming</p> <p>Campus to Corporate</p> <p>Start up Business</p> <p>Research Methodology and IPR</p> <p>General Studies for Competitive Examinations</p> <p>IIT JAM Examination (for Science only)</p> <p>CUCET Examination</p>
VAC	<p>Mathematics for Competitive Examination – I</p> <p>Statistics for Data Analytics</p> <p>R Programming</p> <p>Amazon Web Services</p> <p>Introduction to SPSS</p> <p>Mathematics for Competitive Examination – II</p> <p>SAS (Statistical Analysis System)</p> <p>Big Data Analytics</p> <p>Data Visualization Tools</p>

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	22MAU08A	Elective I : A) Numerical Methods
	22MAU08B	Elective I : B) Astronomy
Electives/ DSE-II	22MAU23A	Elective II : A) Graph Theory
	22MAU23B	Elective II : B) Financial Mathematics
Electives/ DSE-III	22MAU24A	Elective III : A) Internet & JAVA – Theory
	22MAU24B	Elective III : B) Fuzzy sets and Fuzzy logic
Electives/ DSE-IV	22MAU25A	Elective IV : A) Integral Transforms
	22MAU25B	Elective IV : B) Number Theory

P. Delekar

Syllabus Coordinator

M. Sahasrabudhe

Academic Council – Member Secretary

S. Anuradha

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PRINCIPAL
PRINCIPAL

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UG - Scheme of Evaluation (Internal & External Components)

(For the students admitted during the academic year 2022-2023 and onwards)

1. Internal Marks for all UG

Components	Marks
Test I	10
Test II	10
Model Exam	10
Assignment	5
Attendance*	5
Internal Assessment components **	10
TOTAL	50

*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

** List of components for Internal Assessment (MCQ Compulsory)

S.No	Components
1	Multiple choice questions
2	Club activities
3	Assignment
4	Seminar

(Any two components from the above list with five marks each will be calculated
.2x5=10 marks)

2. a) Components for Practical I.E.

Components	Marks
Test -I	15
Test - II	15
Observation	10
Application*	10
Total	50

b) Components for Practical E.E.

Components	Marks
Experiments/Exercise	40
Record	5
Viva	5
Total	50

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: a)Attendance	20	50
Report	50	50	b)Review/Work diary*	30	
Viva-voce	25	50			
Total	100	100	E.E*** a) Evaluation	30	50
			b)Viva-voce	20	
				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 x 1/2 = 25 Marks]	50

6. Guidelines for open Elective (Part IV)

Components	Marks
Two Tests (each 2 hours) of 50 marks each [5 out of 8 descriptive type questions 5 x 10 = 50 Marks]	100

7. Value Added Courses and Aptitude/Placement courses:

Components	Marks
Two Test (each 1 hour) of 25 marks each QP is objective pattern (25x1=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.7, Tests conducted through online modules (Google Form/any other)
5. Item No.2: * - Application should be from the relevant practical subject other than the Listed programmes. It must be enclosed in the practical record.

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

Reg.No:-----

Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS & 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 6 = 24 marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

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

SECTION - C (2x10 = 20 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 & 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** Questions

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)

Blue Print of Question Paper for all UG Programmes

(For the academic year 2021-22, 2022-23)

FOR CIA I, CIA II - QUESTION PATTERN

Max. Marks: 50

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 6	MCQ/ True or False/ Fill up	6	6	1 (6x1=6)	All Questions will be K1
B	7 to 10	Either or Type (a or b)	8	4	6 (4x6=24)	4 Questions will be in K2 4 Questions will be in K3
C	11 to 13	Open choice	3	2	10 (2x10=20)	1 Question will be in K3 2 Question will be in K4

FOR MODEL/ESE - QUESTION PATTERN

Max. Marks:70

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 10	MCQ/ True or False/ Fill up	10	10	1 (10x1=10)	All Questions will be K1
B	11 to 15	Either or Type (a or b)	10	5	6 (5x6=30)	6 Questions will be in K2 4 Questions will be in K3
C	16 to 20	Open choice	5	3	10 (3x10=30)	2 Question will be in K3 3 Question will be in K4

(For the academic year 2020-21)

FOR CIA I, CIA II - QUESTION PATTERN

Max. Marks:50

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 6	MCQ/ True or False/ Fill up	6	6	1 (6x1=6)	All Questions will be K1
B	7 to 10	Either or Type (a or b)	8	4	5 (4x5=20)	4 Questions will be in K2 4 Questions will be in K3
C	11 to 13	Either or Type (a or b)	6	3	8 (3x8=24)	3 Question will be in K3 3 Question will be in K4

FOR MODEL/ESE - QUESTION PATTERN

Max. Marks:70

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 10	MCQ/ True or False/ Fill up	10	10	1 (10x1=10)	All Questions will be K1
B	11 to 15	Either or Type (a or b)	10	5	4 (5x4=20)	6 Questions will be in K2 4 Questions will be in K3
C	16 to 20	Either or Type (a or b)	10	5	8 (5x8=40)	5 Question will be in K3 5 Question will be in K4

Blue Print of Question Paper

Distribution of section-wise marks with K levels for UG 2021-22, 2022-23

CIA							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A -MCQ/T or F /Fill up	6				6	6	6x1=6
B - Either or type		4	4		8	4	4x6=24
C - Open choice			1	2	3	2	2x10=20
Total Marks	6	24	34	20			84
% of marks without choice	7.14	28.57	40.48	23.81			100

Model Exam							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A- MCQ/T or F/ Fill up	10				10	10	10x1=10
B - Either or type		6	4		10	5	5x6=30
C - Open choice			2	3	5	3	3x10=30
Total Marks	10	36	44	30			120
% of marks without choice	8.33	30	36.67	25			100

Distribution of section-wise marks with K levels for UG (2020-21)

CIA							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A MCQ/T or F/ Fill up	6				6	6	6x1=6
B - Either or type		4	4		8	4	4x5=20
C – Either or type			3	3	6	3	3x8=24
Total Marks	6	20	54	24			104
% of marks without choice	5.77	19.23	51.92	23.08			100

Model Exam							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A MCQ/True or False/ Fill up	10				10	10	10x1=10
B - Either or type		6	4		10	5	5x4=20
C – Either or type			5	5	10	5	5x8=40
Total Marks	10	24	56	40			130
% of marks without choice	7.69	18.46	43.08	30.77			100

UG Programme Regulations for the academic year 2022-2023

1. Internal marks components for the candidates admitted from the academic year 2022-2023 and onwards is as follows.

For Theory courses

Components	Marks
Test I	10
Test II	10
Model Exam	10
Assignment	5
Attendance	5
Internal Assessment components	10
TOTAL	50

For Practical courses

Components	Marks
Test –I	15
Test – II	15
Observation/Exercise	10
Application*	10
TOTAL	50

2. The pattern of the question paper for External Examination will be maximum of 70 marks for theory courses, the marks obtained will be converted into 50 as per the scheme.
3. Passing minimum for all UG programme is 40% in Internal and 40 % in External and the composition of total 40 marks out of 100 marks.
4. Internship / Institutional Training / Mini-Project is related to the discipline. The students can be permitted to complete the Internship / Institutional Training / Mini-Project before the end of First year (end of II semester) and before the end of the second year (end of IV semester) and submit a report.

Internship / Institutional Training	Duration: Not more than seven days
Mini project	During the course of study for not more than seven days.

5. 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. Distribution of marks for major project for all UG programme will be 50:50 pattern for both Internal and External in total of 100/200 marks.
6. Two tests for fully internal subjects should be conducted during CIA-I and CIA –II by the department.
7. Retest for the failure candidates in CIA I or CIA II or Part IV or Part V or Extra credit courses should be conducted during the model examination after getting approval from the COE office. The candidates who are not able to complete the minimum pass mark in internal components even getting chance of reappearance, will be treated as arrear candidates.
8. For the Theory cum Practical blended courses, 50:50 Internal and External pattern will be followed for theory examination and Fully internal pattern will be followed for Practical examination. For theory part, External examination will be conducted as regular pattern (max of 70 marks) and it will be converted into 25 marks.

Course	Internal Marks		External marks		Total marks (Max. marks 50)	
	Min.	Max.	Min.	Max.	Min.	Max.
Theory	10	25	10	25	20	50
Practical	20	50	-		20	50

For Practical components for Theory cum Practical courses (Fully Internal)

Components	Marks
Test I	10
Test II	10
Experiment/Excercise	20
Record	5
Viva	5
Total	50

The Internal mark 50 will be converted into 25.

9. For the candidates admitted under the Fast Track System (FTS) must register their names to their concerned department heads and get approval from the COE office at the beginning of the III semester.
10. Students who are not willing to select the Project/Research work in Semester VI, can chose the theory papers offered by their departments as per the prescribed theory pattern.
11. Self Study will be a Core Paper of the department for which the examination pattern will be as like part III courses is followed.
12. 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.
13. SDR – Student Development Report to be received by the department from the students till end of the fifth semester. (Evidences of Curricular activities and Co-curricular activities)
14. For online courses minimum of 2 certificates in any of the online platform is mandatory.
15. Open elective courses:
Departments can offer list of subjects which teaches moral ethics to the young community for the better future. The topics relevant to Indian ethics, Culture, Women rights, Yoga, Green farming, Indian constitution etc., as an open elective courses. These courses can be offered by the department or other department as inter department courses. Marks earned for this courses will not be included for CGPA calculations.

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.

Regulations of Fast Track System (FTS)

- From the academic year 2021-22, our college is offering Fast Track System (FTS) for all UG and PG programmes. In this system, we are offering two courses under the course type of Discipline Specific Elective (DSE) in the sixth semester for all UG programmes and fourth semester for all PG programmes, which are equivalent and related with **National Programme on Technology Enhanced Learning/Study Webs of Active-Learning for Young Aspiring Minds (NPTEL/SWAYAM)** courses.
- The students have the option of taking two subjects of the sixth semester of their programme through NPTEL/SWAYAM portal from the list given by NPTEL and can complete the online course before fifth semester and submit the received original certificates to the COE office for getting approval. If the student completes these courses before the beginning of the sixth semester (UG)/fourth semester (PG), the candidate can be considered and exempted to write the examination from the assigned DSE courses in the sixth semester/fourth semester. They should complete only the self study course and project work during the VI/IV semester as assigned in the scheme. The candidate who completes the online courses and submits the successful course completion credentials, the credit transfer will be considered as per our Scheme of Examination for qualifying the degree. **The minimum duration of the registered online course must be 12 weeks.** Course duration of less than 12 weeks will not be considered.
- For all PG programmes, the candidates who were admitted during the academic year 2021-2022 under the Fast track system, for the self study course, the internal mark component will be as follows. For others regular internal pattern follows.

TEST	Max. Marks	Mode
CIA I	50 (50x1=50)	Online objective type
Model Exam.	50 (50x1=50)	Online objective type

Out of these two tests, the total marks will be converted into 40 marks as Internal.

- For all UG programmes, the candidates who were admitted during the academic year 2021-2022 under the Fast track system, for the self study course, the internal mark component will be as follows. For others regular internal pattern follows.

TEST	Max. Marks	Mode
CIA I	50 (50x1=50)	Online objective type
CIA II	50 (50x1=50)	Online objective type
Model Exam.	50 (50x1=50)	Online objective type

Out of three tests, the total mark will be converted into 30 marks as Internal.

- For the students admitted in Fast Track System, must enroll their names to the concerned department heads and get approval from the COE office at the beginning of III semester for all UG Programmes and at the beginning of II semester for all PG programmes.
- The students who cleared and got certified for online courses under the fast track system, the grade obtained will be converted into average marks of range. The received certificates must be submitted to the COE office for approval of the Controller and the Principal. The FTS courses will be treated as fully external.

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22MAU01	CALCULUS - I WITH SCILAB	4	6	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To enable the students to learn about the concept of Curvature.
- To provide the knowledge about functions of two or more variables from numerical, visual and algebraic points of view.
- To enable the students to learn about the Directional derivatives and the gradient vector.
- To extend the concept of a definite integral to double and triple integrals of functions of two or three variables.
- To solve real world integration problems such as rate of change, optimization and area.

Unit	Course Contents	Hours	K Level
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. Applications: Real life applications of radius of curvature.	15	Up to K4
II	Vector Functions: Differentiation of vectors – Vector functions – Limit, Derivative and Partial derivatives of vector functions. Applications: Vector calculus and its applications.	14	Up to K4
III	Partial Derivatives: Gradient of a scalar point function –Divergence – Curl of a vector point functions – Simple Problems. Applications: Partial derivatives.	14	Up to K4
IV	Multiple Integrals: Single Integrals – Double integrals – Order of integration when limits are constants – Transformation of coordinates – Cylindrical polar coordinates – Spherical coordinates. Applications: Double Integrals.	15	Up to K4
V	Multiple Integrals: Triple integrals – Important surfaces – Coordinates of Points of Regions – Volume under a surface and on the xy – plane. Applications: Applications of Triple Integrals.	14	Up to K4

SCILAB problems related to CALCULUS – I have been included in Practical – I (22MAU06) and questions related to SCILAB excluded in CALCULUS – I (22MAU01) in the questions. Questions related to Applications have been included in internal only and excluded in semester questions.

Note: The Questions should be asked in the ratio of 80 % problems and 20 % for theory.

Book for Study

1. S.Narayanan and T.K.Manicavachagam Pillay, “**Calculus**”, **Volume - I**, S.Viswanathan Printers & Publishers, Re-print 2019.

Unit – I : Chapter : 10 Section : 2.1 – 2.7

2. P.Duraipandian , Kayalal Pachaiyappa, “**Vector Analysis**”, S Chand and company limited, Reprint -2020.

Unit – II : Chapter 1 : Sections : 1.1 – 1.4

Unit – III : Chapter 2 : Sections : 2.1 – 2.13

Unit – IV : Chapter 3 : Page no : 52 – 73

Unit – V : Chapter 3 : Page no : 74 – 84

Books for Reference

1. George B. Thomas, JR and Ross L. Finney, “**Calculus and Analytic Geometry**”, Sixth Edition, Narosa Publishing House, New Delhi, 1998.

2. H. Anton, I. Bivens and S. Davis, “**Calculus**”, Tenth edition, John Wiley & Sons, Inc., USA, 2012.

3. Edwin Hermon and Gilbert Strang, “**Calculus, Vol I**”, Open Stax, Rice University, 2017.

4. S. Narayanan and T. K. Manicavachagom Pillay, “**Calculus, Vol II**”, S. Viswanathan Pvt. Ltd., Chennai, 2004.

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

Web Resources

1. <https://rb.gy/tndbhm>

2. <https://www.pdfdrive.net/calculus-early-transcendentals-8th-ed-2015pdf-e27097109.html>

Application Links

Unit – I : 1. <https://bit.ly/3zkTqtP> 2. <https://youtu.be/IAb98ZgSJNw>

Unit – II : 1. https://youtu.be/tFE8_tljCMA 2. <https://youtu.be/fLIQbC8WIk8>

Unit – III : 1. <https://youtu.be/P43qNhCj1Gg> 2. <https://youtu.be/qT5eJ9tU-ig>

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>

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course : Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given :

1. Prepare comprehensive advanced problems on calculus in various fields.

2. Assignment on curvature and multiple integrals.

3. Preparing the students to do the project by applying solving the equations using SCILAB.

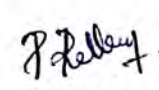
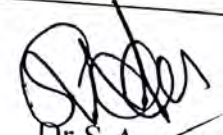
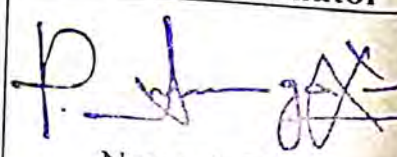
Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Understanding the concept of curvature, Evolute and Involute.	Up to K
CLO 2	Use vector-valued functions to describe the motion of objects through space.	Up to K
CLO 3	Become proficient in finding the surface areas and volumes of more general regions through double and triple integrals.	Up to K
CLO 4	Acquire knowledge in different coordinate systems such as polar, cylindrical and spherical coordinates.	Up to K
CLO 5	Applying the concept of change of variables in double and triple integrals.	Up to K

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	3	3	2	3	3
CLO 2	3	3	2	3	2	3	3
CLO 3	3	3	2	2	2	3	2
CLO 4	3	3	3	3	1	2	3
CLO 5	3	3	2	3	2	3	3

3 – Advance Application 2 – Intermediate Level 1 – Basic Level

Course Designed by  P.Rekha Name & Signature of the Staff	Verified by HOD  Dr.S.Anuradha Name & Signature	Approved by CDC Co-ordinator  Name & Signature
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Dr. S. Anuradha, Ph.D.,
 M.Sc., M.B.A.,
 PG & Res. in Mathematics,
 Hindusthan College of Science,
 Coimbatore-641 028

Co-ordinator
 Curriculum Development
 Hindusthan College of Science,
 Coimbatore-641 028

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22MAU02	ANALYTICAL GEOMETRY OF 3D WITH GEOGEBRA	4	6	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

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 explain 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.

Unit	Course Contents	Hours	K Level
I	Basics and Fundamentals of Analytical Geometry: Polar Co-ordinates – Straight lines – Circle – Chord – Polar equation of Conic. Applications: Real life applications of Analytical Geometry.	15	Up to K4
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. Applications: Real life examples of line and angles.	14	Up to K4
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. Applications: Application part of thin sphere and thin cylinder.	14	Up to K4
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. Applications: Enveloping cone.	15	Up to K4
V	Conicoids: Conicoids – Nature of Conicoids – Standard equation of a central Conicoids – Enveloping Cone – Tangent plane – Conditions for tangency – Director sphere and Director plane. Applications: Conditions for tangency and its applications.	14	Up to K4

GEOGEBRA Problems related to ANALYTICAL GEOMETRY OF 3D have been included in Practical-I (22MAU06) and questions related to GEOGEBRA excluded in ANALYTICAL GEOMETRY OF 3D (22MAU02) in the questions.

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

questions.

Note: The Questions should be asked in the ratio of 80 % problems and 20 % for theory.

Book for Study

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

Unit– I: Chapter 9 : Sections : 1 to 9,

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

Books for Reference

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

2. *P.R.Vittal, ”Analytical Geometry 2D and 3D”, Dorling Kindersly publishing Private Limited, India, 2013.*

3. *S. Arumugam, A.Thangapandi Issac & Somasundaram, “Analytical Geometry”, Edition 20, Yes Dee Publishing Private Limited, Chennai.*

4. *S. Arumugam & A.Thangapandi Issac, “Analytical Geometry of 3D and Vector Calculus”, Edition 2017, New Gamma Publishing House.*

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

Web Resources

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

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

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/y_i-bS5TNh4 2. <https://youtu.be/6vpXM1dskmY>

Unit – III : 1. <https://youtu.be/m4DKG-ADwGg> 2. <https://youtu.be/cbVsAChD1CE>

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/>

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

1. Prepare comprehensive advanced problems on Analytic functions.

2. Assignment on application of analytic function in 2D and 3D.

3. Preparing the students to do the project by applying analytic function in surface comparison in technical fields.


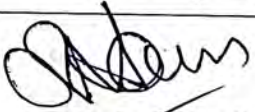
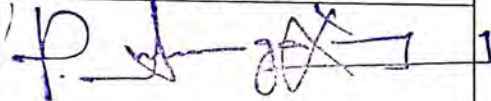
Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Classify the concepts of fundamentals of analytic geometry.	Up to K4
CLO 2	Classify the analytical concepts of three dimensions and Illustrate the problems.	Up to K4
CLO 3	Examine the equation of sphere and its properties.	Up to K4
CLO 4	Use the concepts of cone, cylinder and Analyze its properties.	Up to K4
CLO 5	Apply the concepts of Conicoids and Calculate the problems.	Up to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	3	2	3	3
CLO 2	3	3	2	3	2	3	3
CLO 3	3	3	1	3	2	3	2
CLO 4	3	3	2	2	2	3	3
CLO 5	3	3	2	3	3	3	3

3 – Advance Application 2 – Intermediate Level 1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 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.

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22MAU03	MATHEMATICAL STATISTICS – I WITH LIBRE OFFICE	4	5	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

1. To explain 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.

Unit	Course Contents	Hours	K Level
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.</p> <p>Applications: Application of Baye's Theorem in Real Life.</p>	12	Up to K4
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 – Simple Problems only.</p> <p>Applications: Applications of Random Variables.</p>	12	Up to K4
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 – Covariance – Moment Generating function – Cumulants – Chebychev's inequality.</p> <p>Applications: Application of Expected Value.</p>	12	Up to K4
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.</p> <p>Poisson Distribution: The Poisson process – Moments – Mode –Recurrence relation – MGF – Characteristics functions – Cumulants – Additive property.</p> <p>Applications: The Application of Binomial Distribution.</p>	12	Up to K4

V	<p>Normal Distribution: Introduction – Mode – Median – MGF – Cumulant generating Functions – Moments – Points of inflection – Mean Deviation about Mean. Applications: Applications of the Normal Distribution.</p>	12	Up to K4
<p>LIBRE OFFICE Problems related to MATHEMATICAL STATISTICS – I have been included in Practical–I (22MAU06) and questions related to LIBRE OFFICE excluded in MATHEMATICAL STATISTICS – I (22MAU03) in the questions. Questions related to Applications have been included in internal only and excluded in semester questions.</p>			

Note: The Questions should be asked in the ratio of 70 % problems and 30 % for theory.

Book for Study

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, 7.5

Unit – IV: Chapter 8: Sections : 8.4.1, 8.4.2, 8.4.4 – 8.4.7, 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

Books for Reference

1. R.S.N.Pillay and V.Bagavathi, “*Statistics*”, Sultan Chand, 2008.
2. Gupta. S.P, “*Statistical Methods*”, Sultan Chand, 3rd edition, 2005.
3. VITTAL P R, “*Mathematical Statistics*” -2004-Maragatham Publishers.
4. Veerarajan T, “*Fundamentals of Mathematical Statistics*”, Yes dee Publishing Private Ltd. 2017.
5. Arumugam and Thangapandi Issac, “*Statistics*”, New Gamma Publishing House, 2016.

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 | |

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course : Can be professionals in solving advanced problems to pursue higher studies.

- Activities to be given**
1. Prepare comprehensive advanced problems on distribution for various fields.
 2. Assignment on applications of mathematical Expectation and distribution.
 3. Preparing the students to appear professional courses by giving Advanced Exercise and workout problems on relevant distributions.

Course Learning Outcomes		K - Level
CLOs	On Completion of the Course, the students should be able to	
CLO 1	Applying the basic concepts of Probability and Examining the theorems.	Up to K4
CLO 2	Identifying the appropriate probability distribution for a given discrete or continuous random variable and its properties to calculate probabilities.	Up to K4
CLO 3	Illustrating the Mathematical Expectations.	Up to K4
CLO 4	Solving and Analyzing the mean and variance of the Binomial and Poisson distributions and distinguish.	Up to K4
CLO 5	Analyzing the mean and variance of the Normal distribution.	Up to K4

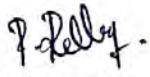
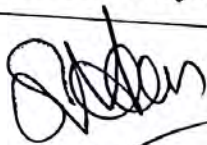
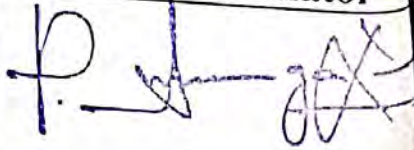
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	3	3	2	3	2
CLO 2	3	3	2	3	2	3	3
CLO 3	3	3	3	2	2	3	2
CLO 4	3	3	3	3	2	2	3
CLO 5	3	3	2	3	2	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

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

M.Sc.,
 PG & Rese...
 Hindusthan College of Arts & Science,
 Coimbatore - 641 028

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

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MAU04	CALCULUS – II WITH SCILAB	4	4	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives			
1. To Study the basic concepts of convergence of infinite sequences and series. 2. To enable the students to learn about the convergence and divergence of the series. 3. To gain the knowledge about the differentiation of vectors. 4. To explain the concepts of Green's, Gauss Divergence and Stoke's theorems and its applications. 5. To study about the hyperbolic function and its applications.			
Unit	Course Contents	Hours	K Level
I	Infinite sequences and 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. Applications: Choosing which Convergence Test to Apply to 8 series.	10	Up to K4
II	Infinite sequences and series: D'Alembert's Ratio Test – Cauchy's Root test – Raabe's test – Absolute convergence series. Applications: Application of Raabe's test.	9	Up to K4
III	Vector Calculus : Line integral – Conservative field and scalar potential – Surface integral – Volume integral. Applications: Vector calculus and its applications.	10	Up to K4
IV	Vector calculus: Integral Theorems: Gauss divergence theorem – Green's theorem in the plane – Stoke's theorem – Statements only Integral Theorems :Gauss divergence theorem – Green's theorem in the plane – Stoke's theorem – Statements only – Problems. Applications: Line integrals in 3D.	9	Up to K4
V	Trigonometry: Hyperbolic functions – Relations between hyperbolic functions – Inverse hyperbolic functions. Applications: Applications of Hyperbolic functions.	10	Up to K4
SCILAB Problems related to CALCULUS - II have been included in Practical-I (22MAU06) and questions related to SCILAB excluded in CALCULUS - II (22MAU04) in the questions. Questions related to Applications have been included in internal only and excluded in semester questions.			

Note: The Questions should be asked in the ratio of 80 % problems and 20 % for theory.

Book for Study

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 – 2.15
Unit – II : Chapter 2 : Section: 2.16 – 2.24
2. P.Duraipandian , Kayalal Pachaiyappa, “**Vector Analysis**”, S Chand and company limited, Reprint -2020.
Unit III : Chapter 3 : Sections : 3.1, 3.3, 3.5,3.6
Unit IV : Chapter 4 : Sections : 4.1, 4.2, 4.4, 4.5, 4.8
3. S. Narayanan and T. K. Manicavachagom Pillay, “**Trigonometry**”, S. Viswanathan Pvt. Ltd., Chennai, 2019.
Unit V : Chapter 4 : Sections: 1, 2, 2.1, 2.2, 2.3

Books for Reference

1. George B. Thomas, JR and Ross L. Finney, “**Calculus and Analytic Geometry**”, Sixth Edition, Narosa Publishing House, New Delhi, 1998.
2. H. Anton, I. Bivens and S. Davis, “**Calculus**”, Tenth Edition, John Wiley & Sons, Inc., USA, 2012.
3. S. Narayanan and T. K. Manicavachagom Pillay, “**Calculus, Vol I**”, S. Viswanathan Pvt. Ltd., Chennai, 2004.
4. S. Narayanan and T. K. Manicavachagom Pillay, “**Calculus, Vol II**”, S. Viswanathan Pvt. Ltd., Chennai, 2004.
5. Josiah Willard Gibbs, “**Vector Analysis**”, Franklin Classics Trade Press, 2018.

Web Resources

1. <https://rb.gy/tndbhm>
2. <https://nptel.ac.in/courses/111105035/22>

Application Links :

- | | | |
|------------------|--|--|
| Unit –I | : 1. https://youtu.be/0wefqjpQyKM | 2. https://youtu.be/f9SJz4-UaQQ |
| Unit –II | : 1. https://youtu.be/jJm36v96z1s | 2. https://youtu.be/vvVmIbzRnzW |
| 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/GOo2gC7S_T4 | |

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course : Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

1. Prepare comprehensive advanced problems on solving infinite series and sequence.
2. Assignment on application of integration of vectors and Trigonometry.
3. Preparing the students to appear professional courses by giving Advanced Exercise and workout problems on calculus.


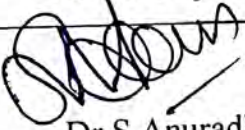
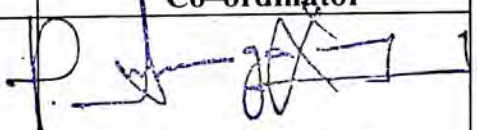
Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Analyzing the concepts of sequences and series.	Up to K4
CLO 2	Developing proficiency in various convergence tests for infinite series.	Up to K4
CLO 3	Using a power series to represent the functions that arise in mathematics, physics, and chemistry.	Up to K4
CLO 4	Applying the concept of the line and surface integrals to different applications.	Up to K4
CLO 5	Solving problems in summations of trigonometric series.	Up to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	3	2	3	3
CLO 2	3	3	2	3	2	2	3
CLO 3	3	3	3	3	2	3	3
CLO 4	3	3	2	3	2	3	2
CLO 5	3	3	2	3	2	3	2

3 – Advance Application 2 – Intermediate Level 1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 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

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

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MAU05	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	4	4	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

1. To learn the fundamentals of the differential equations of first order which act as a tool to learn the higher version in different parameters.
2. To impart knowledge on the method of solving ordinary differential equations of first order.
3. To understand the different methods to solve the simultaneous differential equations.
4. To learn the application of Laplace Transforms.
5. To solve the first and second Order Differential Equations with constant coefficients by using inverse Laplace transform.

Unit	Course Contents	Hours	K Level
I	<p>Linear equations with constant coefficients: Definitions – The Operator D – Complementary function of a linear Equation with constant coefficients – Particular integral of $f(x) = e^{mx}, \sin mx, \cos mx, x^m, xe^{mx}$ – Linear Equations with variable Coefficients – Special method of evaluating the P.I – Equations reducible to Linear Equations. Applications: Solution of linear ODE with constant coefficients-Transforms.</p>	10	Up to K4
II	<p>Ordinary Differential Equations: Equations of the first order but of higher degree: Equations solvable for 'p' – Equations solvable for 'x' – Equations solvable for 'y' – Clairaut's form – Simultaneous differential equations – Methods for solving $\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{r}$ conditions of integrality – Simultaneous linear differential equations of the form $f_1(D)x + \phi_1(D)y = T_1$ and $f_2(D)x + \phi_2(D)y = T_2$ where f_1, f_2, ϕ_1 and ϕ_2 are rational integral functions of $D = \frac{d}{dt}$ with constant coefficients and T_1 and T_2 are explicit functions of 't'. Applications: Clairaut's Equation.</p>	10	Up to K4
III	<p>Partial Differential Equation of the first order: Elementary Arbitrary constants and arbitrary function – Definition of General, Particular and complete solutions – Singular and General solution of first order equations – Derivation of partial differential equations – Lagrange's Method of solving the Linear Partial differential equation $P_p + Q_q = R$ – Special methods in partial differential equations. Applications: Partial Derivatives.</p>	10	Up to K4

IV	Laplace Transforms: Definition-Transforms of first shifting theorem – Laplace transform of periodic functions $e^{at}, \cos at, \sin at, t^n$ where ‘n’ is an integer. First Shifting Theorem – Laplace transforms of $e^{at} \sin bt, e^{at} \cos bt$ and $e^{at} t^n$. Theorems of $L\{f(t)\}, L\{f'(t)\}$ – Laplace transforms of periodic functions. Applications: Laplace Transform First shifting Theorem Problems.	9	Up to K4
V	Inverse Laplace Transformation: Inverse Laplace Transformations - Application of Laplace transform to solution of differential equations with constant coefficients. Applications: Inverse Laplace Transformation.	9	Up to K4
Questions related to Applications have been included in internal only and excluded in semester questions.			

Note: The Questions should be asked in the ratio of 80 % problems and 20 % for theory.

Book for Study

1. T.K.Manickavachagam Pillay, S. Narayanan, **“Differential Equations and its Applications”**. Ananda Book Depot, Reprint 2019.

Unit I : Chapter V: (Sections: 1 to 6)

Unit II : Chapter IV: (Sections: 1 to 3), Chapter VI: (Sections: 1 to 6)

Unit III : Chapter XII: (Sections: 1 to 4 and 5.1 to 5.4)

Unit IV : Chapter IX: (Sections: 1 to 5)

Unit V : Chapter IX: (Sections: 6 to 9)

Books for Reference

1. N.P. Bali, **“Differential Equations”**, Laxmi Publication Ltd, New Delhi, 2015.
2. Dr.M.D.Raisinghania, **“Ordinary and Partial Differential Equations”**, S.Chand & Sons, New Delhi, 2016, 18th Edition.
3. Dr.M.K. Venkataraman, **“Engineering Mathematics”**, The National Publishing Company First Edition 1998.
4. S. Narayanan and T.K. Manickavasagam Pillai, **“Calculus Vol III”**, S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai 1991
5. Dr. J. K. Goyal and K.P. Gupta, **“Laplace and Fourier Transforms”**, Pragati Prakashan Publishers, Meerut, 2000.

Web Resources

1. <https://nptel.ac.in/courses/111105035/>
2. <http://www.nptelvideos.in/2012/11/mathematics-iii.html>
<https://www.digimat.in/nptel/courses/video/111108081/L02.html>
3. https://www.math.ust.hk/~machas/differential_equations.pdf
4. <https://www.ijsr.net/archive/v2i1/ijsrn2013331.pdf>

Applications Link:

Unit 1: <https://youtu.be/s9NqCDIZz9M>

Unit 2: <https://youtu.be/Rm5vmtxm94s>

Unit 3: <https://youtu.be/P43qNhCj1Gg>

Unit 4: <https://youtu.be/A0EXb6aMJ7I>

Unit 5: <https://youtu.be/Y8GXpS31CGI>

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course : Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

1. Prepare comprehensive advanced problems on Analytic functions.
2. Assignment on application of analytic function in 2D and 3D.
3. Preparing the students to do the project by applying analytic function in surface comparison in technical fields.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Solve and analyze the second order linear differential equations.	Up to K4
CLO 2	Interpret the methods to solve Ordinary Differential Equations and examine the solution.	Up to K4
CLO 3	Demonstrate the competency to solve linear PDE by Lagrange's method and examine the solution.	Up to K4
CLO 4	Acquire the concept of ODE & Analyze the concepts of Laplace transforms.	Up to K4
CLO 5	Analyze & Apply the concept of inverse Laplace transforms to solve ODE with constant coefficients.	Up to K4

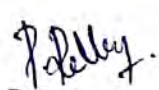
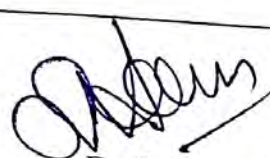
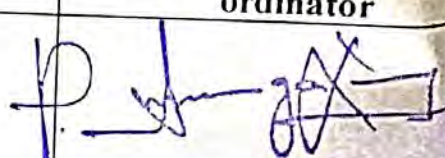
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	3	2	3	3
CLO 2	3	3	2	3	2	3	3
CLO 3	3	3	3	3	2	3	2
CLO 4	3	3	2	3	2	3	3
CLO 5	3	3	2	3	2	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 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 Mathem-
 Hindusthan College of Arts & Sc.
 Coimbatore - 641 028

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

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MAU06	PRACTICAL-I GEOGEBRA, SCILAB,LIBRE OFFICE	2	4	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

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 Contents	Hours	K Level
<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. 	48	Up to K4

<p>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.</p> <p>12. Create mailing labels for employee database by LIBREOFFICE.</p>		
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Pedagogy : PowerPoint Projection through LCD, Discussion and Activity.

Rationale for Nature of the Course: Can be professionals in solving advanced problems using softwares.

Activities to be given

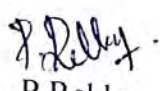
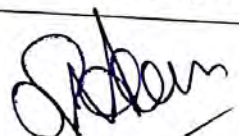
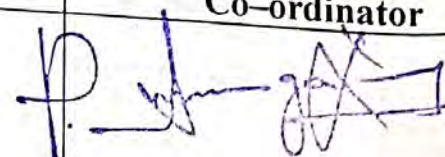
1. Prepare comprehensive advanced problems on GEOGEBRA, SCILAB and LIBREOFFICE.
2. Assignment on functions in GEOGEBRA, SCILAB and LIBREOFFICE.
3. Preparing the students to do the project by applying GEOGEBRA, SCILAB and LIBREOFFICE Softwares.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Apply the concepts of algebra and calculus.	Up to K4
CLO 2	Applying and analyze the math tools for graphing, geometry, 3D by GEOGEBRA.	Up to K4
CLO 3	Understanding and Relate Linear algebra and Trigonometry concepts by Mathematical Software.	Up to K4
CLO 4	Construct programs in SCILAB and analyze plot results.	Up to K4
CLO 5	Utilizing and point out computational tools of LIBRE OFFICE.	Up to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	3	3	3	3
CLO 2	3	3	2	3	3	3	3
CLO 3	3	3	3	3	2	3	3
CLO 4	3	3	3	3	3	3	2
CLO 5	3	3	3	2	3	2	2
	3 – Advance Application		2 – Intermediate Level		1 – Basic Level		

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 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
 Hindusthan College of Arts & Science,
 Coimbatore-641 028

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MAU07	MATHEMATICAL STATISTICS–II WITH LIBRE OFFICE	4	5	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

1. To acquire the concept of chi–square distribution.
2. To study about the relationship between t, F and χ^2 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.

Unit	Course Contents	Hours	K Level
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	Up to K4
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. Applications: t and F distributions.	12	Up to K4
III	THEORY OF ESTIMATION: Introduction – Characteristics of Estimators – Cramer – Rao Inequality – MVU and Blackwellisation theorem. Applications: Characteristics of Estimators.	12	Up to K4
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. Applications: Hypothesis Testing with practical examples.	12	Up to K4
V	Analysis of variance : Analysis of variance – one way classification – ANOVA table – Two way classification. Applications: ANOVA and its applications.	12	Up to K4

LIBRE OFFICE Problems related to MATHEMATICAL STATISTICS – II have been included in Practical – I (22MAU06) and questions related to LIBRE OFFICE excluded in MATHEMATICAL STATISTICS – II (22MAU07) in the questions.

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

Note: The Questions should be asked in the ratio of 70 % problems and 30 % for theory.

Book for Study

1. S.C.Gupta and V.K.Kapoor, "**Fundamentals of Mathematical statistics**", sultan chand 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

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

Unit V : Chapter 5

Books for Reference

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

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

3. Vittal P R, **Mathematical Statistics**,2004-Maragatham Publishers.

4. Hoel.P.G (1971): **Introduction to Mathematical Statistics**, Wiley.

5. Wilks . S. S.**Elementary Statistical Analysis**, Oxford and IBH.

Web Resources

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

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>

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course : Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

1. Prepare comprehensive advanced problems on statistics for various fields.
2. Assignment on distribution and analysis of variance.
3. Preparing the students to appear professional courses in statistics.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Understanding and applying the concepts of chi-square distributions. Compare the distributions.	Up to K4
CLO 2	Finding and Relating the applications of χ^2 , t, F distributions.	Up to K4
CLO 3	Examining the theory of estimations.	Up to K4
CLO 4	Applying and Analyzing the aspects of parametric testing techniques including single and multi- sample tests for mean and proportion.	Up to K4
CLO 5	Analyzing the concept of analysis of variance.	Up to K4

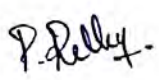
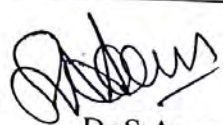
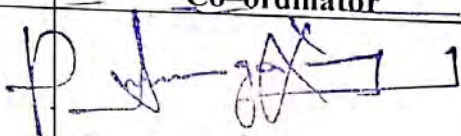
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	3	2	3	3
CLO 2	3	3	2	3	2	3	3
CLO 3	3	2	2	3	2	3	2
CLO 4	3	3	3	3	2	2	3
CLO 5	3	3	2	3	2	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 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,
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Co-ordinator
 Curriculum Development Cell
 Hindusthan College of Arts & Science,
 Coimbatore-641 028.

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSE	22MAU08A	ELECTIVE – I : A) NUMERICAL METHODS	3	3	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

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. To explain about finite differences and its applications.
4. To 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.

Unit	Course Contents	Hours	K Level
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 – Applications: Study of application of Newton Raphson Method.	7	Up to K4
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. Applications: Gauss Jordan Elimination with Traffic Flow.	7	Up to K4
III	Finite Differences: Differences – Operators – Forward and Backward difference tables – Differences of a polynomial – Factorial polynomial. Applications: Finite difference method (FDM) of discretization.	7	Up to K4
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. Applications: Application of interpolation.	8	Up to K4
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. Applications: Lagrange Interpolation and Its Applications.	7	Up to K4

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

Note: The Questions should be asked in the ratio of 80 % problems and 20 % for theory.

Book for Study

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– 5.4

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

Books for Reference

1. M.K.Venkataraman, “*Numerical Methods in Science and Engineering*”, National Publishing company, 5th Edition, 1999.

2. S.S. Sastry, *Introductory Methods of Numerical Analysis-*, Prentice Hall of India Pvt. Ltd. New Delhi-110001, Fourth Edition, 2006.

3. H.C. Saxena, “*Finite differences and Numerical analysis*”, S.Chand & Co., 16, Delhi, (1991)

4. A.Singaravelu, *Numerical Methods*, Meenakshi Agency, Chennai, (2004).

5. K.SankaraRao, “*Numerical Methods for Scientists and Engineers*”, 2nd Edition, 2004.

Web Resources

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/FpdVP8GAXsl>

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>

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course : Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

1. Prepare comprehensive advanced problems on numerical methods
2. Assignment on simultaneous linear equations, finite differences and interpolation problems.
3. Preparing the students to do the project by application of numerical methods.


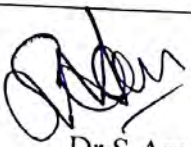
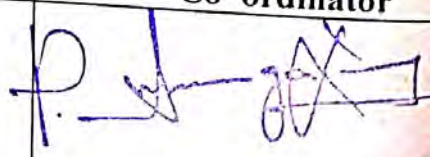
Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Examine the numerical solutions of algebraic and transcendental equations.	Up to K4
CLO 2	Analyzing the solution of simultaneous linear equations.	Up to K4
CLO 3	Applying the finite difference concepts and Calculate the problems in finite difference.	Up to K4
CLO 4	Applying the skills in finding interpolation of equal intervals and Illustrate the problems in it.	Up to K4
CLO 5	Analyzing the concepts of unequal intervals in interpolation.	Up to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	3	2	3	3
CLO 2	3	2	3	3	2	3	3
CLO 3	3	3	2	3	2	2	2
CLO 4	3	3	2	2	3	3	3
CLO 5	3	3	3	3	3	3	2

3 – Advance Application 2 – Intermediate Level 1 – Basic Level

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

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

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

DEPARTMENT OF MATHEMATICS				CLASS: I B.Sc Mathematics				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSE	22MAU08B	ELECTIVE– I : B) ASTRONOMY	3	3	50	50	100

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

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. To explain about Kepler's Three Laws of Planetary Motion.
5. To explain about how the phase of the Moon is controlled by the relative positions of the Sun and Moon in the sky.

Unit	Course Contents	Hours	K Level
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. Applications: Earth and Celestial Sphere.	8	Up to K4
II	Celestial sphere (Contd) : Morning and Evening Stars – Circumpolar Stars – Diagram of the celestial sphere – Zones of earth – Perpetual day – Dip of horizon – Twilight. Applications: The beauty of the geocentric model.	7	Up to K4
III	Refraction : Refraction – Laws of refraction – Tangent formula – Cassini’s formula – Horizontal refraction – Geocentric parallax – Horizontal parallax. Applications: Reflection, refraction and dispersion examples in daily life.	7	Up to K4
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. Applications: Kepler's Laws and How Newton Got Cool.	7	Up to K4
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. Applications: Saros.7 Modern Ways to use Solar Panels in everyday life.	7	Up to K4

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

Note: The Questions should be asked in the ratio of 20 % problems and 80 % for theory.

Book for Study

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

Books for Reference

1. John Duncan, “*Astronomy*”, Paragon Publishers.
2. Andrew Fraknoi, David Morrison, Sidney C. Wolff, “*Astronomy*”, Samurai Media limited.
3. Michael.A. Seeds and Dana . E.Backman, “*Astronomy: The Solar System and Beyond*”, 2010 Edition.
4. Dorling Kindersley, “*The Astronomy Book*”, 2017 edition.
5. Smithsonian, “*The Planets*”, DK Publishing, 2014 Edition.

Web Resources

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/zlhUuph1UoI
Unit –III	: 1. https://youtu.be/tGHYVZjHCis
Unit –IV	: 1. https://youtu.be/zNeFI_JCXIY
Unit –V	: 1. https://youtu.be/PpuIC4F4hQw

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course : Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

1. Prepare comprehensive advanced problems on Celestial sphere.
2. Assignment on Celestial sphere and Kepler’s law.
3. Preparing the students to do the project by solving astronomy problems.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO 1	Defining Celestial sphere and Analyze about celestial objects and its properties.	Up to K4
CLO 2	Understanding the Celestial sphere, Dip – Twilight and compare morning and evening stars.	Up to K4
CLO 3	Classifying and Comparing the refraction phenomena for the celestial objects.	Up to K4
CLO 4	Defining and Analyzing Kepler's Three Laws in the areas of planetary science.	Up to K4
CLO 5	Applying the Techniques to explore the solar surface temperature and Analyze about the solar system.	Up to K4

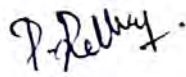
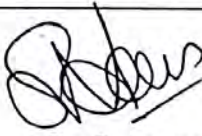
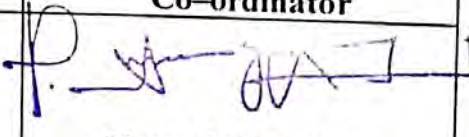
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CLO 4	3	3	2	2	2	3	2
CLO 5	2	3	2	3	3	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 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.,
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