



# PSGR KRISHNAMMAL COLLEGE FOR WOMEN

## College of Excellence

(An Autonomous Institution, Affiliated to Bharathiar University)  
(Reaccredited with 'A' Grade by NAAC, An ISO 9001:2008 Certified  
Institution)  
Peelamedu, Coimbatore-641004



## DEPARTMENT OF MATHEMATICS

### CHOICE BASED CREDIT SYSTEM & OUTCOME BASED EDUCATION SYLLABUS

### B.Sc. MATHEMATICS

2017 - 2020



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### PROGRAMME OUTCOMES

**PO1** : Students will acquire critical thinking skills to solve problems that can be modelled mathematically

**PO2** : Students will be able to read and construct mathematical arguments and proofs

**PO3** : Gain proficiency in using computer technology appropriately to solve problems and to promote understanding

**PO4** : Will be able to apply mathematical knowledge to a career related to mathematical sciences in post graduate cum research studies

**PO5** : Students should see a number of contrasting but complementary points of view in the topics (continuous and discrete), techniques (algebraic and geometric), and approaches (theoretical and applied) to mathematics

**PO6** : Communicate mathematics to others in both oral and written form with precision, clarity and organization

**PO7** : Study at least one area of mathematics in depth, drawing on ideas and tools from previous coursework to extend their understanding e.g. real analysis and complex analysis, number theory and abstract algebra, statics and dynamics, statistics and applied statistics or calculus and differential equations and advanced modelling

## **PROGRAMME SPECIFIC OBJECTIVES**

**PSO1 :** Graduates will develop necessary computer skills and knowledge to enhance their employability

**PSO2 :** Graduated will became good team players and team leaders.

**PSO1 :** Graduated will acquire adequate mathematical and statistical skills which will enable them to have successful careers

**PSO3 :** Graduates will apply their knowledge in modern industry, teaching, and research.

**PSO4 :** Graduates will become effective collaborators and innovators, leading or participating in ventures that address social, technical and business challenges.

**PSO5 :** Graduates will promote the culture of interdisciplinary research among all disciplines and applied mathematics

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## DEPARTMENT OF MATHEMATICS

### CHOICE BASED CREDIT SYSTEM & OUTCOME BASED EDUCATION SYLLABUS & SCHEME OF EXAMINATION

2017 - 2020

Semester	Part	Subject Code	Title of the Paper	Instruction hours per week	Contact Hours	Tutorial Hours	Duration of Examination (in hours)	Examination Marks			Credits
								CA	ESE	TOTAL	
I	I	TAM1701/ HIN1701/ FRE1701	Language Paper I	6	86	4	3	40	60	100	3
	II	ENG1701/ ENG17F1	English Paper I Functional English Paper I	6	86	4	3	40	60	100	3
	III	TH17C01	Classical Algebra with GeoGebra	5	71	4	3	40	60	100	4
		TH17C02	Calculus and SciLab	5	71	4	3	40	60	100	4
		TH17A01/ HI17A01/ ES17A01/ ES17A02/ ENG17A01	Allied – Mathematical Statistics I/ Principles of Modern Govt/ Indian Economic Development / International Marketing/	6	86	4	3	40	60	100	5

			English through Classics								
	IV	NME16B1/ NME16A1/	Basic Tamil/ Advanced Tamil /	2	28/ 26	2/2	3	50/ 50	50/5 0	100/1 00	2
II	I	TAM1702/ HIN1702/ FRE1702	Language Paper II	6	86	4	3	40	60	100	3
	II	ENG1702/ ENG17F2	English Paper II Functional English Paper II	6	86	4	3	40	60	100	3
	III	TH17C03	Differential Equations, Laplace Transforms and SciLab	5	71	4	3	40	60	100	4
		TH17C04	Analytical Geometry with Geogebra	5	71	4	3	40	60	100	4
		TH17A05/ ES17A03/ ES17A04/ ES17A05/ HI17A03/ ENG17A01	Allied - Mathematical Statistics II / Economic Analysis / Econometrics/ Monetary Economics / Indian Constitution/ English for secretarial practice	6	86	4	3	40	60	100	5
	IV	REG16EE	Effective English Communication	2						100	2
		NME17B2/ NME17A2	Basic Tamil/ Advanced Tamil	2	28/ 26	2/4	3	25	100	100	2
		**	Open Course(Online Courses)	-	-	-	-	-	-	-	-
	VI	NM12GAW	General Awareness	Self stud y			--	10 0	--	100	--
III	I	TAM1603/ HIN1603/ FRE1603	Language Paper III	6	86	4	3	40	60	100	3
	II	ENG1603/ ENG16F3	Language through Literature level III/ Language through Literature Functional Level III	5	71	4	3	40	60	100	3
	III	TH16C05	Integral Transforms with SCI lab	3	41	4	3	40	60	100	4
		TH16C06	Statics with GNU - FISICAL lab	4	56	4	3	40	60	100	5
		PS16A03/ PLO16A01 /AS16A01	Allied -Physics / Botany / Zoology / Paper I	4	56	4	3	40	60	75	4
		PS16AP1/ PL16AP1/ AS16AP1	Allied Physics Botany / Zoology / Practicals	3	45	--	--	--	--	--	--
III		SB17MA0 1	SBS - Fundamentals of Data Science & R Programming	2	28	1	2	--	--	--	-
		SB17MAP 1	"R" programming practical	1	15	-	-	-	-	-	-

		NM14VHR	Value Education and Human Rights	2	26	4	2	--	--	100	2
			Job Oriented Course	--			3	--	--	Grade	--
IV	I	TAM1604/ HIN1604/ FRE1604	Language Paper IV	5	71	4	3	40	60	100	3
	II	ENG1604/ ENG16F4	Language through Literature level IV/ Language through Literature Functional Level IV	6	86	4	3	40	60	100	3
	III	TH16C07	Trigonometry, Vector Calculus , Tensors and Maple applications	3	41	4	3	40	60	100	4
		TH16C08	Dynamics with GNU – FISICAL lab	4	56	4	3	40	60	100	5
		PS16A04/ PL16A02/ AS16A02	Allied –Physics / Botany / Zoology / Paper II	4	56	4	3	40	60	75	4
		PS16AP1/ PL16AP1/ AS16AP1	Allied Physics/Botany/Zoology Practicals	3	45		3	10	40	50	2
IV		SB17MA01	SBS - Fundamentals of Data Science & R Programming “R” programming practical	1	14	1	2	25	75	100	4
		SB17MAP1		2	30	--	2	40	60	100	2
IV	I	TAM1604/ HIN1604/ FRE1604	Language Paper IV	5	71	4	3	40	60	100	3
	II	ENG1604/ ENG16F4	Language through Literature level IV/ Language through Literature Functional Level IV	6	86	4	3	40	60	100	3
	III	TH16C07	Trigonometry, Vector Calculus , Tensors and Maple applications	3	41	4	3	40	60	100	4
		TH16C08	Dynamics with GNU – FISICAL lab	4	56	4	3	40	60	100	5
		PS16A04/ PL16A02/ AS16A02	Allied –Physics / Botany / Zoology / Paper II	4	56	4	3	40	60	75	4
		PS16AP1/ PL16AP1/ AS16AP1	Allied Physics/ Botany/ Zoology Practicals	3	45		3	10	40	50	2
IV		SB17MA01	SBS - Fundamentals of Data Science & R Programming “R” programming practical	1	14	1	2	25	75	100	4
		SB17MAP		2	30	--	2	40	60	100	2

		1									
			NSS/NCC/YRC/ECO watch club / YiNET/ Rotract/ Sports & Games	--			--	--	--	100	1
	IV		Internship			Two weeks	100	2			
	IV	NM12EVS	Environmental Studies	2	26	4	2	--	--	100	2
IV			Community Oriented Service	-	-	-	-	-	-	-	Grade
V	III	TH16C09	Real Analysis with Tableau	7	101	4	3	40	60	100	5
		TH16C10	Abstract Algebra with Maple	7	101	4	3	40	60	100	5
		TH16E01/ TH16E02	Elective I- Number Theory and Numerical Methods with C/ Graph Theory with open Modelica	7	101	4	3	40	60	100	4
		TH16PROJ	Group Project	4	60			20 Vi va	80 Disse rtatio n	100	5
		SB16MA02	SBS – Data Visualization and Tableau	2	29	1	--	--	--	--	
		SB16MAP2	SBS –Practical II	1	15						
		NM16IS1/ NM16IS2	Information Security Level I / Level II	2	26	4	3	40	60	100	-
		TH16AC1	Advanced learners' course – Astronomy I	--			3	25	75	100*	5*
		TH16AC2	Fuzzy Mathematics I	--			3	25	75	100*	5*
		TH16AC3	Topics in Fluid Dynamics I	--			3	25	75	100*	5*
		TH16CE	Comprehensive Examination			Online Examination				Grade	--
			Supportive Course			--	--	--	--	--	Sub miss ion

											of Certi ficate
VI	III	TH16C11	Complex Analysis with Tableau	6	86	4	3	40	60	100	5
		TH16C12	Linear Algebra with Maple	6	86	4	3	40	60	100	5
		TH16C13	Operations Research with Tora	7	101	4	3	40	60	100	5
			Library	1			--	--	--	--	--
		TH16E03/ TH16E04	Elective II – Mathematical Modelling with open Modelica /Discrete Mathematics	7	101	4	3	40	60	100	5
		TH16AC4	Advanced learners’ course – Astronomy II	--			3	25	75	100*	5*
		TH16AC5	Fuzzy Mathematics II	--			3	25	75	100*	5*
		TH16AC6	Topics in Fluid Dynamics II	--			3	25	75	100*	5*
		SB16MA02 SB16MAP2	SBS – Data Visualization and Tableau	1	14	1	2	25	75	100	4
			Practical II	2	28	2	2	40	60	100	2
								Total	3800	140	

**\*\* Outside Class Hours**

### QUESTION PAPER PATTERN

#### CORE & ALLIED PAPERS

**Continuous Internal Assessment : 50 Marks**

SECTION	MARKS	TOTAL
A – 5 X 2 Marks	10	50
B – 4 X 5 Marks	20	
C - 2/3 X 10 Marks	20	

**End Semester Examination : 100 Marks**

SECTION	WORD LIMIT	MARKS	TOTAL
A-12/15 X 2 Marks	One or two sentences	24	100
B - 6/8 X 6 Marks	250	36	
C - 4/6 X 10 Marks	500	40	



## **SKILL BASED SUBJECT**

### **Continuous Internal Assessment : 25 Marks**

SECTION	MARKS	TOTAL
A – 4 / 6 X 4 Marks	16	25
B – 1 / 2 X 9 Marks	9	

### **End Semester Examination : 50 Marks**

SECTION	MARKS	TOTAL
A- 4 / 6 X 5 Marks	20	50
B – 2 / 3 X 15 Marks	30	

## **ADVANCED LEARNERS COURSE (ALC)**

### **Continuous Internal Assessment : 25 Marks**

SECTION	MARKS	TOTAL
A – 4 / 6 X 4 Marks	16	25
B – 1 / 2 X 9 Marks	9	

### **End Semester Examination : 75 Marks**

SECTION	MARKS	TOTAL
A-5/8X5=25 Marks	25	75
B – 5/8X10=50 Marks	50	

## **VALUE EDUCATION AND HUMAN RIGHTS / WOMEN STUDIES / AMBEDKAR STUDIES / GANDHIAN STUDIES / ENTREPRENEURSHIP / ENVIRONMENTAL STUDIES**

### **Continuous Internal Assessment : 50 Marks**

SECTION	MARKS	TOTAL
A – 4 / 6 X 5 Marks	20	50
B – 2 / 3 X 15 Marks	30	

Value Education and Human Rights & Environmental Studies two internal tests will be conducted for 50 marks each and the total marks secured will be equated to a maximum of 75 marks and 25 marks is allotted for project / group discussion / presentation of a report.

## **INFORMATION SECURITY**

### **Continuous Internal Assessment : 40 Marks**

SECTION	MARKS	TOTAL
A – 5 / 8 X 2 Marks	10	40
B – 6 / 8 X 5 Marks	30	

## **FIELD TRAINING**

The students have the option to select any organization – Government / private like industry, R & D organizations, scientific companies, etc., in consultation with the staff co-ordinator & HoD. The students are to undergo training for a period of two weeks at the end of semester IV during vacation. The students must maintain a work diary and prepare report of the training undergone and submit the same to the HoD. On a stipulated date, there will be a viva-voce with internal examiners at the beginning of the semester V

MODE OF EVALUATION	MARKS	TOTAL
Attendance	10	100
Work Diary	15	
Report	50	
Viva-voce	25	

## PROJECT

### Group Project and Viva Voce

Each faculty will be allotted 5 students. A specific problem will be assigned to the students. The topic/area of work will be finalized at the end of IV semester, allowing scope for the students to gather relevant literature during the vacation. The research work will be carried out in the chemistry laboratory. Viva Voce/presentation will be conducted by a panel comprising of HOD, internal examiners. A power point presentation by the student group will be evaluated on the basis of students' response to the questions.

### Area of Work

Synthetic Organic Chemistry, Coordination Chemistry, Corrosion Studies, Environmental Chemistry, Polymer Chemistry, Phytochemistry, Nanochemistry, Physical Chemistry.

### Methodology

Each project should contain the following details:

Brief introduction on the topic

Review of Literature

Materials and Methods

Results and Discussions – evidences in the form of figures, tables and photographs

Conclusion / Summary

Bibliography

The above contents should not exceed 50 pages

### Internal Assessment : 20 Marks

Review	Mode of Evaluation	Marks	Total
I	Selection of the field of study, Topic & Literature Collection	5	20
II	Research Design and Data Collection	10	
III	Analysis & Conclusion, Preparation of rough draft	5	

### External Assessment : 80 Marks

Mode of Evaluation	Marks	Total
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<b>Project Report</b>		
Relevance of the topic to academic / society	10	20
Objectives	10	
Experimental Design	20	
Expression of Results and Discussion	20	
<b>Viva Voce</b>		
Presentation	10	20
Discussion	10	

**WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF  
CONTINUOUS INTERNAL ASSESSMENT**

**Theory**

	CI A I	CI A II	Mode l Exam	Assignmen t/ Class Notes	Semin ar	Qui z	Class Participati on	Librar y Usage	Attendan ce	Max. Mark s
Core / Allied	5	5	6	4	5	4	5	3	3	40
SBS	5	5	15	-	-	-	-	-	-	25
ALC		10	15	-	-	-	-	-	-	25
Informati on Security	40	40		10		10				100

**Practical**

	Model Exam	Lab Performance	Regularity in Record Submission	Attendance	Maximum Marks
Core / Allied / SBS	12	20	5	3	40

**RUBRICS**

**Assignment/ Seminar**

**Maximum - 20 Marks (converted to 4 marks)**

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
<b>Focus Purpose</b>	Clear	Shows awareness	Shows little awareness	No awareness
<b>Main idea</b>	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
<b>Organisation: Overall</b>	Well planned	Good over all organization	There is a sense of organization	No sense of organization
<b>Content</b>	Exceptionally well presented	Well presented	Content is sound	Not good
<b>Style: Details and Examples</b>	Large amounts of specific examples and detailed	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

	description			
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### CLASS PARTICIPATION

**Maximum - 20 Marks (converted to 5 marks)**

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark	Points scored
<b>Level of Engagement in Class</b>	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class	Student contributes to class and asks questions occasionally	Student rarely contributes to class by offering ideas and asking no questions	Student never contributes to class by offering ideas	
<b>Listening Skills</b>	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.	
<b>Behavior</b>	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class	
<b>Preparation</b>	Student is almost always prepared for class with required class	Student is usually prepared for class with required class	Student is occasionally prepared for class with required class materials	Student is rarely prepared for class with required class	Student is almost never prepared for class.	

	materials	materials		materials		
					<b>Total</b>	

**MAPPING OF POs WITH COs**

COURSE	PROGRAMME OUTCOMES						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
<b>COURSE - TH17C01</b>							
<b>CLASSICAL ALGEBRA WITH GEOGEBRA</b>							
CO1	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S
CO3	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	M	S	S	S	S	S
CO6	S	S	S	S	S	S	S
<b>COURSE - TH17C02</b>							
<b>CALCULUS AND SCILAB</b>							
CO1	S	M	S	S	S	S	S
CO2	S	M	S	S	S	S	S
CO3	S	M	S	S	S	S	S
CO4	S	M	S	S	S	S	S
CO5	S	M	S	S	S	S	S
<b>COURSE - TH17A01</b>							
<b>MATHEMATICAL STATISTICS – I (Probability, descriptive statistics and distributions)</b>							
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S
<b>COURSE - TH17C03</b>							
<b>DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS AND SCILAB</b>							
CO1.	S	L	M	S	S	S	S
CO2.	S	L	M	S	S	S	S
CO3.	S	L	L	S	S	S	S
CO4.	S	M	L	S	S	S	S
CO5.	S	S	L	S	S	S	S
CO6.	S	S	S	S	S	S	S
CO7.	S	S	S	S	S	S	S
<b>COURSE - TH17C04</b>							
<b>ANALYTICAL GEOMETRY WITH GEOGEBRA</b>							

CO1.	S	M	S	S	S	S	S
CO2.	S	M	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S
<b>COURSE - TH17A05 MATHEMATICAL STATISTICS – II (SAMPLING AND EXPERIMENTAL DESIGNS)</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
<b>COURSE - TH16C05 INTEGRAL TRANSFORMS WITH SCILAB</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
<b>COURSE - TH16C06 STATICS WITH GNU-FISICA LAB</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
<b>COURSE - TH16C07 TRIGONOMETRY, VECTOR CALCULUS, TENSORS AND MAPLE APPLICATIONS</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S
<b>COURSE - TH16C08 DYNAMICS WITH GNU - FISICA LAB</b>							
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S
<b>COURSE - TH16C09 REAL ANALYSIS WITH TABLEAU</b>							

CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S
<b>COURSE - TH16C10</b>							
<b>ABSTRACT ALGEBRA WITH MAPLE</b>							
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S
<b>COURSE: TH16E01</b>							
<b>NUMBER THEORY AND NUMERICAL METHODS WITH C</b>							
CO1.	S	M	S	S	S	S	S
CO2.	S	S	S	M	S	S	S
CO3.	S	S	M	S	S	S	M
CO4.	S	S	S	M	S	S	S
<b>COURSE: TH16E02</b>							
<b>ELECTIVE- GRAPH THEORY with OPEN MODELICA</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S
<b>COURSE: TH16C11</b>							
<b>COMPLEX ANALYSIS WITH TABLEAU</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	M	S	S	S	S	S
CO3.	S	S	M	S	S	S	S
CO4.	M	S	S	M	S	S	S
CO5.	S	S	S	M	S	S	S
<b>COURSE: TH16C12</b>							
<b>LINEAR ALGEBRA WITH MAPLE APPLICATIONS</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
<b>COURSE: TH16C13</b>							
<b>OPERATIONS RESEARCH WITH TORA</b>							
CO1.	S	S	S	S	S	S	S

CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
<b>COURSE: TH16E03 MATHEMATICAL MODELLING WITH OPEN MODELICA</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
<b>COURSE: TH16E04 DISCRETE MATHEMATICS</b>							
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH17C01	CLASSICAL ALGEBRA WITH GEOGEBRA	Core	71	4	-	4

#### Preamble

- To orient the students to solve the equations using algebraic operations and develop problem solving skills.
- To enable the students to learn about the convergence and divergence of the series.

#### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Learn about sequences and series, in particular Binomial, Exponential and Logarithmic	K1
CO2.	Determine the convergence or divergence of sequences and series	K1
CO3.	Find the roots of higher degree algebraic and transcendental equations	K2
CO4.	Apply convergence tests to infinite series	K2
CO5.	Solve the problems related to convergence / divergence of Binomial, Exponential, Logarithmic Series	K3
CO6.	To sum power series	K3

#### Mapping with Programme Outcomes



COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S
CO3	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	M	S	S	S	S	S
CO6	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER I - CORE PAPER I CLASSICAL ALGEBRA WITH GEOGEBRA

**Credits : 4**

**Hours: 71**

#### UNIT I

**14 hrs**

Binomial theorem – Positive integral index – The greatest term in the expansion of  $(1+x)^n$  - Summation of various series involving binomial coefficients - Vandermonde's theorem – Binomial theorem for a rational index – Some important particular cases of Binomial expansion – The method of splitting functions into partial fractions -Application of the binomial theorem to the summation of series - Introduction to FOSS – GEOGEBRA.

#### UNIT II

**14 hrs**

Exponential limit (statement only) - Exponential theorem – Summation- Logarithmic series theorem – Modification of Logarithmic series – Immediate application to summation only –Summation of series –General term of the form  $u_n = v_n - v_{n-1}$ - Application of partial fractions– Their immediate application to summation only, General term is the product of r successive terms of an A.P. and polynomial - Evaluation of simple algebraic problems using GEOGEBRA.

#### UNIT III

**14 hrs**

Convergency and divergency of series: Definitions – Elementary results – Comparison tests - Series of positive terms – Cauchy's condensation test – De Alembert's ratio test -Cauchy's root test - Raabe's test - Absolute convergence - Evaluation of simple algebraic problems using GEOGEBRA.

#### UNIT IV

**14 hrs**

Theory of Equations: Remainder Theorem - Roots of an Equation - Relations connecting the Roots and Coefficients - Symmetric function of roots - Transformations of equations – Reciprocal equations – Removal of terms – Transformations in General - Descarte's rule of signs - Evaluation of simple algebraic problems using GEOGEBRA.

#### UNIT V

**15 hrs**

Rolle's Theorem - Multiple roots – Strum's theorem (statement only) –Strum's functions -Horner's method - Evaluation of simple algebraic problems using GEOGEBRA

#### Text Books

1	T.K.Manicavachagom Pillai, T. Natarajan and K.S.Ganapathy	<i>Algebra Vol I</i>	S.Viswanathan(Printers&Publishers), PVT., LTD, 2011
2	Geogebra Manual – The Official Manual of Geogebra Research.shu.ac.uk/geogebra/GIF – Guides/official Geogebra manual.pdf(2011)		

#### Reference Books

1	P.N. Chatterjee	Algebra	Rajhans Agencies, Meerut, 2010
2	S.Barnard & J.M.Child	Higher Algebra	Enlarged Edition, A.I.T.B.S Publishers & Distributors, 2004
3	Hall & Knight,S R Knight	Higher Algebra	Arihant Prakashan, Meerut, 2008
4	Judith MarkovHohenwarter	Introduction to Geogebra Version 4.4	<a href="http://state.geogebra.org/book/intro.en.pdf">http://state geogebra.org/book/intro.en.pdf</a> (2013)

### Pedagogy

Chalk and Talk, Seminar, Group Discussion and Numerical Exercises.

### Course Designers:

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics
2. Dr. D. Sasikala, Assistant Professor , Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH17C02	CALCULUS AND SCILAB	Core	71	4	-	4

### Preamble

- To provide fundamentals of differentiation and integration and show their significant role in physical, economical and industrial world

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Define, graph, compute limits of, differentiate, and integrate transcendental functions	K1
CO2.	Examine various techniques of integration and apply them to definite and improper integrals	K1
CO3.	Apply derivative concepts to find tangent lines to level curves and to solve optimization problems	K2
CO4.	Apply special functions like Beta and Gamma to evaluate multiple integrals	K2
CO5.	Use computational tools like SciLab	K3

### Mapping with Programme Outcomes

COS/POS	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	M	S	S	S	S	S
CO4.	S	M	S	S	S	S	S
CO5.	S	M	S	S	S	S	S

S- Strong; M-Medium; L-Low

**Syllabus****SEMESTER I CORE PAPER II  
CALCULUS AND SCILAB****Credits: 4****Hours: 71****UNIT I****14 hrs**

Total differentiation – Euler’s theorem on homogeneous functions - Curvature – Radius of curvature in Cartesian and polar forms – Evolutes and envelopes – Pedal equations- linear asymptotes. - Introduction to Sci Lab and Evaluation of the formulas using Sci Lab.

**UNIT II****14 hrs**

Integration of  $\frac{f'(x)}{f(x)}$ ,  $\frac{px+q}{\sqrt{ax^2+bx+c}}$ ,  $\frac{1}{\sqrt{\beta-x}}$ ,  $\frac{1}{\sqrt{(x-\alpha)(\beta-x)}}$ ,  $\frac{1}{\sqrt{a \cos x + b \sin x + c}}$ ,  $\frac{1}{\sqrt{a \cos^2 x + b \sin^2 x + c}}$ , Integration by parts- Solving simple problems using

Sci Lab.

**UNIT III****14 hrs**

Reduction formulae – problems – Notion of improper integrals & their convergence- simple tests for convergence - simple problems – Approximate integration- Simpson’s rule- Trapezoidal rule - Solving simple problems using Sci Lab.

**UNIT IV****15 hrs**

Multiple integrals- Definition- Change of order of integration in double integral – change of variables in double & triple integrals - Applications to calculations of areas and volumes – Surface areas – Areas in polar coordinates-Jacobians- Solving simple problems using Sci Lab.

**UNIT V****14 hrs**

Beta and Gamma integrals – their properties & relation between them.-Simple problems – Applications of Gamma functions to multiple integrals - Solving simple problems using Sci Lab.

**Text Books**

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S. Narayanan and T.K. M Pillai	Calculus Volume I	S.Viswanathan(Printers&Publishers), PVT.,LTD	2010
2.	S. Narayanan and T.K. M Pillai	Calculus Volume II	S.Viswanathan(Printers&Publishers), PVT.,LTD	2012
3.	Er.Hema Ramachandran and Achuthsankar S Nair	Scilab( A free Software to Matlab) 1 <sup>st</sup> edition	S.Chand and Company	2015
4.	Lecture notes/Lab manual/Tutorials onSci Lab			

**Reference Books**

1	Hoffmann L.D. Bradley G.L	Calculus for Business, Economics and the social and Life Sciences	McGraw Hill Book company, India Fourth Edition – 1989
2	Shahriar Shahriari	Approximately Calculus	First Indian Edition, American Mathematical Society, 2012
3	Omar Hijab	Introduction to Calculus and Classical Analysis	Second Edition, Springer Private Ltd, 2012

4	Johnny Heikell	Scilab for real Dummies	<a href="http://www.heikell.fi/download/scilab.pdf.pdf">http://www.heikell.fi/download /scilab.pdf.pdf</a>
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### Pedagogy

Chalk and Talk, Seminar, Group Discussion and Numerical Exercises.

### Course Designers:

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics
2. Ms. A. Karpagam, Associate Professor , Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH17A01	MATHEMATICAL STATISTICS – I (Probability, descriptive statistics and distributions)	Allied	86	4	-	5

### Preamble

- To introduce the basic statistical concepts and help the students to know the need for statistics and statistical analysis.
- To describe the types of data and to discuss random variables and their distributions.

### Prerequisite

Knowledge of population, sample, events and outcome.

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Explain and apply basic concepts of probability	K1
CO2.	Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.	K1
CO3.	Critically evaluate the design, including sampling techniques, of a statistical study	K2
CO4.	Effectively use statistical software (e.g. MiniTab, Excel) to perform statistical computations and display numerical and graphical summaries of data sets	K2
CO5.	Compute and interpret the coefficient of correlation and the "line of best fit" for bivariate data	K3
CO6.	Explore relationships between categorical variables using contingency table	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
C01	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S

CO5	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER I - ALLIED MATHEMATICAL STATISTICS – I (PROBABILITY, DESCRIPTIVE STATISTICS AND DISTRIBUTIONS)

**Credits : 5**

**Hours: 86**

#### UNIT I

**17 hrs**

Measures of Central Tendency: Mean, Median, Mode, Geometric Mean & Harmonic Mean - Partition Values – Measures of dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Coefficient of Variation- Co-efficient of Dispersions – Moments- Skewness & Kurtosis – Introduction to Excel and Verification by using Excel/R

#### UNIT II

**17 hrs**

Theory of probability: Theorems on Probability of Events- Boole's inequality- Conditional Probability - Multiplication Theorem of Probability - Independent Events- Pairwise independent events - Baye's theorem - Baye's theorem for future events .

Random variables and Distribution functions: Introduction – Distribution function- Discrete Random Variable- Continuous Random Variable- Two- Dimensional random variable- Stochastic Independence.

#### UNIT III

**17 hrs**

Mathematical Expectations: Mathematical Expectations of random variable- Properties of Expectation- Properties of Variance- Covariance – Cauchy- Schwartz Inequality- Chebychev's Inequality. Correlation: Introduction – Scatter Diagram- Karl Pearson's co-efficient of Correlation- Probable Error of correlation coefficient–Rank Correlation. Regression: Introduction – Linear Regression – Regression Coefficients- Properties- Angle between two lines of regression. Verification by using Excel/R

#### UNIT IV

**17 hrs**

Theoretical distributions: Binomial, Poisson & Normal Distributions - Moments – Recurrence Relation for Moments – Mean Deviation about Mean, Mode, Recurrence relation for probabilities of Binomial distribution, Fitting of curve, Moment Generating Function, Normal distribution as a limiting form of Binomial Distribution , Characteristics of the Normal Curve.

#### UNIT V

**18 hrs**

Testing of Hypothesis: Statistical hypothesis- Null and alternate hypothesis – Critical region- Two types of errors- Level of Significance-Power of a test – Steps in solving Testing of hypothesis problems- Most powerful test- Uniformly Most Powerful Test – Neyman and Pearson Lemma.

### Text Book

1	S.C.Gupta, V.K.Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi-Eleventh thoroughly revised edition (2002), Reprint 2009.
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### Reference Books

1	B.L.Agarwal	Basic Statistics	New Age International Publishers- Revised Fourth Edition - 2006
2	A.K.Goon, M.K.Gupta, Das Gupta	Fundamentals of Statistics Vol – I	Sultan Chand and sons, New Delhi, Eleventh thoroughly revised edition, Reprint 2009.

3	Murray R.Spiegel, Larry J.Stephens	Theory and Problems of Statistics	Third Edition, Tata McGraw Hill Publishing Company Ltd, 2009
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**UNIT I** : Chapter 2 Sections 2.5-2.17(excluding 2.10)

**UNIT II** : Chapter 3 Sections 3.9, 3.9.3, 3.10, 3.11,3.12, 3.13 and 3.15

Chapter 4 Sections 4.2, 4.2.1.

Chapter 5 Sections 5.1, 5.2, 5.3, 5.3.1, 5.3.2 5.4:5.4.1, 5.4.2, 5.4.3, 5.5: 5.5.1 -

5.5.6

**UNIT III:** Chapter 6 Sections 6.1-6.7

Chapter 7 Sections 7.5; 7.5.1

Chapter 10 Sections 10.1-10.4, 10.4.1,10.4.2, 10.6, and 10.7.1- 10.7.4,

Chapter 11 Sections 11.1, 11.2, 11.2.1, 11.2.2, 11.2.3.

**UNIT IV:** Chapter 8 Sections 8.4: 8.4.1-8.4.7, 8.4.12, 8.5: 8.5.1-8.5.5, 8.5.10

Chapter 9 Sections 9.1, 9.2: 9.2.1-9.2.5, 9.2.7.

**UNIT V:** Chapter 18 Sections 18.1, 18.2:18.2.1-18.2.7, 18.3, 18.4: 18.4.1, 18.4.2, 18.5:18.5.1, 18.5.2.

**NOTE:**

Question paper setters to confine to the above text books only.

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises and Demonstration.

**Course Designers:**

1. Dr. K. Sumathi, Associate Professor, Department of Mathematics
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH17C03	DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS AND SCILAB	Core	71	4	-	4

**Preamble**

- To learn the basics of differential equations and various techniques of solving differential equations
- To expose the practical applications of differential equations
- To show that differential equations are powerful tools in solving problems of physical, social and managerial sciences.

**Course Outcomes**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Solve differential equations of first order using graphical, numerical and analytical methods,	K2
CO2.	Solve and apply linear differential equations of second order (and higher)	K2
CO3.	Solve linear differential equations using the Laplace transform technique,	K2
CO4.	Solve partial differential equations using Lagrange's'	K3

	method and Charpit's method	
CO5.	Develop the ability to apply differential equations to significant applied and/or theoretical problems.	K3
CO6.	Demonstrate their understanding of how physical phenomena are modelled by differential equations	K3
CO7.	Use computational tools like SciLab	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	L	M	S	S	S	S
CO2.	S	L	M	S	S	S	S
CO3.	S	L	L	S	S	S	S
CO4.	S	M	L	S	S	S	S
CO5.	S	S	L	S	S	S	S
CO6.	S	S	S	S	S	S	S
CO7.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER II - CORE PAPER III DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS AND SCILAB

**Credits: 5**

**Hours: 71**

#### UNIT I

**14 hrs**

Linear equations with constant coefficients - Linear equations with variable coefficients – Equations reducible to the linear homogeneous equation (reducible to Q form) - Evaluation of the formulas using Sci Lab.

#### UNIT II

**14 hrs**

ODE: First order higher degree equations solvable for x, y, p – Clairaut's form – Simultaneous differential equations (i)  $f_1(D)x + f_2(D)y = F_1(t)$ ,  $g_1(D)x + g_2(D)y = F_2(t)$

$$(ii) \quad \frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$$

Conditions of integrability- Exact differential equations - Solving simple problems using Sci Lab.

#### UNIT III

**14 hrs**

PDE: Formation of equations by elimination of arbitrary constants and arbitrary functions. Definition of general, particular and complete solutions – Singular and general solutions of first order equations in the standard form :  $f(p,q) = 0$  ;  $f(x,p,q)=0$  ;  $f(y,p,q)=0$  ;  $f(z,p,q)=0$  ;  $f(x,p) = f(y,q)$  ;  $z = px + qy + f(p,q)$ - Equations reducible to the standard forms - Solving simple problems using Sci Lab.

#### UNIT IV

**14 hrs**

Lagrange method of solving the linear partial differential equations  $P_p + Q_q = R$  - Simple Problems - Charpit's method. Laplace Transforms: Definitions - Laplace Transforms of  $e^{at}$ ,  $\cos at$ ,  $\sin at$  &  $t^n$  where n is an integer.  $L[f'(t)]$ ,  $L[f''(t)]$ , ...,  $L[f^{(n)}(t)]$ . First shifting theorem - Laplace transforms of  $e^{at}\cos bt$ ,  $e^{at}\sin bt$  and  $e^{at}t^n$ . Some general Theorems - Solving simple problems using Sci Lab.

**UNIT V****15 hrs**

Inverse Laplace Transforms - Solutions of ordinary differential equations of 1<sup>st</sup> order using Laplace transforms- Solutions of 2<sup>nd</sup> order differential equations using Laplace Transforms - Solutions of Differential equations with variable coefficients using Laplace transforms -Solving simple problems using Sci Lab.

**Text Books**

1	S. Narayanan & T.K Manickavachagom Pillai	Calculus Volume III	S. Viswanathan ( Printers and Publishers) Pvt. Ltd.- Revised eighteenth edition, 2010.
2	Er.Hema Ramachandran & Dr.Achuthsankar S.Nair	Scilab ( A free Software to Matlab) 1 <sup>st</sup> edition	S Chand and company 2015
3	Lecture notes/Lab manual/Tutorials on Sci Lab		

**Reference Books**

1	N.M Kapur	A text book of Differential equations	Pitambar Publishing Company Educational Publishers, NewDelhi - 110005, 2008
2	M.D Raisinghania	Advanced differential equations	S.Chand & Co NewDelhi, 2009
3	George F.Simmons & Steven G.Krantz	Differential Equations Theory, Technique and Practice	Tenth reprint 2011, Tata McGraw Hill Education Private Ltd
4	Richard Bronson	Theory and Problems of Differential Equations	Second Edition 2012, Schaum's outline series, McGraw Hill
5	Johnny Heikell	Scilab for real Dummies	<a href="http://www.heikell.fi/downloads/scilab.pdf.pdf">http://www.heikell.fi/downloads/scilab.pdf.pdf</a>

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises

**Course Designers:**

1. Dr. K. Sumathi, Associate Professor, Department of Mathematics
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH17C04	ANALYTICAL GEOMETRY WITH GEOGEBRA	Core	71	4	-	4

**Preamble**

- To provide a comprehensive and clear description of geometrical objects
- To introduce equations for various shapes used in physics and engineering.

**Course Outcomes**

On the successful completion of the course, students will be able to



CO Number	CO Statement	Knowledge Level
CO1.	Identify and classify geometric shapes using correct mathematical language. Draw and label figures based on verbal descriptions	K1
CO2.	Graph lines and interrelate all of the following: slopes, intercepts, tables of values, and equations	K1
CO3.	Apply theorems involving vertical angles, complementary angles, supplementary angles, transversals, internal angle measure in triangles, circles and tangent lines to circles	K2
CO4.	Apply geometric concepts to solve problems	K2
CO5.	Solve geometrical problems using the software GEOGEBRA	K3
CO6.	Transform from polar co-ordinate system to rectangular co-ordinate system and vice versa	K3

### Mapping with Programme Outcomes

COS/POS	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	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER II – CORE PAPER IV ANALYTICAL GEOMETRY WITH GEOGEBRA

**Credits: 4**

**Hours: 71**

#### UNIT I

**14 hrs**

Polar co-ordinates – Polar equation of a conic – Tracing the conic - Directrix – Chord – Tangent – Normal-Asymptotes – Properties of general conic - Executing simple geometrical problems using GEOGEBRA

#### UNIT II

**14 hrs**

Equations of a straight line – Co planarity of two lines – Angle between a plane and a line – Projection of a line – Perpendicular drawn to a line – Shortest distance between two skew lines – Line intersecting a given line – Lines of intersection of three planes – Equations of two given skew lines – Surface generated by a straight line– Simple problems - Executing simple geometrical problems using GEOGEBRA

#### UNIT III

**14 hrs**

Sphere: Standard equation of a sphere – Results based on the properties of a sphere – Tangent plane – Radical plane – Equation of a circle - Executing simple geometrical problems using GEOGEBRA

#### UNIT IV

**14 hrs**

Cone and Cylinder: Equation of a cone – Cone and Quadric cone whose vertex is at the origin – Right circular cone – Equation of a cylinder – Right circular cylinder – Quadric surfaces - Executing simple geometrical problems using GEOGEBRA

**UNIT V****15 hrs**

Conicoids: Nature of conicoids – Standard equation of central conicoids – Enveloping cone - Tangent plane – Condition for tangency – Director sphere and director plane - Normal to a Conicoid – Ruled surface - Executing simple geometrical problems using GEOGEBRA

**Text Books**

1.	T.K.Manicavachagom Pillay&T.Natarajan	A Text Book of Analytical Geometry– Two and Three Dimensions (For unit I)	S.Viswanathan (Printers and Publishers) Pvt. Ltd. Reprint (2008).
2.	P.Duraipandian, LaxmiDuraipandian &D.Muhilan	Analytical Geometry – Three Dimensional (For Unit II, III, IV & V)	Emerald Publishers, 2010
3.	Department of Mathematics	Lab Manual on GEOGEBRA	
4.	Geogebra Manual – The Official Manual of Geogebra Research.shu.ac.uk/geogebra/GIF – Guides/official Geogebra manual.pdf(2011)		

**Reference Books**

1	N.P.Bali & Dr. Hari Kishan	Solid Geometry	Laxmi Publications, 2009
2	M.L.Khanna	Solid Geometry	Jai Prakash Nath & Co., Educational Publishers, 2011
3	D.Chatterjee	Analytical Geometry- Two and Three Dimensions	Narosa Publishing House,2011
4	Dr.S.C. Mittal	Analytical Geometry	Pragati Prakashan, Third Edition, 2008
5	Shanti Narayan	Analytical Solid Geometry	Fifteenth Edition, S.Chand & Company Ltd, 2009

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz.

**Course Designers:**

1. Dr. K. Sumathi, Associate Professor, Department of Mathematics
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
TH17A05	MATHEMATICAL STATISTICS – II (SAMPLING AND EXPERIMENTAL DESIGNS)	Allied	86	4	-	5

**Preamble**

- To introduce statistical techniques of analysis and inference that are useful in many areas of scientific research.
- To present descriptive statistics and utilize the probability distributions to perform statistical inference.

**Course Outcomes**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Construct and interpret confidence intervals to estimate means, standard deviations and proportions for populations,	K2
CO2.	Explain and successfully apply all aspects of parametric testing techniques including single and multi-sample tests for mean and proportion	K2
CO3.	Explain and successfully apply all aspects of appropriate non-parametric tests.	K2
CO4.	Understand, apply and compute maximum likelihood estimation	K2
CO5.	Take up a career in statistical analysis	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER II – ALLIED - MATHEMATICAL STATISTICS – II (SAMPLING AND EXPERIMENTAL DESIGNS)

**Credits : 5**

**Hours:86**

#### UNIT I

**17 hrs**

Theory of Estimation: Introduction - Characteristics of Estimators -Properties- Cramer Rao Inequality - Rao Blackwell Theorem – Method of Estimation -Method of maximum likelihood- Method of Minimum variance- Confidence Interval & Confidence limits.

#### UNIT II

**17 hrs**

Large sample Theory: Procedure for testing of hypothesis- Test of significance for large samples- Sampling of Attributes - Test of significance for a single proportion-Test of significance for difference of proportions- Sampling of Variables- Test of significance for single mean-Test of significance for difference of mean.

#### UNIT III

**17 hrs**

Exact sampling distribution: Introduction -  $\chi^2$ , t, F, Z Distributions -Derivations – Applications- Relation between t and F, F and  $\chi^2$ , Fisher's Z-distribution.

Verification by using Excel/R

#### UNIT IV

**17 hrs**

Analysis of variance: F- Test- Application of F –Test – Assumptions and Techniques in Analysis of Variance- One and Two way classification Model – Experimental Designs – Introduction - Randomized Block Design - Latin Squares- Randomized block Vs Latin Squares- Latin Cubes. Verification by using Excel/R

#### UNIT V

**18 hrs**

Statistical Quality Control: Control Charts-Single and Double Sampling Plans – Acceptance Sampling – Analysis of Time Series – Components- Methods of estimation of linear trend – Seasonal Variation – Cyclic Variation – Irregular Variations - Simple average.

### Mini project of statistical survey using News Paper Information

#### Text Books

1.	S.C.Gupta and V.K.Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & sons, New Delhi.11 <sup>th</sup> Thoroughly Revised edition, Reprint 2014 (for units 1,2,3)
2.	S.P.Gupta	Statistical methods	Sultan Chand & Sons, New Delhi-43 <sup>rd</sup> edition s2014 (for units 4,5)

#### Reference Books

1.	Robert V. Hogg, Joseph Mckon, Allen T.Craig	Introduction to Mathematical Statistics, 7 <sup>th</sup> Edition	Pearson India Ltd, 2009
2.	Sheldon M Ross	Introductory Statistics (3 <sup>rd</sup> Edition)	Elsevier, 2012
3	E.L.Lehmann Joseph P.Romano	Testing Statistical Hypotheses	Third Edition, Springer Private Ltd, 2009
4	Murray R.Spiegel Larry J.Stephens	Theory and problems of Statistics	Third Edition, Tata McGraw Hill Publishing Company Ltd, 2008

#### Pedagogy

Chalk and Talk, Demonstration, Seminar, Group Discussion and Numerical Exercises.

#### Course Designers:

1. Dr. K. Sumathi, Associate Professor, Department of Mathematics
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16C05	INTEGRAL TRANSFORMS WITH SCILAB	Core	41	4	-	4

#### Preamble

- To understand the practical applications of Integral transforms in solving problems of signal processing, differential and integral equations.
- To use SCILAB effectively to solve problems involving Integral transform.

#### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Learn the basics of Integral transforms	K1
CO2.	Understand the properties of Fourier, Laplace, Hankel and Mellin transforms	K2
CO3.	Solve simple differential and integral equations using the Fourier Laplace, Hankel and Mellin transforms	K3
CO4.	Learn to use SCILAB to solve Integral equations involving	K3

	Integral transforms.	
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### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S

S- Strong; M- Medium; L- Low

### Syllabus

#### SEMESTER III- CORE PAPER IV INTEGRAL TRANSFORMS with SCILAB

**Credits:4**

**Hours: 41**

#### UNIT I

**8 hrs**

Piecewise or sectional continuity – Function of exponential order - Definition of transform concept – Application of Laplace transforms to integral equations - Evaluation of simple problems using SciLab.

#### UNIT II

**8 hrs**

Fourier transforms - Sine and Cosine transforms - Inverse Fourier transforms (Infinite and Finite transforms) - Elementary properties - *Evaluation of simple problems using SciLab.*

#### UNIT III

**8 hrs**

Hankel Transforms - Hankel Transform of the derivatives of a function - Parseval's theorem – Elementary problems - Application of Hankel Transforms in boundary value problems – Elementary problems - *Evaluation of simple problems using SciLab.*

#### UNIT IV

**8 hrs**

Application of Hankel Transforms in boundary value problems – Mellin transform – Mellin Properties - *Evaluation of simple problems using SciLab.*

#### UNIT V

**9 hrs**

Applications of Laplace transform to boundary value problems (electrical circuits, beams & dynamics) – Applications of Fourier transforms to boundary value problems (restricted to infinite Fourier transforms only)– *Evaluation of simple problems using SciLab.*

### Text Book

1	J. K. Goyal and K.P. Gupta	Integral Transform	PragatiPrakashan Educational publishers, Meerut, Revised Edition 2015
2	Lecture notes/Lab manual/Tutorials on SciLab		

### Reference Books

1	B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers, New Delhi, 39th Edition, 2007
2	Veerarajan. T	Engineering Mathematics	Tata McGraw Hill, New Delhi, 3rd Edition, 2004.
3	Kreyszig. E	Advanced Engineering Mathematics	John wiley and sons, (Asia) Pvt. Ltd., Singapore, 2006.

## Pedagogy

Chalk and Talk, Seminar, Group discussion, Numerical Exercises, Quiz.

## Course Designers:

1. Dr. K. Sumathi, Associate Professor, Department of Mathematics
2. Dr. R. Lakshmi, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16C06	STATICS WITH GNU-FISICA LAB	Core	56	4	-	5

## Preamble

- To promote conceptual understanding and problem solving skills, the course contains many interactive elements.

## Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Know the basic principles and to develop the ability to describe position, forces and moments	K1
CO2.	Select suitable reference coordinate axes, construct free body diagrams and understand the relation between constraints imposed by supportive forces	K2
CO3.	Analyze systems that include frictional forces	K2
CO4.	Gain ability to apply the results from physical models to create real target systems	K3
CO5.	Appreciate/Understand application of the resultant of forces, theorems in statics and their interpretations.	K3

## Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER III – CORE PAPER VI STATICS with GNU – FISICA Lab

**Credits: 5**

**Hours: 56**

#### UNIT I

**11 hrs**

Forces acting at a point: Resultant and components – Parallelogram of forces – Triangle of forces – Polygon of forces – Lami's Theorem – An extended form of the parallelogram law of forces – Resolution of a force – Components of a force along two given directions – Theorem on Resolved parts – Resultant of any number of forces and coplanar forces acting at a point :

Graphical and Analytical method – Condition of Equilibrium of any number of forces acting upon a particle - *Simple Problems using GNU - fisicaLab.*

## UNIT II

11hrs

**Parallel Forces and Moments:** Introduction – The resultant of two like, unlike and unequal parallel forces acting on a rigid body – Moment of a force – Physical significance and Geometrical representation of a moment – Varignon’s theorem of moments – Generalised theorem of moments. **Couples:** Definition – Equilibrium and Equivalence of two couples – couples in parallel planes – Representation of a couple by a vector - Resultant of a Couple and a Force - *Simple Problems using GNU - fisicaLab.*

## UNIT III

11 hrs

**Equilibrium of Three Forces Acting on a Rigid body:** Rigid body subjected to any three forces – Three coplanar forces – Procedure to be followed in solving any statistical problem – Two Trigonometrical theorems. **Coplanar forces:** Introduction – Reduction of any number of coplanar forces – Condition and Alternative condition for a system of forces to reduce to a single force or to a couple – Change of the base point – Equation to the line of action of the resultant - *Simple Problems using GNU– fisicaLab.*

## UNIT IV

11 hrs

**Friction:** Introduction – Statical, Dynamical and limiting friction – coefficient of friction – Angle of friction – Cone of friction - Equilibrium of a particle on a rough inclined plane – Equilibrium of a body on a rough inclined plane under a force parallel to the plane – Equilibrium of a body on a rough inclined plane under any forces. **Centre of gravity:** Centre of Like Parallel Forces – Centre of mass or centre of Inertia – Distinction between centre of gravity and centre of mass – The centre of gravity of a body – Determination of uniqueness of the centre of gravity in simple cases – Centre of gravity by integration - *Simple Problems using GNU – fisicaLab.*

## UNIT V

12 hrs

**Stability of equilibrium:** Stable, Unstable and Neutral equilibrium – Nature of equilibrium of a rigid body supported at one fixed point – conditions of stability for a body with one degree of freedom. **Equilibrium of strings:** Equation of the common catenary – Tension at any point – Geometrical properties of the common catenary - *Simple Problems using GNU - fisicaLab.*

### Text Books

1.	Dr.M.K.Venkataraman	A Text Book of Statics	Agasthiar Publications– (Eleventh edition) (2014)
2	<a href="https://www.gnu.org/software/fisicalab/manual/en/fisicalab.pdf">https://www.gnu.org/software/fisicalab/manual/en/fisicalab.pdf</a>		

### Reference Books

1.	K.ViswanathaNaik&M.S.Kasi	Statics	Emerald Publishers, 1992
2.	N.P. Bali	Statics	Golden Mathematics Series, Laxmi publications,1992

### Pedagogy

Chalk and talk, seminar, group discussion, numerical exercises and quiz.

### Course Designers:

1. Dr.K.Sumathi, Associate Professor, Department of Mathematics
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
TH16C07	TRIGONOMETRY, VECTOR CALCULUS, TENSORS AND MAPLE APPLICATIONS	CORE	41	4	-	4

### Preamble

- To use Trigonometry concepts to solve applied problems
- To introduce students to the fundamentals of vector calculus and tensor analysis

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Find solutions of a Trigonometric equation	K1
CO2.	Work with the Trigonometric form of complex numbers	K1
CO3.	Calculate vector scalar and vector products	K2
CO4.	Recognise irrotational and solenoidal vector fields	K2
CO5.	Understand the various integral theorems relating line, surface and volume integrals	K3
CO6.	Formulate tensor representation for a vector	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S
CO6.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER IV – CORE PAPER VII

#### TRIGONOMETRY, VECTOR CALCULUS, TENSORS AND MAPLE APPLICATIONS

Credits: 4

Hours: 41

#### UNIT I

8 hrs

Solutions of simple trigonometric functions - Expansion of  $\cos n\theta$ ,  $\sin n\theta$ ,  $\cos^n\theta$ ,  $\sin^n\theta$  – Hyperbolic functions – Separation of real and imaginary parts of  $\text{Sin}(\alpha+i\beta)$ ,  $\text{Cos}(\alpha+i\beta)$ ,  $\text{Tan}$



$(\alpha+i\beta)$ ,  $\text{Sin h}(\alpha+i\beta)$ ,  $\text{Cos h}(\alpha+i\beta)$ ,  $\text{Tan h}(\alpha+i\beta)$ ,  $\text{Tan}^{-1}(\alpha+i\beta)$  – MAPLE Application for branches and branch cuts of inverse trigonometric and hyperbolic functions.

**UNIT II**

**8 hrs**

Logarithm of a complex number – Summation of trigonometric series – Simple problems.

**UNIT III**

**8 hrs**

Scalar and vector point functions – Differentiation of vectors: Differential operator, directional derivative, gradient, divergence, curl - *MAPLE Applications* - Stepwise Solutions of Vector Calculus.

**UNIT IV**

**8 hrs**

Integration for vectors: – Line, surface and volume integrals. Theorems of Gauss, Green & Stoke's (Statement only) – Verification - *MAPLE Application* – Stoke's Theorem.

**UNIT V**

**9 hrs**

Tensor Analysis - Definition of Tensors – Contravariant - Covariant and mixed tensors - Addition and subtraction of Tensors - Summation convention - Symmetry and Axisymmetry Tensor - Contraction and direct product - Quotient law - *MAPLE Application* - Tensor Calculus with differential Geometry.

**Text Books**

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	T.K.Manicavachagom Pillay and S. Narayanan	Trigonometry (For Unit I,II)	S. Viswanathan (Printers and Publishers) Pvt. Ltd.	2010
2	P. Duraipandian & Lakshmi Duraipandian	Vector Analysis- (Unit III & IV)	Emerald publishers- Reprint .	2000
3	A.W.Joshi	Matrices and Tensors in Physics (Unit V)	New Age International Publishers, Revised Edition.	2010
4	<a href="http://www.maplesoft.com/applications/">http://www.maplesoft.com/applications/</a>			

**Reference Books**

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Nathaniel Coburn	Vector and Tensor Analysis	The Macmillan Company, New York	
2	<u>Shaheer Khan</u>	Tensor Analysis and Its Applications	Partridge India	2015
3	<a href="http://www.intmath.com/">http://www.intmath.com/</a>			

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion and Numerical Exercises.

**Course Designers:**

1.Dr. B. Tamilselvi , Associate professor, Department of Mathematics

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDIT</b>
TH16C08	DYNAMICS WITH GNU - FISICA LAB	CORE	56	4	-	5

### Preamble

- To develop an understanding of the principles of dynamics and the ability to analyze problems in a systematic and logical manner, including the ability to draw free - body diagrams
- To teach the students basic mathematical and computational tools for modeling and analysis of dynamic systems.

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Know basic kinematic concepts and dynamic concepts	K1
CO2.	Understand and work with practical problems in dynamics	K2
CO3.	Study the kinematics and kinetics of particles and rigid bodies using force and acceleration, work and energy, and impulse and momentum principles	K2
CO4.	Apply physical principles to the analysis of particle and rigid body motion problems	K3
CO5	Solving dynamics problems and determine which concepts to apply, and choose an appropriate solution strategy.	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER IV – CORE PAPER VIII

#### DYNAMICS with GNU-FISICA Lab

Credits : 5

Hours : 56

#### UNIT I

11 hrs

Kinematics: Composition of velocities – Parallelogram law – Components of a velocity along two given directions – Resultant of several simultaneous coplanar velocities of a particle – Relative velocity – Angular velocity – Angular velocity of a particle moving along a circle with

uniform speed – Acceleration – Composition of accelerations – Relative acceleration – Motion in a straight line under uniform acceleration – Space described in any particular second – Motion in a straight line with variable acceleration – The equations of motion of a particle under constant acceleration: graphical method – Acceleration of falling bodies – Motion of a particle down a smooth inclined plane. Laws of motion: Introduction – Newton’s laws of motion – Composition of forces – Gravitational units of forces. Work function of a varying force – Tension in an elastic string – Power – Energy – Kinetic energy – Potential energy – Principle of conservation of energy. (simple problems only) – *Simple Problems using GNU – fisicaLab.*

**UNIT II** **11 hrs**

Projectiles: Introduction – Two fundamental principles – The path of a projectile is a parabola – Characteristics of a motion of a projectile – Moment of inertia: Theorem of parallel axes – Theorem of perpendicular axes – Moments of inertia in some particular cases. M.I of a thin uniform rod, rectangular lamina – Uniform rectangular parallelepiped of edges  $2a, 2b, 2c$  – *Simple Problems using GNU – fisicaLab.*

**UNIT III** **11 hrs**

Motion under the action of Central forces : Introduction – Velocity and acceleration in polar coordinates – Equations of motion in polar coordinates – Note on the equiangular spiral – Motion under a central force – Differential Equations of central orbit – Pedal equation – Velocities in a central orbit – Apses and apsidal distances – Law of inverse square, inverse cube (simple problems only)– *Simple Problems using GNU-fisicaLab.*

**UNIT IV** **11 hrs**

Simple Harmonic motion : Introduction – S.H.M in a straight line – General solution – Geometrical representation of a S.H.M – Change of origin – Composition of two S.H.M of the same period and in the same straight line – Composition of two S.H.M of the same period in two perpendicular directions – Units and Dimensions – *Simple Problems using GNU-fisicaLab.*

**UNIT V** **12 hrs**

Impulsive forces: Impulse – Impulsive force – Impact of two bodies – Loss of kinetic energy in impact – Motion of a shot and gun – Impact of water on a surface. Collision of Elastic Bodies: Introduction – Fundamental laws of impact – Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – Loss of kinetic energy due to direct impact of two smooth spheres – Oblique impact of two smooth spheres – Loss of kinetic energy due to oblique impact of two smooth spheres (simple problems only)– *Simple Problems using GNU – fisicaLab.*

**Text Books**

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Dr.M.K.Venkataraman	A Text Book of Dynamics	Agasthiar Publications-	2014
2	<a href="https://www.gnu.org/software/fiscalab/manual/en/fiscalab.pdf">https://www.gnu.org/software/fiscalab/manual/en/fiscalab.pdf</a>			

**Reference Books**

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	K.ViswanathaNaik & M.S.Kasi	Dynamics	Emerald Publishers	1992

2.	N.P. Bali	Dynamics	(Golden Mathematics series), Laxmi Publications, New edition	2011
3.	M L Khanna	Dynamics	Jai Prakash Nath company.	15 <sup>th</sup> edition,1998

### Pedagogy

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz and Case Study.

### Course Designers:

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics
- 2 .Dr. G. Arthi, Assistant Professor, Department of Mathematics

**Skill Based Subject**  
**Fundamentals of Data Science & R Programming**  
**Semester III & IV**

**Credits: 4**

**Subject code: SB17MA01**

**Hours: 43**

### OBJECTIVE

To enhance career opportunities for the students and to provide an overview of Data Science and “R” programming to carry out big data analytics

#### UNIT I:

**9 hrs**

Introduction to data science - Data Evolution: Data Development Time Line – ICT Advancements- Data Growth- IT Components-Business Process-Landscape- Data to Data Science- Data Classification – Data analytics- Relation –Data Science, analytics and Big data Analytics

#### UNIT II:

**9 hrs**

Data Science Components-Data Engineering- Data Analytics – methods and Algorithms- Data Visualization- Big data Technology- Data science user- roles and skills-Big data road map-Digital data- an imprint- evolution of Dig data, What is Big data?, sources of Big data- Characteristics of Big data- Data discovery – traditional Approach.

#### UNIT III:

**9 hrs**

Exploring R Basics- Introduction- Getting started-Rstudio-R basic data types-R operators- R objects-Vectors-list, arrays-Matrix- factors-Data frame- Data Visualization in R- Exploratory data Analytics- Lattice package- Data sets- different types of diagrams in Statistics.

#### UNIT IV:

**8 hrs**

Statistical Measures – Introduction – Understanding data distribution – Use cases- Central Tendency Measure- Measures of Variability- Standard deviation- Probability distributions.

#### UNIT V :

**8 hrs**

Regression Analysis – Data types of regression – Linear regression- Inferential Analysis- Residuals and coefficients- plot Diagnostics- Multi linear regression using ANOVA.

### Text Books

S.No	Author	Title of the book	Publishers	Year of Publication

1.	V. Bhuvanewari, T. Devi	Big Data Analytics: A Practitioner's Approach (Unit I : Page No. 1 – 13) Unit II : Page No. 14-25	Published by Department of Computer Applications, Bharathiar University.	2016
2.	V. Bhuvanewari	Data Analytics with R Step by Step Unit III: Chapter 3, 4 Pg no. 21 - 65 Unit IV: Chapter 5 Pg no. 83 to 130 Unit V: Chapter 6 Page No. 107 to 115	Lean Publishers	2016

### Reference Books

Book Name	Author	Publisher	Year & Edition
The Art of R Programming	Norman Matloff	No Starch Press	2011
The R Book	Michael J. Crawle	Wiley	2008
Statistical Analysis with R.	M. John	Tata McGraw Hill Publishing Co. Ltd	October 2010
Learning R	Richard Cotton	O'Reilly Media	September 2013

### Course Designers:

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. R.Lakshmi, Assistant Professor, Department of Mathematics

## R PROGRAMMING PRACTICALS SEMESTER III & IV

**Credits: 2**

**Subject code: SB17MAP1**

**Hours: 43**

1. Creating Vectors, Matrices, Factors and plotting graphs
2. Import Data, copy data from Excel to R
3. Working with variables and Data in R
4. Logic statements
5. Bar charts and pie charts in R
6. Histograms in R
7. Summary statistics in R: Mean, Standard Deviation, Frequencies, t-Test
8. ANOVA
9. Chi-Square
10. Correlation
11. Regression

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
TH16C09	REAL ANALYSIS WITH TABLEAU	Core	101	4	-	5

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### Preamble

- To develop the basic material in a systematic and rigorous manner in the context of real-valued functions of a real variable.
- Apply mathematical concepts and principles to perform numerical and symbolic computations.
- Able to construct, analyze and critique mathematical proofs in analysis

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Knowing the concept of convergence and limits as they apply to sequences, series, differentiation and integration	K1
CO2	Analyze the precise proofs of results that arise in the context of real analysis	K2
CO3	Able to identify, formulate and solve problems by the implementation of a variety of proof techniques	K2
CO4	Apply critical thinking skills to solve problems that can be modelled mathematically	K3
CO5	Analyze how abstract ideas and rigorous methods in real analysis can be applied to practical problems	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

## REAL ANALYSIS WITH TABLEAU

**Credits : 5**

**Hours:101**

### UNIT I

**20 hrs**

Some Basic notions of set theory – Countable and uncountable sets – uncountability of the real number system – set algebra – countable collections of countable sets. Elements of point set topology – Euclidean space  $\mathbb{R}^n$  – open balls and open sets in  $\mathbb{R}^n$  -The structure of open sets in  $\mathbb{R}^n$  – closed sets and adherent points – the Bolzano Weierstrass theorem.

**UNIT II****20hrs**

The Cantor intersection theorem – covering – Lindelof covering theorem – the Heine Borel theorem – compactness in  $\mathbb{R}^n$ - Metric space – point set topology in metric space – Compact subsets of a metric space – convergent sequences in a metric space – Cauchy sequences – complete metric space. Simple visualizations using Tableau

**UNIT III****20 hrs**

Limit of a function – continuous functions – continuity of composite function – Examples of continuous functions – continuity and inverse images of open or closed sets – functions continuous on compact sets – topological mappings – Bolzano’s theorem – connectedness – components of a metric space – arc wise connectedness- uniform continuity- fixed point theorem. Simple visualizations using Tableau

**UNIT IV****20hrs**

Definition of derivatives – derivative and continuity – algebra of derivatives – the chain rule – one sided derivatives – zero derivatives – Rolle’s theorem – the mean value theorem for derivative – Taylor’s formula with remainder – functions of bounded variations – properties of monotonic functions – total variations – additive property – continuous function of bounded variations – total variation on  $[a,x]$  as a function of  $x$ .

**UNIT V****21 hrs**

The Riemann Stieltjes integral : Introduction notation – The definition of Riemann Stieltjes integral – linear properties – integration by parts – change of variable in a Riemann stieltjes integral – Reduction of a Riemann integral – step functions as integrators – reduction of a Riemann Stieltjes integral to a finite sum – Eulers summation formula – upper and lower integrals – Riemann’s condition – Comparison theorems – necessary and sufficient condition for existence of Riemann Stieltjes integral.

**Text Book**

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	T.M.Apostol	Mathematical analysis second edition	Narosa Publishing House	2002
<a href="https://public.tableau.com/en-us/s/download">https://public.tableau.com/en-us/s/download</a>				

**Reference Books**

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	R.R.Goldberg	Methods of Real Analysis	Oxford and IBH Publishing Co. Pvt. Ltd.	2017
2	Walter Rudin	Principles of Mathematical Analysis	Mc Graw – Hill	1976

## Pedagogy

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz and Case Study

## Course Designers:

1. Dr. B. Tamil Selvi, Associate Professor, Department of Mathematics.

2. Dr. D. Sasikala, Assistant Professor, Department of Mathematics.

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
TH16C10	ABSTRACT ALGEBRA WITH MAPLE	Core	101	4	-	5

## Preamble

- To acquaint the students with basic concepts of fundamental algebraic structures
- Able to construct and analyze mathematical proofs in algebra.

## Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn about Subgroups, Homomorphism, Automorphism, Rings, Ideals and Quotient rings and Euclidean rings.	K1
CO2	To identify, formulate and solve problems by using the implementation of a variety of proof techniques	K2
CO3	Demonstrate knowledge and understanding of the concept of cosets of a subgroup of a group and normal subgroups.	K2
CO4	Demonstrate knowledge and understanding of symmetric groups, cyclic groups, their Properties, direct product of groups and the concept of quotient groups.	K3
CO5	Analyse the application of Permutation groups, Sylow's theorem, Abelian groups.	K3

## Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER V – CORE PAPER X ABSTRACT ALGEBRA WITH MAPLE



Credits : 5

Hours:101

Subject Code : TH16C10

**UNIT I**

**20 hrs**

Subgroups - Congruence relation-cosets-Lagrange's Theorem -Order of an element - A counting Principle – Normal subgroups and quotient groups – Homomorphisms - Kernel of a homomorphism – Isomorphism- Cauchy's theorem for Abelian Group – Sylow's theorem for Abelian Group.

**UNIT II**

**20 hrs**

Automorphisms –Inner Automorphisms- Cayley's theorem - Permutation groups- Another counting principle – Equivalence relation– Sylow's Theorem – Finite abelian group.

**UNIT III**

**20 hrs**

Rings – Definition and examples – Basic properties – Special classes of rings – The Pigeonhole Principle– Integral domains and fields – Homomorphisms of rings.

**UNIT IV**

**20 hrs**

Ideals and Quotient rings - Maximal , principal and prime ideals - The field of quotients of an integral domain.

**UNIT V**

**21 hrs**

Euclidean rings – A particular Euclidean ring – Polynomial rings – Polynomials over the rational field – Gauss' Lemma – The Eisenstein Criterion - Polynomial rings over commutative rings.

**Text Book**

1	I.N. Herstein	Topics in Algebra	Wiley Eastern Ltd. - 2 <sup>nd</sup> edition (2002)
	<a href="http://www.maplesoft.com/applications/">http://www.maplesoft.com/applications/</a>		

**Reference Books**

1	S.Arumugam & A. Thangapandi Isaac	Modern Algebra	New Gamma Publishing House, 1990
2	M.L. Khanna	Modern Algebra	Jai Prakash Nath and Co, 1990

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz and Case Study

**Course Designers:**

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics.

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16E01	Number Theory and Numerical Methods with C	Core	101	4		5

## Preamble

- To understand and appreciate the beauty of Number Theory, which has contributed significantly to the development of Algebra and Analysis.
- To provide the necessary basic concepts of numerical methods and give procedures for solving numerically different kinds of problems in scientific computing.

## Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define and interpret the concepts of divisibility, congruence, greatest common divisor, prime, and prime-factorization	K1
CO2	Formulate and prove conjectures about numeric patterns and Produce rigorous arguments (proofs) centered on number theory.	K2
CO3	Derive numerical methods for approximating the solution of problems and Analyze the error incumbent in any such numerical approximation,	K3
CO4	Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems.	K3

## Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	M	S	S	S	S	S
CO2	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	M
CO4	S	S	S	M	S	S	S

S- Strong; M- Medium; L- Low

## Syllabus

### SEMESTER V –Elective 1 NUMBER THEORY and NUMERICAL METHODS with C

Credits : 4

Hours:101

Subject code: TH16E01

#### UNIT I

20 hrs

Peano's axioms- Mathematical induction – Addition and multiplication\* – order relation – principle of well ordering.

Integers: Addition and multiplication- positive and negative integers- Trichotomy law- absolute value – Binomial theorem - Divisibility: Associates – Division algorithm – g.c.d (H.C.F) – Euclidean algorithm – l.c.m

#### UNIT II :

21 hrs

Distribution of primes: General discussion – Fermat's conjecture – Fermat numbers – Gold Bach's conjecture – Mersenne numbers – Gap theorem – infinitude of primes.

Congruences : Definition - residue classes – complete and least residue systems – reduced residue systems – casting out 9 magic numbers – Divisibility tests – linear congruences – solution of congruences – Chinese remainder theorem.

Theorems of Fermat and Wilson: Little Fermat’s Theorem – Euler’s extension

**UNIT III**

**20 hrs**

Solution of numerical, algebraic and transcendental equation : The bisection method – Method of false position – Newton Raphson method ,Geometrical interpretation of Newton’s method ,Gauss elimination method – Gauss seidal iteration method – Gauss Jordan and Gauss Jacobi methods – Simple problems using C

**UNIT IV**

**20 hrs**

Finite differences – forward, backward and central differences – The operator E – Relation between E and the operator D and other difference operators- Interpolation: Gauss forward and backward interpolation formula, Numerical differentiation and integration: Derivatives using Newton’s forward, backward and divided differences – Lagrange’s interpolation formula – Inverse interpolation - Simple problems using C

**UNIT V**

**20 hrs**

Numerical solution of Ordinary Differential Equations: Introduction – Solution by Taylor’s series (Type 1) - Taylor series method for simultaneous first order differential equations - Taylor series method for second order differential equations — Euler’s method – Improved Euler method – Runge-Kutta method – Second order Runge-Kutta method (for first order O.D.E)

Numerical solution of Partial Differential Equations: Introduction – Difference Quotients – Graphical representation of Partial Quotients – Classification of Partial Differential Equations of the Second order – Elliptic Equations – Solution of Laplace’s Equation (By Liebmann’s iteration process)

**Text Books**

1	S.Kumaravelu & Susheela Kumaravelu	Elements of Number Theory	Raja Sankar offset Printers, Sivakasi, 2002
2	P. Kandasamy, K. Thilagavathy and K. Gunavathy,	Numerical Methods	S.Chand Co. Ltd., New Delhi, Reprint 2010
3	Numerical methods with Programs in C (only for C programs)	T.Veerarajan & T.Ramachandran	Tata McGraw-Hill Publishing Company Limited, New Delhi, 2006, Second Edition

**Reference Books**

1.	Introduction to the theory of numbers	Ivan Niven and Herberts Zuckerman	Wiley Publishing House- Fifth edition Narosa 1991
2.	Elementry Number Theory	David M.Burton	McGraw-Hill Companies, New York, 2007, Sixth edition
3.	Numerical Methods in Science & Engineering	M.K.Venkataraman	National Publishing Company 1990 edition
4.	Numerical Methods for Scientific and Engineering Computations	M.K.Jain, S.R.K.Iyengar & R.K.Jain	New Age International Publishers, New Delhi, 2010

## Pedagogy

Chalk and Talk, Seminar, Group discussion, Numerical Exercises, Quiz.

## Course Designers:

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. R.Lakshmi, Assistant Professor, Department of Mathematics.

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16E02	ELECTIVE- GRAPH THEORY WITH OPEN MODELICA	CORE	101	4		5

## Preamble

- To introduce Graph theory concepts to solve the applied problems

## Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Find solutions of Ramsey, Matroids, Graphical Partitions.	K1
CO2.	Appreciate and use Konigsberg bridge problem, Menger's theorem, Hamiltonian Graphs, Eulerian Graphs.	K1
CO3.	Calculate degrees cutpoints, no. of cycles, centres, centroids, connectivity, line connectivity.	K2
CO4.	Recognise operations on graphs, characterization of trees,line graphs , properties of line graphs.	K2
CO5.	Understand various Graphs relating extremal graphs, intersection graph cutpoint graphs, centres and centroids , Independent cycles and cocycles,connectivity and line-connectivity, graphical variations of menger's theorem, line graphs and Traversability, adjacency matrix,incidence matrix, cycle matrix	K3
CO6.	Demonstrate knowledge of basic concepts such as variety of graphs,Blocks, Trees,Connectivity and line ,matroids, Matrices and Partitions	K3

## Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

CO6.	S	S	S	S	S	S	S
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S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER V - ELECTIVE I

#### GRAPH THEORY WITH OPEN MODELICA

**Credits :** 5

**Hours :** 101

#### OBJECTIVE:

To enable the students to learn many branches of mathematics such as probability, topology, combinatorics etc.

#### UNIT I 20 hrs

Graphs : varieties of graphs – walks and connectedness – degrees – the problem of Ramsey – extremal graphs – intersection graphs– Konigsberg bridge problem-problems using open Modelica

#### UNIT II 20hrs

Operations on graphs - Blocks : cut points , bridges and blocks – block graphs and cutpoint graphs. problems using open Modelica

#### UNIT III 20 hrs

Trees : Characterization of trees – centers and centroids – block - cutpoint trees – independent cycles and co-cycles – matroids- problems using open Modelica.

#### UNIT IV 21 hrs

Connectivity and line - connectivity – graphical variations of Menger's theorem – further variations of Menger's theorem . Matrices: the adjacency matrix – the incidence matrix – the cycle matrix problems -using open Modelica

#### UNIT V 20 hrs

Partitions – Traversability : Eulerian graphs – Hamiltonian graphs. Line graphs: Properties of line graphs – characterization of line graphs- problems using open Modelica

#### Text Book

1	Frank Harary	Graph theory	Narosa publishing house 10 <sup>th</sup> reprint 2001
	<a href="https://www.openmodelica.org/">https://www.openmodelica.org/</a>		

#### Reference Books

1	Narsing Deo	Graph Theory with Applications to energy and computer science	Prentice Hall of India Publication reprint (2004)
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#### Pedagogy

Chalk and Talk , Seminar , Group Discussion and Numerical Exercises

#### Course Designers:

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics.
2. Ms. A. Karpagam, Assistant Professor, Department of Mathematics.

**SEMESTER V – Advanced Learners’ Course**  
**ASTRONOMY I**

**Credits 5**

**Subject Code: TH16AC1**

**OBJECTIVE**

To study the solar system and expose the mathematical tools used to solve the mysteries of the universe.

**UNIT I:**

A brief history of solar system - General description of the solar system-comets and meteorites-spherical trigonometry.

**UNIT II:**

Celestial sphere-celestial coordinates – diurnal motion – variation in length of the day

**UNIT III:**

Dip – twilight – geocentric parallax.

**UNIT IV:**

Refraction – Tangent formula – Cassini’s formula

**UNIT V:**

Kepler’s laws – Relation between true eccentric and mean anomalies.

**Text Book:**

<b>1</b>	S. Kumaravelu and Suseela Kumaravelu	Astronomy	Revised edition 2005.
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<b>Unit I</b>	Chapter 11, 1	Headings 327 – 339, 1.1 – 1.13
<b>Unit II</b>	Chapter 2	Headings 39 - 86
<b>Unit III</b>	Chapter 3, 5	Headings 106 – 111, 135
<b>Unit IV</b>	Chapter 4	Headings 117 – 134
<b>Unit V</b>	Chapter 4	Headings 146 – 158

**Course Designers:**

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics.

**Advanced Learners’ Course**  
**FUZZY MATHEMATICS I**

**Credits : 5**

**Subject Code : TH16AC2**

**UNIT I**

From Classical sets to Fuzzy sets: Introduction – Crisp sets – Fuzzy sets – Basic Types – Basic concepts – Characteristics and significance of the paradigm shift.

**UNIT II**

Fuzzy Sets versus Crisp Sets Additional properties of  $\alpha$  sets – Representation of Fuzzy sets – Extension principle for Fuzzy sets.

**UNIT III**

Operations on Fuzzy sets – Types of operations – Fuzzy compliments – Fuzzy intersections: t – norms – Fuzzy Unions: t – conforms.

#### UNIT IV

Fuzzy Arithmetic Fuzzy Numbers – Linguistic variables-Arithmetic operations on intervals – Lattice of fuzzy numbers – Fuzzy equations.

#### UNIT V

Fuzzy Relations Crisp versus Fuzzy relations-Projections and cylindric extensions – Binary Fuzzy relations - Fuzzy equivalence relations – Fuzzy compatibility relations – Fuzzy morphisms.

#### Text Book:

1	George J. Klir/Bo Yuan	Fuzzy sets and Fuzzy logic Theory and applications	Prentice Hall of India Fourth printing June 2001.
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UNIT I	:	Chapter 1	Sections 1.1 –1.5
UNIT II	:	Chapter 2	Sections 2.1 – 2.3
UNIT III	:	Chapter 3	Sections 3.1 – 3.4
UNIT IV	:	Chapter 4	Sections 4.1 –4.6
UNIT V	:	Chapter 5	Sections 5.1 –5.3, 5.5, 5.6, 5.8

#### Course Designers:

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics.
2. Dr. D. Sasikala, Assistant Professor, Department of Mathematics.

### SEMESTER V – Advanced Learners’ Course Topics in Fluid Dynamics I

Credits : 5

Subject Code : TH16AC3

#### OBJECTIVE

To introduce the basic concepts of fluid dynamics and expose the students to the practical applications of mathematics

#### UNIT I:

Basic concepts: Types of fluid - properties.

#### UNIT II:

Kinematics of flow field: Definitions – Velocity – Local, convective and material derivatives – equation of continuity in Cartesian co-ordinates – velocity potential , irrotational flow – rotational flow – vorticity

#### UNIT III:

Conservation of momentum – equation of motion of an inviscid fluid in Cartesian co-ordinates – Bernoullis’ equation –Applications of Bernoullis’ theorem

#### UNIT IV:

Irrotational motion: General motion of a fluid element – Vorticity – body forces and surface forces – flow and circulation – stokes’ theorem – Kelvin circulation theorem

**UNIT V:**

Motion in two dimensions: Stream function – Physical interpretation of stream function – complex potential and complex velocity – Two dimensional source and sink – complex potential of a source – two dimensional doublet – complex potential of a doublet

**Text Book:**

1	<b>Shanthi Swarup</b>	<i>Fluid dynamics</i>	Krishna Prakashan media (p) ltd, Meerut 11th edition 2003,
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<b>UNIT I</b>	:	Chapter 1	Sections 1.0 –1.1
<b>UNIT II</b>	:	Chapter 2	Sections 2.4 – 2.9, 2.14 – 2.15
<b>UNIT III</b>	:	Chapter 3	Sections 3.11, 3.3, 3.10
<b>UNIT IV</b>	:	Chapter 4	Sections 4.0 –4.5
<b>UNIT V</b>	:	Chapter 5	Sections 5.1 –5.7

**Course Designers:**

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics
2. Dr. R.Lakshmi, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
TH16C11	COMPLEX ANALYSIS WITH TABLEAU	CORE	86	4	-	5

**Preamble**

- Introduce students to the Complex Number System
- Equip students with necessary knowledge and skills to enable them handle mathematical operations, analyses and problems involving complex numbers.

**Course Outcomes**

- Upon the successful completion of the course students

CO Number	CO Statement	Knowledge Level
CO1.	Understanding the fundamental concepts of complex analysis.	K1
CO2.	Understand the significance of differentiability for complex functions and familiar with the Cauchy-Riemann equations;	K2
CO3.	Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues;	K2
CO4.	Use Cauchy Residue Theorem to evaluate integrals.	K3
CO5.	Evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem;	K3

**Mapping with Programme Outcomes**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S
CO3	S	S	M	S	S	S	S
CO4	M	S	S	M	S	S	S



CO5	S	S	S	M	S	S	S
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S- Strong; M-Medium; L-Low

## COMPLEX ANALYSIS WITH TABLEAU

**Credits : 5**

**Hours: 86**

### OBJECTIVE

To expose a fertile area of pure mathematics as a source of powerful techniques that are widely applied in sciences.

#### UNIT I

**17 hrs**

Complex number system : Complex number system-Field of complex numbers-scalar multiplication of a complex number –Field of real numbers – Expression of  $(\alpha, \beta)$  in the form of  $\alpha + i\beta$  – Conjugation- Absolute value of a complex number –Inequalities in terms of moduli- Examples. Complex plane: Representation of complex number by points-nth roots of a complex number- Geometrical Addition-Angle between two rays-Equations of Straight lines and circles – Elementary transformation ; Infinity and extended complex plane- Stereographic projection- Fixed points-Problems ; Analytic Functions-Complex functions –Limit of a Function-Continuity of a function –Uniform continuity-Differentiability and analyticity of a function - Necessary condition for differentiability – Sufficient condition for differentiability - CR equations in polar coordinates - Complex function on a function of  $z$  and  $\bar{z}$  - problems. Simple visualizations using Tableau

#### UNIT II

**17 hrs**

Bilinear Transformation –Special bilinear transformations- Circle and inverse points – Problems – Complex Integration : Simple rectifiable oriented curves -Integration of complex functions – Simple integrals using definition –Definite Integrals-Interior and Exterior of a closed curve-Simply connected region-Cauchy’s fundamental theorem(statement only)-Integral along an arc joining two points - Cauchy’s integral formula and formula for derivatives -Problems.

#### UNIT III

**17 hrs**

Zeros of a function – Related integral theorems: Cauchy’s inequality - Liouville’s theorem –Fundamental theorem of algebra – Maximum modulus theorem – Gauss’ mean value theorem, Theorem on the mean of the values of a harmonic function on a circle – Problems-Simple visualizations using Tableau

#### UNIT IV

**17hrs**

Taylor- Zeros of an Analytic function-Laurent’s series-Cauchy product and division – Singular points –Isolated singularities-Removable singularities- pole-Essential singularity-Behaviour of a function at an isolated singularity- Determination of the nature of singularities-Nature of singularity at infinity-Problems.

#### UNIT V

**18 hrs**

Residue-calculation of residues-Real definite integrals: Integrals of type I

$$\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta \quad \text{type II} \quad \int_{-\infty}^{\infty} \frac{P(x)}{Q(x)} dx \quad \text{evaluation} - \text{Problems} - \text{Meromorphic functions} :$$

Principle of argument – Rouché’s theorem – Fundamental theorem of algebra – Function meromorphic in the extended plane – problems.

### Text Book

1	P. Duraipandian, Kayal Pachaiyappa	<i>Complex Analysis</i>	S.Chand & Company Pvt.Ltd,2014
	<a href="https://public.tableau.com/en-us/s/download">https://public.tableau.com/en-us/s/download</a>		

### Reference Books

1	Shanti Narayan	<i>Theory of functions of a complex variable</i>	S.Chand& company, 2010
2	J.N.Sharma	<i>Functions of a complex variable</i>	Krishna Prakashan Mandir, 1980
3	P. Duraipandian, Laxmi Duraipandian and D.Muhilan	Complex Analysis	Emerald Publishers-revised edition 1994.

### Pedagogy

Chalk and Talk, Seminar, Group discussion, Numerical Exercises, Quiz.

### Course Designers:

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics
2. Dr. D. Sasikala, Assistant Professor, Department of Mathematics.

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16C12	LINEAR ALGEBRA WITH MAPLE APPLICATIONS	Core	86	4	--	5

### Preamble

- To understand the concepts of the algebraic properties of vectors, vector spaces and matrices.
- To understand the concept of transformations

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Learn the basics of matrices and vector spaces	K1
CO2.	Understanding of linear independence, span, and basis.	K2
CO3.	Compute the inner product of two vectors	K3
CO4.	Demonstrate the relationship between the operations on linear transformations and their corresponding matrices	K3

## Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S

S- Strong; M- Medium; L- Low

### SEMESTER VI- CORE PAPER XII

#### LINEAR ALGEBRA WITH MAPLE APPLICATIONS

**Subject Code : TH13C12**

**Hours: 86**

##### UNIT I

**17 hrs**

Rank of a matrix- General solution of a system- Matrix- Matrix product. Linear transformations: Functions, Mappings and Transformation- Domain, Co- domain, and Range- Injective and Surjective Mappings-Linear Transformations- Using Matrices to Define Linear Maps- Injective and Surjective Linear Transformations- Effects of Linear Transformations- Effects of Transformations on Geometrical Figures-Composition of two Linear Mappings- Application: Data Smoothing.

##### UNIT II

**17 hrs**

General Vector Spaces: Vector spaces- Theorems on Vector Spaces-Linearly Dependent Sets- Linear Mapping. Matrices: Symmetric Matrices- Skew- Symmetric Matrices- Linear Transformations. Matrix Inverses: Square Matrices- Elementary Matrices and LU Factorization- Computing an Inverse- Invertible Matrix Theorem-Mathematical Software.

##### UNIT III

**17 hrs**

Bases and Dimension: Basis for a Vector Space- Coordinate Vector-Isomorphism and Equivalence Relations- Finite Dimensional and Infinite-Dimensional Vector Spaces-Linear Transformation of a set-Dimensions of Various Subspaces-Caution. Eigen Values and Eigen Vectors: Introduction- Eigen Vectors and Eigen Values- Using Determinants in Finding Eigen values-Linear Transformations-Distinct Eigen Values-Bases of Eigen Vectors- Application: Powers of Matrix- Characteristic Equation and Characteristic Polynomial.

##### UNIT IV

**17 hrs**

Inner-Product Spaces: Inner-Product Spaces and their Properties-The Norm in an Inner-Product Space. Orthogonality: The Gram-Schmidt Process- UnNormalized Gram-Schmidt Algorithm- Modified Gram-Schmidt Process- Linear Least- Squares Solution- Gram Matrix- Distance from a Point to Hyper plane-Mathematical Software.

##### UNIT V

**18 hrs**

Hermitian Matrices and the Spectral Theorem: Hermitian Matrices and Self -Adjoint Mappings- Self -Adjoint Mapping- The Spectral Theorem- Unitary and Orthogonal Matrices-The Cayley- Hamilton Theorem-Quadratic Forms-Application: World Wide Web Searching- Mathematical Software. Matrix Factorizations and Block Matrices: LU Factorization-  $LL^T$  Factorization: Cholesky Factorization-  $LDL^T$  Factorization- Application: Linear Least- Squares Problem-Mathematical Software

**Text Book**

1	Ward Cheney David Kincaid	Linear Algebra Theory and Applications	Jones and Bartlett India Pvt. Ltd. 1 <sup>st</sup> Edition (2010)
	<a href="http://www.maplesoft.com/applications/">http://www.maplesoft.com/applications/</a>		

### Reference Books

1.	R.J. Goult	<i>Applied linear Algebra</i>	Ellis Horwood Ltd, Publisher Chichester, 1978
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### Pedagogy

Chalk and Talk, Seminar, Group discussion, Numerical Exercises, Quiz.

### Course Designers:

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics.

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
TH16C13	OPERATIONS RESEARCH with TORA	CORE	86	4	-	5

### Preamble

- To present students the elements and importance of Understanding the meaning, purpose, and tools of Operations Research
- To define and recognize the basic concepts of Operations Research.
- To enable the students to know the applications and the Limitations of Operations Research and simulation.

### Course Outcomes

Upon the successful completion of the course students

CO Number	CO Statement	Knowledge Level
CO1.	Understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.	K1
CO2.	Identify and develop operational research models from the verbal description of the real system	K2
CO3.	Know how to use variables for formulating mathematical models in management science, industrial engineering and transportation science and in real life.	K2, K3
CO4.	Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering	K3

CO5.	Be able to design new simple models, like: CPM, PERT to improve decision –making and develop critical thinking and objective analysis of decision problems.	K3
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### Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

## SEMESTER VI– CORE PAPER XIII

### OPERATIONS RESEARCH with TORA

**Subject Code: TH16C13**

**Hours: 101**

#### OBJECTIVE

To expose the application of optimization techniques to social sciences and to enhance the indispensability of mathematical tools in day today problems.

#### UNIT I

**20 hrs**

Operations Research –An overview - \* Natures and features of OR\* Linear Programming problem : Mathematical Formulation-graphical solution-Linear Programming: Simplex Method – Two - Phase method - Duality in Linear programming – Dual simplex method-problems using TORA

#### UNIT II

**20 hrs**

Integer Programming: Gomory's All I.P.P method - \* Construction of Gomory's constraints\* Fractional Cut method – All integer - Transportation Problem – Finding an Initial Basic Feasible Solution - Test for optimality – Transportation Algorithm(Modi Method) - Assignment Problem –Mathematical formulation – Assignment method- problems using TORA.

#### UNIT III

**20 hrs**

Dynamic Programming: Recursive Equation Approach- \*Characteristics of Dynamic Programming\*- Dynamic Programming Algorithm - Games and Strategies – Two- person Zero-Sum games- Maximin - Minimax Principle-Games Without Saddle Points-Mixed Strategies- Graphical Solution of 2 x n and m x 2 games- problems using TORA.

#### UNIT IV

**20 hrs**

Inventory Control: – Costs Associated with Inventories- Factors Affecting Inventory Control- Economic Order Quantity- Deterministic Inventory Problems with no Shortages - Queuing Theory- \*Elements of a Queuing System\*-Operating Characteristics of Queuing System-Probability Distribution –Classification of Queuing Models-Poisson Queuing Systems-problems using TORA.

**UNIT V****21 hrs**

Network Scheduling By PERT / CPM. Distinction between PERT & CPM- problems using TORA.

**Text Book**

1	KantiSwarup ,P.K.Gupta and Man Mohan	<i>A Text Book of operations research</i>	Twelfth Thoroughly Revised Edition Published By sultan chand& sons, 2008
	<a href="https://sourceforge.net/directory/?q=tora+for+linear+programming">https://sourceforge.net/directory/?q=tora+for+linear+programming</a>		

**Pedagogy**

Chalk and Talk, Seminar, Group discussion, Numerical Exercises, Quiz.

**Course Designers:**

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. R.Lakshmi, Assistant Professor, Department of Mathematics

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
TH16E03	MATHEMATICAL MODELLING with OPEN MODELICA	Elective	101	4	-	5

**Preamble**

- To understand how mathematical models are formulated, solved and interpreted
- To equip students with the basic mathematical modelling skills
- To use MATLAB effectively to solve problems involved in mathematical modelling

**Course Outcomes**

On the successful completion of the course, students will be able to

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1.	Understand what is a mathematical model and to know the steps involved in a mathematical modeling process	K1
CO2.	State and explain the different classifications of mathematical models	K2

CO3.	Learn the essential features of a good model and to discuss the benefits of using a mathematical model	K3
CO4.	Understand the applications of mathematical modelling to solve problems in engineering, physical, biological, and social sciences	K3
CO5.	Acquire basic mathematical modelling skills that will enable them to carry out simple modelling tasks individually or as a group	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1.	S	S	S	S	S	S	S
CO2.	S	S	S	S	S	S	S
CO3.	S	S	S	S	S	S	S
CO4.	S	S	S	S	S	S	S
CO5.	S	S	S	S	S	S	S

S- Strong; M-Medium

### Syllabus

#### SEMESTER VI – ELECTIVE III

#### MATHEMATICAL MODELLING WITH OPEN MODELICA

**Credits: 5**

**Hours: 101**

#### UNIT I

**21hrs**

Mathematical Modelling Need , Techniques, Classifications and Simple Illustrations : Simple Situations Requiring Mathematical Modelling – The Technique of Mathematical Modelling – Classification of Mathematical Models – Some Characteristics of Mathematical Models – Mathematical Modelling Through Geometry – Mathematical Modeling Through Algebra- Mathematical Modeling Through Trigonometry - Mathematical Modeling Through Calculus –Limitations of Mathematical Modelling-solving problems using open Modelica.

#### UNIT II

**20hrs**

Mathematical Modeling Through ODE of First order: Mathematical Modeling Through Differential Equations – Linear Growth and Decay Models – Non – Linear Growth and Decay Models – Compartment Models – Mathematical Modelling in Dynamics Through Ordinary Differential Equations of First Order – Mathematical Modelling of Geometrical Problems Through Ordinary Differential Equations of First Order- solving problems using open Modelica.

#### UNIT III

**20hrs**

Mathematical Modelling Through Systems of ODE of First Order: Mathematical Modelling in Population Dynamics – Mathematical Modelling of Epidemics Through Systems of Ordinary Differential Equations of First Order – Compartment Models Through Systems ODE of First Order – Mathematical Modelling in Economics Through Systems of ODE of First Order –

Mathematical Modelling in Dynamics Through Systems of ODE of First Order- solving problems using open Modelica.

**UNIT IV**

**20 hrs**

Mathematical Modelling Through Systems of ODE of Second Order: Mathematical Modelling of Planetary Motions – Mathematical Modelling of Circular Motion and Motion of Satellites – Mathematical Modelling Through Linear Differential Equations of Second Order- solving problems using open Modelica.

**UNIT V**

**20hrs**

Mathematical Modelling Through Systems of PDE of Second Order: Situations Giving Rise to PDE Models – Mass- Balance Equations: First Method of Getting PDE Models – Momentum – Balance Equations: The Second Method of Obtaining PDE Models – Variational Principles: Third Method of Obtaining PDE Models – Model of Traffic Flow on a Highway- solving problems using open Modelica.

**Text book**

1	J.N.Kapur	Mathematical modelling	New Age International(P) Ltd,Publishers,New Delhi.
	<a href="https://www.openmodelica.org/">https://www.openmodelica.org/</a>		

**Reference Books**

1	F.R.Hiordano.,M.D.Weir. and W.P.Fox.,	A First Course in Mathematical Modelling	3 <sup>rd</sup> edition, vikas publishing house. 2003
2	Clive L.Dym.,	PriciplesofMathematical Modelling	Second edition , Academic press, Burlington,2006

**Course Designers:**

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics.

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16E04	DISCRETE MATHEMATICS	Elective	101	4	-	5

**Preamble**

- To introduce the basic Mathematics which is applicable for Computer Science.

**Course Outcomes**

On the successful completion of the course, students will be able to



CO Number	CO Statement	Knowledge Level
CO1	Understand and Application of Mathematical logic and definitions and well formed formula. Apply the understanding of Tautology Equality relations	K1
CO2	Ability to reason logically and understand relations, Diagraph and lattice.	K2
CO3	Apply algebraic concepts in coding theory using group codes	K3
CO4	Understand use of groups and codes in Encoding Decoding	K3
CO5	Demonstrate an understanding of abstract models of computing, including deterministic (DFA), nondeterministic (NFA), and Turing (TM) machine models.	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER VI – Elective IV DISCRETE MATHEMATICS

**Credits: 5**

**Hours: 101**

#### UNIT I:

**20hrs**

Logic : IF – Statement – Connectives –Atomic and compound statements- Well formed formulas – Truth tables – Tautology – Tautological implications and equivalence – Replacement process.

#### UNIT II

**20 hrs**

Normal forms: Normal forms – Principal normal forms – Theory of inference – open statements – quantifiers – theory of inference for Predicate calculus – Statements involving more than one quantifiers.

#### UNIT III

**20 hrs**

Coding theory : Introduction – Hamming distance – Encoding a message – Group codes – procedure for generating group codes – Decoding and error correction – An example of simple error correcting code.

#### UNIT IV

**20 hrs**

Automata and Languages : Finite Automata – Definition – representation – acceptability of a string by a FA – Languages accepted by a FA – Equivalence of a FA and NFA – Procedure of finding a FA equivalent to a given NFA.

#### UNIT V:

**21hrs**

Push down Automata : Push down automata – definition – description – properties of move

relation – acceptance by a PDA – equivalence of two types of a acceptance by PDA – context free languages and PDA –turing machines

### Text Books

1	Dr. M.K. Venkataraman, Dr. N. Sridharan and N. Chandrasekaran	Discrete Mathematics	First edition Reprint 2003, The National Publishing company, Chennai
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### Reference Books

1	T.Veerarajan	Discrete Mathematics with Graph Theory and Combinatorics	Tata mcgraw-Hill publishing company Limited, 2008
2	Kenneth H. Rosen	Discrete Mathematics and its Applications	Mc.Graw Hill, 2002.
3	J.P.Tremblay and R.P.Manohar	Discrete mathematical Structures with Applications to Computer Science	McGraw Hill Publishing Company, Edition 1997, Reprint 2010
4	Narsing Deo	Graph Theory with applications to Engineering and Computer science	Prentice-Hall of India pvt. Ltd.,New Delhi, 2004
5	Bernard Kolman, Robert C. Busby, Sharon Culter Ross, Nadeen-ur- Rehman	Discrete Mathematical Structures	Pearson Education,5th edition,2004

### Pedagogy

Chalk and Talk, Seminar, Group discussion, Numerical Exercises, Quiz.

### Course Designers:

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics
2. Dr. D. Sasikala, Assistant Professor, Department of Mathematics.

## SEMESTER VI – Advanced Learners’ Course ASTRONOMY II

**Credits**        5

**Hours:60**

**Subject Code: TH16AC4**

### OBJECTIVE

To study the solar system and expose the mathematical tools used to solve the mysteries of the universe.

### UNIT I

Time : Equation of time – seasons – calendar – conversion of time.

### UNIT II

Annual parallax – abberation.

**UNIT III**

Precession – Nutation.

**UNIT IV**

The moon – eclipses.

**UNIT V**

Planetary phenomena – The Stellar Universe.

**Text Book:**

1	Mr. S. Kumaravelu and Mrs. Susheela Kumaravelu	Astronomy	Revised edition 2005.
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<b>Unit I</b>	Chapter 7	Headings 166 – 189
<b>Unit II</b>	Chapter 9	Headings 190, 195 – 203
<b>Unit III</b>	Chapter 10	Headings 204 – 214
<b>Unit IV</b>	Chapter 12, 13	Headings 229 – 284
<b>Unit V</b>	Chapter 14, 18	Headings 285 – 304, 341 – 359

**Course Designers:**

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. G. Arthi, Assistant Professor, Department of Mathematics.

**SEMESTER VI– Advanced Learners’ Course**  
**FUZZY MATHEMATICS II**

**Credits : 5****Hours : 60****Subject Code: TH16AC5****UNIT I**Fuzzy Relation Equations Sup-i compositions of Fuzzy relations-Inf –  $\omega$ i compositions of Fuzzy relations-Fuzzy relation equations based on sup – i and inf –  $\omega$ i compositions.**UNIT II**

Solution method – Approximate solutions – The use of neural networks.

**UNIT III**

Possibility theory - Fuzzy measures – Evidence theory – Possibility theory –Fuzzy sets and possibility theory.

**UNIT IV**

Fuzzy logic – Fuzzy propositions – Fuzzy quantifiers – Inference from conditional Fuzzy propositions – Inference from conditional and qualified propositions.

**UNIT V**

Uncertainty based information - Information and uncertainty – Non specificity of crisp sets and Fuzzy sets – Fuzziness of Fuzzy sets – Uncertainty in evidence theory.

**Text Book:**

1.	George J Klir/Bo Yuan.,	Fuzzy sets and Fuzzy logic Theory and applications	Prentice Hall of India, Fourth printing June 2001
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**Unit I** Chapter 6 Sections 6.4, 6.5**Unit II** Chapter 6 Sections 6.6, 6.7

<b>Unit III</b>	Chapter 7	Sections 7.1 – 7.4
<b>Unit IV</b>	Chapter 8	Sections 8.3, 8.4, 8.6, 8.7
<b>Unit V</b>	Chapter 9	Sections 9.1 - 9.5

**Course Designers:**

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics
2. Dr. D. Sasikala, Assistant Professor, Department of Mathematics.

**SEMESTER VI– Advanced Learners’ Course  
Topics in Fluid Dynamics II**

**Credits : 5**

**Hours: 60**

**Subject Code: TH16AC6**

**OBJECTIVE**

To introduce the basic concepts of fluid dynamics and expose the students to the practical applications of mathematics.

**UNIT I**

Motion in two dimensions: images, image of a source with regard to a plane – image of a doublet with regard to a plane, circle theorem, image of source with regard to a circle – image of doublet with regard to a circle

**UNIT II**

General motion of cylinder in two dimensions – motion of a circular cylinder in a uniform stream - Blasius theorem – equation of motion of a circular cylinder with circulation

**UNIT III**

The aerofoil – Joukowski transformation – Kutta joukowski theorem – d’ Alemberts’ paradox

**UNIT IV**

Vortex motion : Vortex line – properties of the vortex – strength of a vortex – rectilinear vortex – velocity component – center of vortices – a case of a two vortex filament – stream function when the strength of the vortex filaments are equal – vortex pair – vortex doublet – vortex inside an infinite circular cylinder

**UNIT V**

Navier stokes theorem – equation of motion of a viscous fluid – equation of energy – dissipation of energy – vorticity and circulation in viscous fluids – diffusion of vorticity – the equation of state

**Text Book:**

1	<b>Shanthi Swarup</b>	Fluid dynamics	Krishna Prakashan media (p) ltd, Meerut11th edition 2003,
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<b>UNIT I</b>	:	Chapter 1	Sections 5.8-5.13
<b>UNIT II</b>	:	Chapter 2	Sections 5.17 –5.18, 5.22,5.24
<b>UNIT III</b>	:	Chapter 3	Sections 5.34 – 5.37
<b>UNIT IV</b>	:	Chapter 4	Sections 6.0 – 6.10
<b>UNIT V</b>	:	Chapter 5	Sections 9.13 ,9.15-9.19

**Course Designers:**

1. Dr. B.Tamil Selvi, Associate Professor and Head, Department of Mathematics

**Skill Based Subject**  
**DATA VISUALIZATION AND TABLEAU**

**Semester V & VI**

**Credits: 4**

**Hours: 43**

**Subject code: SB16MA02**

**UNIT I :**

**9 hrs**

Introduction – Computational Statistics and Data Visualization and Theory- Presentation and Exploratory Graphics – Graphics and Computing- Summary and Overview- Part II- Summary and Overview Part III- Outlook-

A Brief History of Data Visualization: Introduction – Milestones Tour- Statistical Historiography- History as Data- Analysing Milestones Data – What was he thinking and Dynamic Data Visualization- Final Thoughts

**UNIT II:**

**9hrs**

Introduction – Content, Context and Construction- Presentation Graphics and Exploratory Graphics- Background- History- Literature- The media and Graphics- Presentation- Scientific Design Choices in Data Visualization – Choice of Graphical Form- Graphical Display options- Higher –dimensional Displays and special Structures- Scatterplo Matrices- Parallel Coordinates- MosaicPlots- Small Mltiples and Trellis Displays- Time series and maps.

**UNIT III:**

**9 hrs**

Static Graphics – Complete plots- Sensible Defaults- User interface- Customization- Setting Parameters – Arranging plots- Annotation. Extensibility- Building Blocks- Combining Graphical Elements- 3D plots – speed- Output formats- Data Handling.

**UNIT IV**

**8 hrs**

**Tableau:** Introduction and Getting Started: Tableau Desktop’s role in the Tableau product line – Application terminology – Tableau Packaged Workbooks – Publishing to Tableau Server (Web) – Publishing to Tableau Reader – Publishing to Tableau Public – Publishing to PDF. Best Practices in Connecting to Data: Working with Meta data – Data source changes – Overview of other connection options. Working with Data: Filtering your data – Sorting – Building groups – Building hierarchies – Sets

**UNIT V**

**8 hrs**

Building Visualizations: Building Bar Charts – Building Text Tables – Building Line Charts – Building Scatter Plots – Building Heat Maps – Building Gantt Bar Charts – Building Pie Charts – Building Treemaps – Building Box Plots – Building Packed Bubble Charts – Building Map Views. Building Dashboards: Overview of dashboards – Building your first dashboard

**Text Books:**

Sl.No.	Author Name	Title of the Book	Publisher Name	Year & Edition
1.	Chun-houh Chen, Wolfgang Hardle, Antony Unwin	Handbook of Data Visualization	Springer publication	2008
2.	Joshua N. Milligan	Learning Tableau -	Packt Publishing	Revised Edition

		How Data Visualization Brings Business Intelligence to Life		
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**Course Designers:**

1. Dr. K.Sumathi, Associate Professor, Department of Mathematics.
2. Dr. D. Sasikala, Assistant Professor, Department of Mathematics.

**DATA VISUALIZATION AND TABLEAU PRACTICALS**

**Semester V & VI**

**Credits: 4**

**Hours: 43**

**Subject code: SB16MAP2**

1. Creating a Tree map using Tableau
2. Draw a histogram , pie chart using Tableau
3. Draw box plot and Gantt chart using Tableau
4. Draw a trend line using Tableau
5. Creating or modify a schedule using Tableau
6. Publishing data in Tableau
7. Working with data, filter, sorting
8. Data visualization using charts and scatter plots
9. Report generation in Tableau
10. Form a word cloud using Tableau

**Allied Courses Offered to Other Programs**  
**For the Students Admitted During the Year 2017 -2018**

**Semester I**

BBA – Allied - Mathematics for Management I Level I (TH17A02B)  
 BBA - Allied - Mathematics for Management I Level II (TH17A02A)

**Semester III**

B.COM Allied - Mathematics for Commerce Level I (TH16A07B)  
 B.COM Allied - Mathematics for Commerce Level II (TH16A07A)  
 B.SC (Chemistry/ Botany) Allied - Mathematics for Sciences I (TH16A09)  
 B.SC (Physics) Allied - Mathematics for Physics I - (TH16A12)

**Semester IV:**

B.COM Allied - Statistics for Commerce Level I (TH16A08B)  
 B.COM Allied – Statistics for Commerce Level II (TH16A08A)  
 B.SC (Chemistry/ Botany) Allied - Mathematics for Sciences II (TH16A14)  
 B.SC (Physics) Allied - Mathematics for Physics II - (TH16A13)

<b>COURSE NUMBER</b>	<b>COURSE NAME</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>TH17A02B</b>	<b>MATHEMATICS FOR MANAGEMENT I - LEVEL I</b>	<b>Allied</b>	<b>86</b>	<b>4</b>	<b>-</b>	<b>5</b>

**Preamble**

- To inspire the students to get the knowledge in basic mathematical concepts
- Introducing the need for mathematics to recognize appropriate investigate and interpretive procedures in management

**Course Outcomes**

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Learn basic set theoretic concepts, matrices and statistics	K1
CO2	Apply mathematical results to find solutions in the real life like annuities and sampling theory	K2
CO3	Use statistical software (eg., Minitab, Excel)to perform statistical computations and display numerical and graphical summaries of data sets.	K2
CO4	Critically evaluate the design, including sampling techniques of a statistical study	K3
CO5	Solve simultaneous equations using matrices	K3

**Mapping with Programme Outcomes**

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	M	S	M
CO3	S	S	S	S	S
CO4	M	S	S	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

**Syllabus****BBA(Aided)****ALLIED - MATHEMATICS FOR MANAGEMENT I- LEVEL I (TH17A02B)****UNIT I****17 hrs**

Set theory: Definition, notation, Methods of description of sets, types of sets, Venn diagram, Set operations, laws and properties of sets, number of elements, Cartesian product.

Matrices-Fundamental ideas about Matrices-operational Rules-Matrix Multiplication- Solving a system of linear equation by Cramer's rule and matrix inverse method , Inversion of Square Matrices of 3<sup>rd</sup> order, rank, simple problems.

**UNIT II****17 hrs**

Mathematics of Finance- Simple and Compound Interest, Depreciation, Annuities, Sinking Fund,

**UNIT III****17 hrs**

Meaning and scope, statistical survey, collection of data, classification and tabulation, diagrams and graphs. Introduction to statistical software( like Excel) and learning graphs and diagrams using Excel.

**UNIT IV****17 hrs**

Measure of central tendency, arithmetic mean, median and mode, geometric and harmonic mean. Measures of dispersion: Range, Quartile deviation, mean deviation, standard deviation, coefficient of variation. Simple problems related to above mentioned concepts using Excel.

**UNIT V****18 hrs**

Analysis of Time Series: **Secular Trend**, Index numbers: Weighted and unweighted indices, cost of living index.

Mini project using a sample of size 50 and analysis using Minitab/Excel.

**Text Book**

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A.Navntham	Business Mathematics And Statistics	Jai Publishers	2003
	<b>UNIT I</b>	: Vol I Ch-3 sections 1, 2,3,4,5,6,7,8,9 Ch-4 sections :1,2,3,4,5,6,7,9,10		
	<b>UNIT II</b>	: Vol I Ch-2 sections 1, 2, 3,4,5,6,7		
	<b>UNIT III</b>	: Vol II Ch-1-6		
	<b>UNIT IV</b>	: Vol II Ch-7, 8. Ch-12: (pg 503-521)		
	<b>UNIT V</b>	: Vol II Ch-14 (pg no:579-594) Ch- 10 (444-459)		

**References**

S.No	Author	Title of Book	Publishers	Year of publication
1	S.P .Gupta	Statistical Method	Sultan Chand Publications	2002



2	Sundaresan , Jayaselan	An Introduction To Business Mathematics	Sultan Chand & Sons	2003
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### Pedagogy

Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

### Course Designers:

1. Dr.B.Tamil Selvi, Associate Professor, Department of Mathematics
2. S.Deepa, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
TH17A02A	MATHEMATICS FOR MANAGEMENT I LEVEL II	ALLIED	86	4	-	5

### Preamble

- To inspire the students to get the knowledge in basic mathematical concepts
- Introducing the need for mathematics to recognize appropriate investigate and interpretive procedures in management

### Course Outcomes

CO Number	CO Statement	Knowledge Level
CO1	Learn basic set theoretic concepts, matrices and statistics	K1
CO2	Apply mathematical results to find solutions in the real life like annuities and sampling theory	K2
CO3	Use statistical software (eg., Minitab, Excel)to perform statistical computations and display numerical and graphical summaries of data sets.	K2
CO4	Critically evaluate the design, including sampling techniques of a statistical study	K3
CO5	Solve simultaneous equations using matrices	K3

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	M	S	M
CO3	S	S	S	S	S
CO4	S	S	M	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

### Syllabus

#### BBA (Aided)

#### ALLIED - MATHEMATICS FOR MANAGEMENT I - LEVEL II (TH17A02A)

#### UNIT I

17 hrs

Set theory: Definition, notation, Methods of description of sets, types of sets, Venn diagram, Set operations, laws and properties of sets, number of elements, Cartesian product. Matrices-Fundamental ideas about Matrices-operational Rules-Matrix Multiplication- Solving a system of linear equation by Cramer's rule and matrix inverse method , Inversion of Square Matrices of 3<sup>rd</sup> order, rank, consistency of a system of simultaneous linear Equations, input-output analysis.

## UNIT II

17 hrs

Mathematics of Finance- Simple and Compound Interest, Depreciation, Annuities, Sinking Fund, Discounting present Values, Discounting of bills true discount, Bankers discount and gain.

## UNIT III

17 hrs

Meaning and scope, statistical survey, collection of data, classification and tabulation, diagrams and graphs. Introduction to statistical software( like Minitab/Excel) and learning graphs and diagrams using Excel.

## UNIT IV

17 hrs

Measure of central tendency, arithmetic mean, median and mode, geometric and harmonic mean, Deciles, percentiles Measures of dispersion: Range, Quartile deviation, mean deviation, standard deviation, coefficient of variation. Simple linear correlation, simple linear regression simple problems related to above mentioned concepts using Excel.

## UNIT V

18 hrs

Analysis of Time Series: Secular Trend, Seasonal fluctuations, Index numbers: Weighted and unweighted indices, cost of living index.

Mini project using a sample of size 50 and analysis using Minitab/Excel.

### Text Book:

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A.Navnitham	Business Mathematics And Statistics	Jai Publishers	2009
	<b>UNIT I</b>	: Vol I Ch-3 sections 1, 2,3,4,5,6,7,8,9 Ch-4 sections 1,2,3,4,5,6,7,9,10,11,13		
	<b>UNIT II</b>	: Vol I Ch-2 sections 1, 2, 3,4,5,6,7,8,10.		
	<b>UNIT III</b>	: Vol II Ch-1-6		
	<b>UNIT IV</b>	: Vol II Ch-7, 8,12,13.		
	<b>UNIT V</b>	: Vol II Ch-14 sections -1,2,3,4 Ch- 10 Sections -1,2,3,4		

### References

S.No	Author	Title of Book	Publishers	Year of publication
1	S.P .Gupta	Statistical Method	Sultan Chand Publications	2010
2	Sundaresan , Jayaselan	An Introduction To Business Mathematics	Sultan Chand & Sons	2011

### Pedagogy

Chalk and talk, ppt, Group discussion, Seminar, Quiz , Assignment

### Course Designers:

- 1.Dr.B.Tamil Selvi, Associate Professor, Department of Mathematics
- 2.S.Deepa, Assistant Professor, Department of Mathematics

<b>COURSE NUMBER</b>	<b>COURSE NAME -</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
TH16A07B	MATHEMATICS FOR COMMERCE - LEVEL I	Allied	86	4	-	5

### Preamble

- To present the basic concepts of Mathematics to the students.
- To enable the students to find the practical applications to the real world problems etc.

### Course Outcomes

Upon the successful completion of the course, students will be able to

### Mapping with Programme Outcomes

CO Number	CO Statement	Knowledge Level			
CO1	Demonstrate about the series, sets and Mathematics of Finance	K1			
CO2	Understand the concepts of Matrices	K2			
CO3	Understand the limits of Algebraic functions and simple differentiation	K2			
CO4	Understand the concepts of simple integration and its application in business	K3			
CO5	Understand the linear programming problems	K3			
COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	M	S	M	S	S
CO3	M	S	S	M	M
CO4	S	M	M	S	M
CO5	M	S	M	S	M

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER III B.COM

#### ALLIED - MATHEMATICS FOR COMMERCE – LEVEL I (TH16A07B)

**Credits 5**

**Hours 86**

#### Unit I

**17 hrs**

Series: Arithmetic and Geometric series - Mathematics of Finance: Simple and compound interest - Effective rate of interest – Annuities - Present value - Discounting of bills - True discount - Banker's gain. Set Theory: Definition - Notation - Methods of description of sets - Types of sets - Venn diagram - Set operations - Laws and properties of sets - Number of elements - Cartesian product.

#### Unit II

**17hrs**

Matrices : Basic concepts - Addition and Multiplication of Matrices - Inverse of a Matrix - Rank of a Matrix - Solution of simultaneous linear equations by matrix inverse method and by Cramer's rule.

#### Unit III

**17 hrs**

Variables - Constants and functions - Limits of algebraic functions - Simple differentiation of algebraic function - Meaning of derivative - Evaluation of first and second order derivatives for algebraic - Exponential - Logarithmic functions. Maxima and minima - applications to Business problems (excluding trigonometric functions).

**Unit IV****16hrs**

Integration: Elementary integral calculus - Determine indefinite and definite integrals of simple functions - Method of substitution - Method of partial fractions - Integration by parts - Business applications (excluding Trigonometric functions).

**Unit V****17 hrs**

Linear programming problem: Formation - Solution by Graphical method & Simplex method (No theory problem only). The Transportation problem: Mathematical formulation of the problem – Initial Basic feasible solution (Matrix Minima Method - North – West Corner rule and VAM)

**Text Books**

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003
	UNIT I : Chapter -1 sections 1,2,3,4. Chapter -2 sections 1, 2,3,4,5,6,7,9,10 Chapter - 3 sections 1, 2,3,4,5,6,7,8,9 UNIT II : Chapter - 4 sections 1,2,3,4,5,6,7,8,9,10 UNIT III: Chapter - 5, sections 1, 2,3,4,5 Chapter - 6 sections 1,2,3,4,5, 6,7,8 Chapter - 7 sections 1, 2,3,4,5, 6 UNIT IV: Chapter -8 sections 1,2,3,4,5,6,7,8 UNIT V :Chapter -9 excluding “Charne’s method of penalties			
2.	Kantiswarup, P.K.Gupta and Man mohan	Operations Research	Sultan Chand and Sons - 14 <sup>th</sup> edition	2008
	UNIT -V :Chapter -2,3,4: 4.1 -4.3 Chapter 10: 10.1-10.9			

**Reference Books**

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Dharmapadam	Business Mathematics	Visvanathan .S Ltd	1991
2.	Dr.P.R.Vittal	Business Mathematics and Statistics	Margham Publications	2000

**Pedagogy**

Chalk and talk, ppt, Group discussion, Seminar, Quiz , Assignment

**Course Designers:**

- 1.Dr. B. Tamilselvi, Associate professor, Department of Mathematics
- 2.Ms. A. Karpagam, Associate professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16A08A	MATHEMATICS FOR COMMERCE - LEVEL II	Allied	86	4	-	5

**Preamble**

- To present the basic concepts of Mathematics to the students.

- To enable the students to find the practical applications to the real world problems etc.

### Course Outcomes

Upon the successful completion of the course, students will be able to

### Mapping with Programme Outcomes

CO Number	CO Statement					Knowledge Level
CO1	Demonstrate about the series, sets and Mathematics of Finance					K1
CO2	Understand the concepts of Matrices					K2
CO3	Understand the limits of Algebraic functions and simple differentiation					K2
CO4	Understand the concepts of simple integration and its application in business					K3
CO5	Understand the linear programming problems and Game theory					K3
COs/POs	PO1	PO2	PO3	PO4	PO5	
CO1	S	S	M	S	M	
CO2	M	S	M	S	S	
CO3	M	S	S	M	M	
CO4	S	M	M	S	M	
CO5	M	S	M	S	M	

S- Strong; M-Medium; L-Low

### Syllabus

#### SEMESTER III B.COM

#### ALLIED - MATHEMATICS FOR COMMERCE – LEVEL II

**Credits 5**

**Hours 86**

#### Unit I

**17 hrs**

Series: Arithmetic and Geometric series - Mathematics of Finance: Simple and compound interest - Effective rate of interest – Annuities - Present value - Discounting of bills - True discount - Banker's gain. Set Theory: Definition - Notation - Methods of description of sets - Types of sets - Venn diagram - Set operations - Laws and properties of sets - Number of elements - Cartesian product.

#### Unit II

**17 hrs**

Matrices : Basic concepts - Addition and Multiplication of Matrices - Inverse of a Matrix - Rank of a Matrix - Solution of simultaneous linear equations by matrix inverse method and by Cramer's rule.

#### Unit III

**17 hrs**

Variables - constants and functions - Limits of algebraic functions - Simple differentiation of algebraic function - Meaning of derivative - evaluation of first and second order derivatives for algebraic - Exponential - Logarithmic functions. Maxima and minima - applications to Business problems (Excluding Trigonometric functions).

#### Unit IV

**17 hrs**

Integration : Elementary integral calculus - Determine indefinite and definite integrals of simple functions - Method of substitution - Method of partial fractions - Integration by parts - Business applications (Excluding Trigonometric functions).

#### Unit V

**18 hrs**

Linear programming problem: Formation - Solution by Graphical method & Simplex method (No theory - problem only) Game Theory: Useful Terminology – Rules for Game Theory - Pure Strategy - Mixed Strategy (2 x 2 games, 2 x n games and m x 2 games) - Simple problems only.

**Text books:**

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	JaiPublishers, Trichy.	2003
		UNIT I : Chapter -1 sections 1,2,3,4. Chapter -3 sections 1, 2,3,4,5,6,7,8. Chapter -2 sections 1, 2,3,4,5,6,7,10 UNIT -II : Chapter -4 sections 1,2,3,4,5,6,7,9,10 UNIT -III: Chapter -7 sections 1, 2,3,4,5, 6 Chapter -6 sections 1,2,3,4,5, 6,7,8 Chapter -5, sections 1, 2,3,4,5 UNIT -IV: Chapter -8 sections 1,2,3,4,5,6,7,8 UNIT -V :Chapter -9 excluding “Charne’s method of penalties		
2.	Kantiswarup, P.K.Gupta and Man mohan	Operations Research	Sultan Chand and Sons - 14 <sup>th</sup> edition	2008
		UNIT -V :Chapter -2,3,4: 4.1 -4.3 Chapter 17:17.1-17.6		

**References Books:**

S. No	Author	Title of the book	Publishers	Year of Publication
1.	Dharmapadam	Business Mathematics	Visvanathan .S Ltd	1991
2.	Dr.P.R.Vittal	Business Mathematics and Statistics	Margham Publications	2000

**Pedagogy**

Chalk and talk, PPT, Group discussion, Seminar, Quiz, Assignment

**Course Designers:**

- 1.Dr. B. Tamilselvi , Associate professor, Department of Mathematics
2. Dr. D. Sasikala, Assistant professor, Department of Mathematics

COURSE NUMBER	COURSE NAME -	Category	L	T	P	Credit
TH16A12	ALLIED MATHEMATICS FOR PHYSICS I	Allied	101	4	-	5

## Preamble

- To introduce the fundamentals concepts of vector calculus, matrices, Laplace transforms and tensors which acts as a tool for understanding basic theories in theoretical physics

## Prerequisite

- Knowledge in basic concepts of calculus and matrices

## Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Understand the differential operators of classical vector Calculus: gradient, divergence and curl	K1
CO2.	Differentiate and integrate vector and scalar fields along contours in n – dimensional space. Appreciate and use Gauss's, Green's & Stokes theorems	K1
CO3.	Determine when a matrix has an inverse and find it when it exists	K2
CO4.	Apply the Laplace transform to differential equations	K2
CO5.	Demonstrate knowledge of tensors and operations of tensors	K3

## Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
C01.	S	S	S	S	S	S
CO2.	S	S	S	S	S	S
CO3.	S	S	S	S	S	S
CO4.	S	S	S	S	S	S
CO5.	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER III – ALLIED MATHEMATICS FOR PHYSICS - I

**Credits: 5**

**Hours: 101**

**Subject Code : TH16A12**

#### UNIT I

**20 hrs**

Vector Calculus: Scalar and vector point functions - Differentiation of vectors - Differential vector Operators - Directional derivative: Gradient, Divergence and curl -MAPLE Applications – Stepwise Solutions of Vector Calculus.

#### UNIT II

**20 hrs**

Integration for vectors: Line, Surface and Volume integrals - Theorems of Gauss, Green's and Stoke's (Statement only) - Verification of Simple problems - MAPLE Applications - Stoke's problem

#### UNIT III

**20 hrs**

Laplace Transforms : Definition – Laplace Transform of  $e^{at}$ ,  $\cos at$ ,  $\sin at$ ,  $\cosh at$ ,  $\sinh at$ ,  $t^n$ ,  $n$  a positive integer –  $L[f'(t)]$ ,  $L[f''(t)]$ , .....,  $L[f^n(t)]$  – Laplace transform of  $e^{at}\cos bt$ ,  $e^{at}\sin bt$  and  $e^{at}t^n$ . Inverse Laplace transforms of standard functions. Solving differential equations of second order with constant coefficients using Laplace transform.

**UNIT IV**

**20 hrs**

Matrices: Eigen values and Eigen vectors - Cayley Hamilton theorem (without proof) – Verification – Using this theorem finding the inverse of a matrix – Partition of matrices – Diagonalisation of matrices - Power of matrices.

**UNIT V**

**21 hrs**

Tensor Analysis : Definition of Tensors – Contravariant - Covariant and mixed tensors - Addition and subtraction of Tensors - Summation convention - Symmetry and Axisymmetry Tensor - Contraction and direct product – Quotient Rule – MAPLE Application – Tensor Calculus with differential Geometry.

**Text Books**

S. No	Author	Title of the book	Publishers
1	P.Kandasamy & K.Thilagavathy	Allied Mathematics Volume II (For Unit I &II)	S.Chand & company LTD – First edition (2004)
2	T.K.Manicavachagam Pillai and S. Narayanan	Ancillary Mathematics (For Unit III & IV) Volume - I & Volume - II	S.Viswanathan (Printers and Publishers) Pvt. Ltd. Vol. I - 2009 & Vol. II - 2008
3	A.W.Joshi	Matrices and Tensors in Physics(For unit V)	New Age International Publishers, Revised Edition,(2010)
4	<a href="http://www.maplesoft.com/applications/">http://www.maplesoft.com/applications/</a>		

**Reference Books**

S. No	Author	Title of the book	Publishers
1	P.DuraiPandian and KayalalPachaiyappa	Vector Analysis	S Chand Publications (2014)
2	Shanthinarayan and P.K Mital	Vector Calculus	S Chand publications (20)
3	P.C .Mathews	Vector Calculus	Springer Verlag London Ltd. (1998)
4	B. D. Gupta	Mathematical Physics	Vikas Publications (1993)

- Unit I & II** : Chapters 1 to 3
- Unit III** : Chapter 7 (Volume II)
- Unit IV** : Chapter 3 (Volume I) 6.2, 14.0 to 17
- Unit V** : Part II, Chapters 15, 17

**Note**

*Question paper setters confine to the above text books only.*

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises and Demonstration



### Course Designers:

1.Dr.B.TamilSelvi, Associate Professor and Head, Department of Mathematics

2.Ms. A. Karpagam, Associate Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16A09	ALLIED – MATHEMATICS FOR SCIENCES I	Allied	101	4	-	5

### Preamble

- To inspire the students to use appropriate and relevant, fundamental and applied mathematical knowledge.
- To explore how Chemistry and Mathematics interact with other disciplines with industry and with wider society.

### Prerequisite

- Knowledge in Calculus and Set theory.

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Determine and apply the important quantities associated with vector fields such as divergence, curl and scalar potential.	K1
CO2.	Apply fundamental theorem of line integrals, Green's theorem, Stoke's theorem and Divergence theorem to evaluate integrals	K2
CO3.	Find the Laplace transform of one variable and solve an initial value problem for $n^{\text{th}}$ order ordinary differential equation using Laplace transform	K2
CO4.	Determine when a matrix has an inverse and find it when it exists	K3
CO5.	Demonstrate knowledge of basic concepts such as Abelian groups, normal subgroups, quotient groups, cyclic groups, permutation groups and group actions	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	M	S	S
CO2	S	M	S	S	S	S
CO3	S	S	S	M	S	S
CO4	S	S	M	S	S	S
CO5	S	S	S	S	M	S

S- Strong; M-Medium; L-Low

**Syllabus****SEMESTER III  
ALLIED - MATHEMATICS FOR SCIENCES I****Credits : 5****Hours: 101****Subject Code : TH16A09****UNIT I****20 hrs**

Vector Calculus: Scalar and Vector point functions - Differentiation of vectors - Differential Operators - Directional derivative: Gradient - Divergence and curl - MAPLE Applications - Stepwise Solutions of Vector Calculus.

**UNIT II****20 hrs**

Integration for vectors : Line, surface and volume integrals – Theorems of Gauss, Green's and Stoke's (statements only) – *Verification of MAPLE Applications* – Stoke's problem.

**UNIT III****20 hrs**

Laplace Transforms : Definition – Laplace Transform of  $e^{at}$ ,  $\cos at$ ,  $\sin at$ ,  $\cosh at$ ,  $\sinh at$ ,  $t^n$ ,  $n$  is a positive integer –  $L[f'(t)]$ ,  $L[f''(t)]$ , .....,  $L[f^{(n)}(t)]$  – Laplace transform of  $e^{at}\cos bt$ ,  $e^{at}\sin bt$  and  $e^{at}t^n$  – Inverse Laplace Transforms of standard functions - Solving differential equations of second order with constant coefficients using Laplace transform.

**UNIT IV****20 hrs**

Matrices: Eigen values and eigen vectors - Cayley Hamilton theorem (without proof) – Verification – Finding the inverse of a matrix (Using Cayley Hamilton theorem).

**UNIT V****21 hrs**

Review of Set theory and equivalence relations – Group – Properties - Order of an element – Subgroups - Cyclic groups – Theorems – Permutation group - Symmetric group  $S_n$ .

**Text Books**

S. No	Author	Title of the book	Publishers
1	P.Kandasamy & K.Thilagavathy	Allied Mathematics Volume II (For Unit I & II)	S.Chand & company LTD – First edition (2004)
2	T.K.Manicavachagam Pillai and S. Narayanan	Ancillary Mathematics (For Unit III & IV) Volume I & Volume II	S.Viswanathan (Printers and Publishers) Pvt. Ltd. Volume I – 2009 & Volume II – 2008
3	P.Kandasamy & K.Thilagavathy	Mathematics Volume II (For Unit V)	S Chand & Company LTD - First edition (2004)
4	<a href="http://www.maplesoft.com/applications/">http://www.maplesoft.com/applications/</a>		

**Reference Books**

S. No	Author	Title of the book	Publishers
1	P.DuraiPandian and	Vector Analysis	S Chand Publications (2014)

	KayalalPachaiyappa		
2	Shanthinarayan and P.K. Mital	Vector Calculus	S Chand publications (20)
3	P.C. Mathews	Vector Calculus	Springer Verlang London Ltd. (1998)
4	G. Balaji	Transforms and Partial differential equations	G. Balaji publishers, Revised edition (2011)

<b>Unit I &amp; II</b>	:	Chapters– 1 to 3
<b>Unit III</b>	:	Chapter 7 Volume II
<b>Unit IV</b>	:	Chapter 3 Volume I
<b>Unit V</b>	:	Group Theory 1– 4 (Volume II)

### Note

*Question paper setters to confine to the above text books only.*

### Pedagogy

Chalk and Talk, Seminar, Group Discussion, Demonstration and Numerical Exercises.

### Course Designers

1. Dr.B.Tamilselvi, Associate Professor and Head, Department of Mathematics
2. Dr.R.Lakshmi, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16A08B	STATISTICS FOR COMMERCE - LEVEL I	Allied	86	4	-	5

### Preamble

- To present students the Basic concepts of statistics.
- To enable the students to find the practical applications to the real world problems etc.

### Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO7.	Understand the basics about collection of data and representation of data	K1
CO8.	Obtain the approximate solutions in mathematical problems.	K2
CO9.	Analyse and evaluate the accuracy of common Statistical methods or model.	K2
CO10.	Understand about Index numbers, interpolation and extrapolation	K3
CO11.	Implement the Statistical Techniques in various types of topics.	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	M
CO3	S	M	S	M	S
CO4	M	S	M	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER IV B.COM

#### ALLIED - STATISTICS FOR COMMERCE – LEVEL I (TH16A08B)

**Credits 5**

**Hours 86**

#### Unit I

**16 hrs**

Diagrams and graphs - Measures of central tendency - Measures of dispersion.  
(Verification by excel)

#### Unit II

**19 hrs**

Skewness - Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - Types of correlation - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error - Coefficient of determination - Properties of the coefficient of the correlation - Rank correlation coefficient - Features of Spearman's correlation coefficient. Regression analysis.(Verification by excel)

#### Unit III

**17 hrs**

Analysis of time Series - Introduction -Utility of time series - Components of time series - Preliminary adjustments before analyzing time series - Measurement of trend - Free hand graphic method - Method of semi averages - Moving average method - Measurement of seasonal variations - Method of simple averages only.

#### Unit IV

**17 hrs**

Index Numbers: Introduction - Uses of index numbers - Classification of index numbers - problems in construction of index numbers - Methods of constructing index numbers - Quantity of volume index numbers - Value index numbers - Tests of adequacy of index number formulae. Interpolation: Introduction - Significance of interpolation and extrapolation - Assumptions of interpolation and extrapolation - Methods of interpolation - Binomial expansion methods - Lagrange's method

#### .Unit V

**17 hrs**

$\chi^2$  Test and Goodness of fit: F -test - Analysis of variance (Problems only).

## Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S P Gupta	Statistical Methods	Sultan Chand & Sons publishers	2004
		Unit I :Volume I: Chapter: 6, 7 & 8.		

Unit II: Volume I: Chapter: 9(till measures of skewness),10,11. Unit III: Volume I: Chapter: 14(up to Method of simple averages only) Unit IV: Volume I: Chapter: 13 & 15. Unit V : Volume II: Chapter: 4 & 5.
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### Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003

### Pedagogy

Chalk and talk, ppt, Group discussion, Seminar, Quiz , Assignment

### Course Designers:

- 1.Dr. K. Sumathi, Associate professor, Department of Mathematics
- 2.Dr. G. Arthi, Assistant professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16A08A	STATISTICS FOR COMMERCE - LEVEL II	Allied	86	4	-	5

### Preamble

- To present the basic concepts of Statistics to the students.
- To enable the students to find the practical applications to the real world problems etc.

### Course Outcomes

Upon the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics about collection of data and representation of data	K1
CO2	Obtain the approximate solutions in Mathematical problems.	K2
CO3	Analyse and evaluate the accuracy of common Statistical methods or model.	K2
CO4	Understand about Index numbers, interpolation and extrapolation	K3
CO5	Implement the Statistical Techniques in various types of topics.	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	M

CO3	S	M	S	M	S
CO4	M	S	M	S	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

## Syllabus

### SEMESTER B.COM

#### ALLIED - STATISTICS FOR COMMERCE – LEVEL II (TH16A08A)

**Credits 5**

**Hours 86**

#### Unit I

**16 hrs**

Diagrams and graphs - Measures of central tendency - Measures of dispersion - Probability: Introduction - probability defined - Importance of the concept of probability - Calculation of probability - Theorems of probability (statements only) - Simple problems. (Verification by Excel)

#### Unit II

**19 hrs**

Skewness - Correlation analysis :Introduction - Significance of the study of correlation - Correlation and causation - Types of correlation - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error - Coefficient of determination - Properties of the coefficient of the correlation - Rank correlation coefficient - Features of Spearman's correlation coefficient - Merits and limitations of the rank method - Regression analysis. (Verification by Excel)

#### Unit III

**17 hrs**

Analysis of time Series -Introduction - Utility of time series - Components of time series - Preliminary adjustments before analysing time series - Measurement of trend - Free hand graphic method - Method of semi averages - Moving average method - Measurement of seasonal variations - Method of simple averages only - Ratio-to-trend Method - Ratio-to - moving average method - Link relative method.

#### Unit IV

**17 hrs**

Index Numbers: Introduction - Uses of index numbers - Classification of index numbers - Problems in construction of index numbers - Methods of constructing index numbers - Quantity of volume index numbers - Value index numbers - Tests of adequacy of index number formulae. Interpolation: Introduction - Significance of interpolation and extrapolation - Extrapolation - Assumptions of interpolation and extrapolation - Methods of interpolation - Binomial expansion methods - Newton's method - Lagrange's method.

#### Unit V

**17 hrs**

$\chi^2$  Test and Goodness of fit: F-test - t-test - Analysis of variance-Test of significance for small samples - The assumptions of Normality - Student's t -distribution - Properties of t-distribution - Application of the t-distribution - To test the significance of the mean of a Random Sample - Testing Difference Between means of two samples(Independent sample). (Problems only)

## Text Book

S. No	Author	Title of the book	Publishers	Year of Publication
1.	S P Gupta	Statistical Methods	Sultan Chand & Sons publishers	2004
	Unit I :Volume I: Chapter: 6, 7 & 8. Volume-II Chapter :1(Till Multiplication Theorem)			

Unit II: Volume I: Chapter: 9(till measures of skewness),10,11. Unit III: Volume I: Chapter: 14 (Up to Link relative Method) Unit IV: Volume I: Chapter: 13 & 15. Unit V : Volume II: Chapter: 3 (Section 3.5 fully) 4 & 5.
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### Reference Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	P.A. Navnitham	Business Mathematics and Statistics	Jai Publishers, Trichy.	2003

### Pedagogy

Chalk and talk, ppt, Group discussion, Seminar, Quiz , Assignment

### Course Designers:

1. Dr. K. Sumathi, Associate professor, Department of Mathematics
2. Dr. R. Lakshmi, Assistant professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16A13	ALLIED MATHEMATICS FOR PHYSICS II	Allied	101	4	-	5

### Preamble

- To develop general skills in differentiation, integration and algebraic manipulation
- To introduce variety of differential equations and their solutions with emphasis on applied problems in Engineering and Physics
- To describe basic ideas of Fourier series

### Prerequisite

Knowledge of Differential Calculus, Integral Calculus and Vector Calculus.

### Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Use multiple integration to find areas and volumes of simple geometrical objects	K1
CO2.	Develop the ability to apply differential equations to significant applied or theoretical problems.	K1
CO3.	Solve problems in ordinary differential equations, dynamical systems	K2
CO4.	Demonstrate their understanding of how physical phenomena are modeled by differential equations and dynamical systems	K2
CO5.	Compute the Fourier series representation of a periodic function, in both exponential and sine-cosine forms	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5
C01.	S	S	S	S	S
CO2.	S	S	S	S	S
CO3.	S	S	S	S	S
CO4.	S	S	S	S	S
CO5.	S	S	S	S	S

S- Strong; M- Medium; L- Low

## Syllabus

### SEMESTER IV – ALLIED MATHEMATICS FOR PHYSICS - II

**Credits: 5**

**Hours: 101**

#### UNIT I

**20 hrs**

Integration – Multiple integrals – Evaluation of double integrals – Changing the order of integration – Double integrals in polar Coordinates – Cylindrical co-ordinates (problems related cylindrical coordinates) - Application of double integrals in evaluating area between curves.

#### UNIT II

**20 hrs**

Integration: Evaluation of triple integrals – Jacobian of two and three variables- Beta and Gamma functions – Relation - Evaluation of double and triple integrals using Beta and Gamma Functions – Bessel's function (Simple problems)

#### UNIT III

**20 hrs**

Differential equation of the form  $(aD^2 + bD + C)y = e^{ax}\phi(x)$  where a,b,c are constants,  $\phi(x) = \sin mx$  or  $\cos mx$  or  $x^m$  - Solution of homogeneous linear differential equations of the form  $(ax^2D^2 + bxD + c)y = X$  where X is a function of x – Equation reducible to homogeneous equation.

#### UNIT IV

**20 hrs**

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of first order equations.  $f(p,q) = 0$ ,  $f(x,p,q)=0$ ,  $f(y,p,q)=0$ ,  $f(z,p,q)=0$ ,  $f_1(x,p) = f_2(y,q)$ ,  $z = px+qy+f(p,q)$  – Equations reducible to the standard forms - Lagrange method of solving linear partial differential equation  $Pp+Qq = R$  – Charpit's method (simple problems only).

#### UNIT V

**21 hrs**

Fourier series: Definition – Finding Fourier Coefficients for a given periodic function with period  $2\pi$  - Odd and Even functions – Half range series – Change of Intervals – Applications.

#### Text Book

1	S. Narayanan and T.K.M Pillay	Calculus Volume II & III	S. Viswanathan (Printers and Publishers) Pvt. Ltd. – Reprint Volume III (2014), Volume II (2015)
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#### Reference Books

1	Dr. M.D. Raisinghania	Ordinary and Partial differential Equations	S Chand and Company Ltd., Revised Edition (2013)
2	Richard C. Diprima William E.Boyce	Elementary Differential equations and Boundary value problems	Wiley India private Ltd., 9 <sup>th</sup> Edition (2013)



3	A.K.Sharma	Multiple Integrals	Discovery Publishing House, First Edition (2005)
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<b>UNIT I &amp; II</b>	:	Chapter 5	Sections –2.1 to 4.0, 5.1to 5.4& 6.0 to 6.3
		Chapter 6	Sections-1.1 to 2.4
		Chapter 7	Sections-2.1 to 2.3,3,4,5,6
<b>UNIT III</b>	:	Chapter 2	Sections – 1.0 to 4, 8.0 to8.3
<b>UNIT IV</b>	:	Chapter 4	Sections 1.0 to 7.0
<b>UNIT V</b>	:	Chapter 6	Sections 1.0 to 6.0

**Note:**

(Question paper setters to confine to the above text books only)

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises and Demonstration.

**Course Designers:**

1. Dr.K.Sumathi, Associate Professor, Department of Mathematics
2. Dr.D.Sasikala, Assistant Professor, Department of Mathematics

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
TH16A14	ALLIED - MATHEMATICS FOR SCIENCES II	Allied	101	4	-	5

**Preamble**

- To acquaint the students with the tools in Mathematics to problem solving in as many areas as possible.
- To acquire both a conceptual and operational understanding of differential and integral calculus in one and several variables

**Prerequisite**

- Knowledge in Differential and Integral Equations

**Course Outcomes**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Know basic concepts relating integration, differentiation and Fourier series	K1
CO2.	Understand several techniques of differentiation and integration of real valued functions	K2
CO3.	Learn methods of formation and solving differential equations of dimensions one and higher	K2
CO4.	Impart the application of periodic functions through Fourier series	K3

CO5.	Develop skills in problem solving, modelling, approximation and mathematical exploration	K3
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### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

S- Strong; M- Medium; L- Low

### Syllabus

#### SEMESTER IV – ALLIED MATHEMATICS FOR SCIENCES II

**Credits: 5**

**Hours: 101**

#### UNIT I

**20 hrs**

Integration – Integration by parts – Multiple integrals – Evaluation of the double integral – Changing the order of integration – Double integral in polar co-ordinates.

#### UNIT II

**20 hrs**

Integration: Application of double integrals in evaluating area between curves – Evaluation of triple integrals – Jacobian of two and three variables – Beta and Gamma functions – Relation – Evaluation of double and triple integrals using Beta and Gamma Functions.

#### UNIT III

**20 hrs**

Differential equation of the form  $(aD^2 + bD + C)y = e^{ax}\phi(x)$ , where a,b,c are constants,  $\phi(x) = \sin mx$  or  $\cos mx$  or  $x^m$  – Solution of homogeneous linear differential equations of the form  $(ax^2D^2 + bxD + c)y = X$ , where X is a function of x – Equations reducible to the linear homogenous equation.

#### UNIT IV

**20hrs**

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of first order equations:  $f(p,q) = 0$ ,  $f(x,p,q)=0$ ,  $f(y,p,q)=0$ ,  $f(z,p,q)=0$ ,  $f_1(x,p) = f_2(y,q)$ ,  $z = px+qy+f(p,q)$  – Lagrange method of solving linear partial differential equation  $P_p+Q_q = R$  – Charpit's Method – Simple problems.

#### UNIT V

**21 hrs**

Fourier series: Definition – Finding Fourier coefficients for a given periodic function with period  $2\pi$ . Odd and Even functions – Half range series – Change of intervals.

### Text Book

1.	S. Narayanan and T.K.ManicavachagomPillay	Calculus Vol II & III	S.Viswanathan (Printers and Publishers) Pvt.Ltd.Reprint (2000).
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### Reference Books

1	Dr. M. D. Raisinghania	Ordinary and Partial differential Equations	S Chand and Company Ltd., Revised Edition ( 2013)
2	Richard C. Diprima William E.Boyce	Elementary Differential equations and Boundary	Wiley India private Ltd., 9 <sup>th</sup> Edition (2013)

		value problems	
3	A. K. Sharma	Multiple Integrals	Discovery Publishing House, First Edition (2005)

**UNIT I & II** : Vol II Chapter 1– Section – 12.0.  
Chapter 5 –Sections – 2.1 to 4.0, 5.1 to 5.4 & 6.1 to 6.3.  
Chapter 6 –Sections – 1.1 to 2.4.  
Chapter 7 –Sections – 2.1 to 2.3,3,4,5,6.

**UNIT III** : Vol III Chapter 2 –Sections – 1.0 to 4, 8.0 to 8.3, 9.0.

**UNIT IV** : Chapter 4 –Sections – 1.0 to 7.0.

**UNIT V** : Chapter 6 –Sections – 1.0 to 6.0.

**NOTE:**

Question paper setters to confine to the above text books only.

**Pedagogy**

Chalk and Talk, Seminar, Group Discussion, Numerical Exercises, Quiz and Case Study

**Course Designers:**

- 1.Dr.B.Tamil Selvi, Associate Professor and Head, Department of Mathematics
- 2.Dr.D.Sasikala, Assistant Professor, Department of Mathematics