ANNEXURE 18B01

V.V. VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Re-accredited with 'A' Grade(3rd Cycle)by NAAC
VIRUDHUNAGAR - 626 001

CHOICE BASED CREDIT SYSTEM
REGULATIONS AND SYLLABUS
(with effect from Academic Year 2018 - 2019)

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 19 UG Programmes, 14 PG Programmes, 6 M.Phil. Programmes and 3 Ph.D. Programmes. All these programmes, except Ph.D. Programmes, have been framed as per the guidelines given by UGC under Choice Based Credit System (CBCS).

The Departments of Commerce, English and History upgraded as Research Centres offer Ph.D. Programmes as per the norms and regulations of Madurai Kamaraj University, Madurai and do not come under the purview of CBCS.

CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose courses from the prescribed Courses. The CBCS is followed as per the guidelines formulated by the UGC. The Students' performance will be evaluated based on the uniform grading system. Computation of the Cumulative Grade Point Average (CGPA) is made to ensure uniformity in evaluation system.

List of Programmes in which CBCS/Elective Course System is implemented

UG PROGRAMMES

Arts & Humanities	:	History (E.M. & T.M.), English, Tamil
Physical & Life Sciences	:	Mathematics, Zoology, Chemistry, Physics, Biochemistry, Home Science - Nutrition and Dietetics, Costume Design and Fashion, Microbiology, Biotechnology, Computer Science, Information Technology and Computer Applications.
Commerce & Management	:	Commerce, Commerce with Computer Applications, Commerce with Professional Accounting Business Administration

PG PROGRAMMES

Arts & Humanities	:	History, English, Tamil
Physical & Life Sciences	:	Mathematics, Physics, Biochemistry, Food Processing & Quality Control, Chemistry, Zoology, Computer Science, Information Technology, Computer Applications (MCA*)
Commerce & Management	:	Commerce, Business Administration (MBA*)
		* AICTE approved Programmes

PRE-DOCTORAL PROGRAMMES (M.Phil.)

Arts &Humanities	:	History, English, Tamil
Physical & Life Sciences	:	Mathematics, Biochemistry
Commerce & Management	:	Commerce

OUTLINE OF CHOICE BASED CREDIT SYSTEM

1. Core Courses
2. Elective Courses
    - 2.1. Discipline Specific Elective Courses (DSEC)
    - 2.2. Dissertation / Project
3. Non Major Elective Courses (NMEC)
4. Generic Elective Courses (GEC)
5. Ability Enhancement Courses (AEC)
    - 5.1 Ability Enhancement Compulsory Courses (AECC)
    - 5.2. Skill Enhancement Courses (SEC)

List of Non Major Elective Courses (NMEC) offered

UG PROGRAMMES

Name of the Course	Semester	Department
Indian National Movement (A.D 1885-1947)	III	History(EM)
இந்திய தேசிய இயக்கம் (கி.பி. 1885 – 1947)	III	History (TM)
Constitution of India	IV	History(EM)
இந்தியாவில் அரசியல் அமைப்பு	IV	History(TM)
Communication Skills-I	III	English
Communication Skills-II	IV	
இக்காலநீதி இலக்கியம்	III	Tamil
உரைநடை இலக்கியம்	IV	
Basic Hindi – I	III	Hindi
Basic Hindi – II	IV	
Practical Banking	III	Commerce
Basic Accounting Principles	IV	
Business Management	III	Business Administration
Entrepreneurship Development	IV	
Quantitative Aptitude	III	Mathematics
Statistics and Operations Research	IV	
Physics in Everyday life	III	Physics
Digital Electronics	IV	
Industrial Chemistry-I	III	Chemistry
Industrial Chemistry-II	IV	
Applied Zoology	III	Zoology
Animal Science	IV	
Basic Food Science	III	Home Science – Nutrition and Dietetics
Basic Nutrition and Dietetics	IV	
Women and Health	III	Biochemistry
Life style associated disorders	IV	
Medical Lab Technology	III	Microbiology
Applied Microbiology	IV	
Infectious Diseases	III	Biotechnology
Organic Farming	IV	
Basics of Fashion	III	Costume Design And Fashion
Interior Designing	IV	
Introduction to Computers and Office Automation	III	Computer Science
Introduction to Internet and HTML	IV	
Computer Fundamentals and E-mail	III	Information Technology
Introduction to HTML	IV	
Fundamentals of Computers	III	Computer Applications
Web Design with HTML	IV	
Horticulture – I	III	Botany
Horticulture – II	IV	
மருத்துவ தாவரவியல் - I	III	
மருத்துவ தாவரவியல் - II	IV	
Library and Information Science – I	III	Library Science
Library and Information Science - II	IV	

List of Generic Elective Courses (GEC) Offered

GENERIC ELECTIVE COURSES – 1

1. Human Rights

2. Women Studies

GENERIC ELECTIVE COURSES – 2

1. Constitution of India

2. Modern Economics

3. Adolescent Psychology

4. Disaster Management

ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

1. Environmental Studies

2. Value Education

மேல்நிலை கல்வி வரை தமிழை முதன்மை பாடமாக எடுத்து படிக்காத மாணவிகள் கீழ்கண்ட பாடங்களை கட்டாயம் படிக்க வேண்டும்

1. அடிப்படைத் தமிழ் -எழுத்தறிதல்
2. அடிப்படைத் தமிழ் -மொழித்திறனறிதல்

ELIGIBILITY FOR ADMISSION

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamilnadu or any other equivalent Examination accepted by Academic Council with Mathematics as one of the subjects in Higher Secondary Course.

DURATION OF THE PROGRAMME

The candidates shall undergo the prescribed Programme of study for a period of three academic years (six semesters).

MEDIUM OF INSTRUCTION

English

COURSES OFFERED

Part I : Tamil/Hindi

Part II : English

Part-III : Core Courses

Elective Courses: Discipline Specific Elective Courses

Internship

Allied Courses: 1. Physics

2. Applied Mathematics

Part IV : Non-Major Elective Courses (NMEC)

Generic Elective Courses (GEC)

Ability Enhancement Compulsory Courses (AECC)

Skill Enhancement Courses (SEC)

Part V:National Service Scheme, Physical Education, Youth Red Cross Society, Red Ribbon Club, Science Forum, Eco Club, Library and Information Science, Consumer Forum, Health and Fitness Club

Internship / Field Project is compulsory for II year UG Science students

Internship: A designated activity that carries one credit involving more than 7 days of working in an organization under the guidance of an identified mentor.

Field Project: Project students need to undertake project that involve conducting surveys inside/outside the college premises and collection of data from designated communities or natural places

EVALUATION SCHEME

Components	**Internal Assessment Marks**	**External Examination Marks**	**Total Marks**
Theory	25	75	100
Practical	40	60	100
Project	40	60	100

PART III - Core Courses, Discipline Specific Elective Courses & Allied Courses

INTERNAL ASSESSMENT

Distribution of Marks

Theory

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	:	5
Quiz	:	5
Total	**:**	**25**

Three Periodic Tests - Average of the best two will be considered
Two Assignments - Best one will be considered
Three Quiz Tests - Best one will be considered

Practical

Mode of Evaluation		Marks
Model Test	:	30
Performance	:	10
Total	**:**	**40**

Two Model Tests - Best one will be considered
Performance - Attendance and Record

Question Pattern for Periodic Tests **Duration: 2 Hours**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Marks for each question	Total Marks
A Q. No.(1- 4)	Multiple Choice	4	4	1	4
B Q. No.(5 - 7)	Either or type	3	3	7	21
C Q. No.(8-10)	Open Choice	3	2	10	20
Total					**45**

EXTERNAL EXAMINATION

Question Pattern **Duration: 3 Hours**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Marks for each question	Total Marks
A Q. No.(1- 10)	Multiple choice (Atleast Two question from each unit)	10	10	1	10
B Q. No.(11 -15)	Either or type (one set from each unit)	5	5	7	35
C Q. No.(16-20)	Open Choice (one from each unit)	5	3	10	30
Total					**75**

CORE COURSES ASSESSMENT

Online Test will be conducted for the Core Courses in V & VI Semester.Multiple Choice questions Pattern will be followed.

PART IV - Skill Enhancement Courses and Non Major Elective Courses

INTERNAL ASSESSMENT
Distribution of Marks
Theory

Mode of Evaluation		Marks
Periodic Test	:	25
Assignment	:	10
Quiz	:	5
Total	**:**	**40**

Three Periodic Tests - Average of the best two will be considered
Two Assignments - Best of the two will be considered
Three Quiz Tests - Best of the three will be considered

Question Pattern **Duration: 1 Hour**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 4)	Open Choice	4	3	5	15
B Q. No.(5- 6)	Open Choice	2	1	10	10
				Total	**25**

EXTERNAL EXAMINATION

Question Pattern **Duration: 2 Hours**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 8)	Open Choice	8	6	5	30
B Q. No.(9- 13)	Open Choice	5	3	10	30
				Total	**60**

PART IV - Generic Elective Coursesand Ability Enhancement Compulsory Courses

- Assessment by Internal Examiner only
- Model Examination is conducted after two periodic tests.
- Book and Study Material prepared by the Faculty Members of the respective departments will be prescribed.

ASSESSMENT PATTERN

Mode of Evaluation		Marks
Periodic Test	:	30
Assignment	:	10
Model Examination	:	60
Total	**:**	**100**

Two Periodic tests - Best of the two will be considered
Two Assignments - Best of the two will be considered

Question Pattern for Periodic Test **Duration: 1 Hour**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 4)	Open Choice	4	3	6	18
B Q. No.(5- 6)	Open Choice	2	1	12	12
				Total	**30**

Question Pattern for Model Examination **Duration: 2 Hours**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 8)	Open Choice	8	5	6	30
B Q. No.(9- 13)	Open Choice	5	3	10	30
				Total	**60**

EXTRA CREDIT COURSES (Optional)

- Assessment by Internal Examiner only

Question Pattern for Internal Examination **Duration: 2 Hours**

Section	No. of Questions	No. of Questions to be answered	Marks for each question	Total Marks
A	8	6	2	12
B	6	4	7	28
C	2	1	10	10
			Total	**50**

ELIGIBILITY FOR THE DEGREE

i) The candidate will not be eligible for degree without completing the prescribed Courses of study and a minimum Pass marks in all the Courses.

ii) Attendance, progress and conduct certification from the Head of the Institution will be required for the students to write the examination.

- No Pass minimum for Internal Assessment.
- Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Allied Courses and Discipline Specific Elective Courses.
- Pass minimum for External Examination is 21 marks out of 60 marks for Non Major Elective Courses and Skill Enhancement Courses.
- The aggregate minimum pass percentage is 40.
- Pass minimum for External Practical Examination is 21 marks out of 60 marks.

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B.Sc. MATHEMATICS (SEMESTER)
PROGRAMME CODE - 2014

PROGRAMME OUTCOMES

The students will be able to

- get an in-depth understanding of the subject.
- develop an effective oral and written communication.
- have wider social mobility into reality.
- outsource the acquired knowledge with social concern and responsibility.
- have a wholesome personality by imbibing ethical and traditional values.
- strengthen the passion for learning with vigour and self-motivation.

PROGRAMME SPECIFIC OUTCOMES

- Understands the basic concepts of Advanced Mathematics.
- Acquire strong knowledge in core areas of Mathematics and applications of Mathematics to continue with research.
- Enables the students to investigate and apply mathematical problems and solutions to a variety of contexts related to science.
- Acquire problem solving skills in a broad range of Mathematics.
- Develop Abstract Mathematical thinking.
- Communicate Mathematical ideas and arguments both written and orally.
- Equip students with analytic and problem solving skills for careers.

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PART - I

S.No.	Sem.	Code	Title of Paper	Credits	Marks
1.	I	18UTAG11	இக்கால இலக்கியம் - கவிதையும் சிறுகதையும்	3	100
2.	II	18UTAG21	பக்தி இலக்கியமும், புதினமும்	3	100
3.	III	18UTAG31	காப்பிய இலக்கியமும், நாடகமும்	3	100
4.	IV	18UTAG41	சங்க இலக்கியமும் உரைநடையும்	3	100
	TOTAL			**12**	**400**

PART I -HINDI

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UHDG11	Prose – I & II, Ekganki - I, Short stories, Functional Hindi – I & Grammar	3	100
2.	II	18UHDG21	Drama, Ekganki – II, Letter Correspondence, Functional Hindi-II & Grammar	3	100
3.	III	18UHDG31	Ancient poetry, Drama, Indian History, Poetics and functional Hindi-III	3	100
4.	IV	18UHDG41	Modern poetry, History of Modern Hindi Literature and functional Hindi -IV	3	100
	TOTAL			**12**	**400**

PART II

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UENG11A	English for Advanced Learners I	3	100
		18UENG11B	English for Career Guidance - I		
		18UENG11C	English for Communicative Competence-I		
2.	II	18UENG21A	English for Advanced Learners II	3	100
		18UENG21B	English for Career Guidance - II		
		18UENG21C	English for Communicative Competence - II		
3.	III	18UENG31A	English for Advanced Learners III	3	100
		18UENG31B	English for Career Guidance – III		
		18UENG31C	English for Communicative Competence - III		
4.	IV	18UENG41A	English for Advanced Learners IV	3	100
		18UENG41B	English for Career Guidance – IV		
		18UENG41C	English for Communicative Competence - IV		
	TOTAL			**12**	**400**

PART III – CORE, DISCIPLINE SPECIFIC ELECTIVE COURSES

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1	I	18UMTC11	Differential Calculus	4	100
2	I	18UMTC12	Theory of Equations	4	100
3	II	18UMTC21	Integral Calculus	4	100
4	II	18UMTC22	Analytical Geometry of Three Dimensions	4	100
5	II	18UMTC21P	Office Automation for Mathematics and DTP - Practical	2	100
6	III	18UMTC31	Statics	3	100
7	III	18UMTC32	Sequences and Series	3	100
8	IV	18UMTC41	Dynamics	3	100
9	IV	18UMTC42	Trigonometry and Vector Calculus	3	100
10	V	18UMTC51	Modern Algebra	4	100
11	V	18UMTC52	Real Analysis	4	100
12	V	18UMTC53	Numerical Methods	4	100
13	V	18UMTC54	Statistics – I	4	100
14	V	18UMTE51/ 18UMTE52/ 18UMTE53	Graph Theory Automata Theory Astronomy	4	100
15	V	18UMTO51	Online Assessment	1	50
16	VI	18UMTC61	Linear Algebra	4	100
17	VI	18UMTC62	Complex Analysis	4	100
18	VI	18UMTC63	Differential Equations and Laplace Transforms	4	100
19	VI	18UMTC64	Statistics – II	4	100
20	VI	18UMTE61/ 18UMTE62/ 18UMTE63	Boolean Algebra and Lattices Optimization Techniques Stochastic Processes	4	100
21	VI	18UMTO61	Online Assessment	1	50
Total				**72**	**2000**

PART III – ALLIED COURSE I- MATHEMATICS

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UPHA11	Physics –I	4	100
2.	II	18UPHA21	Physics – II	4	100
		18UPHA21P	Physics Practical- I	2	100
			Total	**10**	**300**

PART III - ALLIED COURSE II- APPLIED MATHEMATICS

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	III	18UAMA31	Operations Research	4	100
2.	IV	18UAMA41	Programming in C	4	100
	IV	18UAMA41P	C - Practical	2	100
			Total	**10**	**300**

PART IV -SKILL ENHANCEMENT COURSES

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	II	18UMTS21	Fundamentals of Accounting	2	100
2.	III	18UMTS31P	MAT LAB– Practical	2	100
3.	IV	18UMTS41	Transforms	2	100
4.	V	18UMTS51	Summation of Series	2	100
5.	V	18UMTS52	Mathematical Modelling	2	100
6.	VI	18UMTS61P	Numerical Methods using C	2	100
			Total	**12**	**600**

PART IV –NON MAJOR ELECTIVE COURSES

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	III	18UMTN31	Quantitative Aptitude	2	100
2.	IV	18UMTN41	Statistics and Operations Research	2	100
			Total	**4**	**200**

PARTIV–GENERIC ELECTIVE AND ABILITY ENHANCEMENT COMPULSORY COURSES

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UGVE11	Value Education	2	100
2	III	18UGHR31 18UGWS32	Human Rights Women Studies	1	100
3.	IV	18UGEC41	Constitution of India	1	100
4		18UGEM42	Modern Economics		
5		18UGEG43	Global Warming		
6		18UGEA44	Adolescent Psychology		
7		18UGED45	Disaster Management		
8		18UPHI41G	Internship/Field Project	1	100
9		PART-V	Extension Activities	1	-
10	V	18UGES51	Environmental Studies	2	100
			Total	**8**	**500**

PART –V -EXTENSION ACTIVITIES

S.No.	Sem.	Code	Title of the Course	Credit
1	I, II, III & IV	18UVNS1	National Service Scheme	1
2		18UVNS2	Physical Education	
3		18UVYR1 18UVYR2	Youth Red Cross Society	
4		18UVRR1	Red Ribbon Club	
5		18UVSF1	ScienceForum	
6		18UVEC1	Eco Club	
7		18UVLI1	Library and Information Science	
8		18UVCC1	Consumer Forum	
9		18UVHF1	Health and Fitness Club	

EXTRA CREDIT COURSE(Optional)

S.No.	Sem.	Code	Title of the Course	Credits	Total Marks
1.	V	18UMT051	Arithmetic Ability (Internal Only)	2	50

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DEPARTMENT OF MATHEMATICS

PROGRAMME STRUCTURE

Semester		Course Code	Courses	Hours per week	Credits	Total Marks	
						Int.	Ext.
I	Part I	18UTAG11	Tamil/Hindi I	6	3	25	75
	Part II	18UENG11	English I	6	3	25	75
	Part III	18UMTC11	**Core Course -1** Differential Calculus	4	4	25	75
		18UMTC12	**Core Course - 2** Theory of Equations	4	4	25	75
		18UMTC21P	**Core Course -1** Core Practical Office Automation for Mathematics and DTP	2	-	-	-
		18UPHA11 18UPHA21P	**Allied Course –I** Allied Physics –I Allied Physics Practical– I	4 2	4 -	25 -	75 -
	Part IV	18UGVE11	Value Education	2	2	100	-
			TOTAL	**30**	**20**	**600**	

Semester		Course Code	Courses	Hours per week	Credits	Total Marks	
						Int.	Ext.
II	Part I	18UTAG21	Tamil /Hindi II	6	3	25	75
	Part II	18UENG21	English II	6	3	25	75
	Part III	18UMTC21	**Core Course - 3** Integral Calculus	4	4	25	75
		18UMTC22	**Core Course - 4** Analytical Geometry of Three Dimensions	4	4	25	75
		18UMTC21P	**Core Course** Core Practical **-1** Office Automation for Mathematics and DTP	2	2	40	60
		18UPHA21 18UPHA21P	**Allied Course -I** Allied Physics –II Allied Physics Practical–I	 4 2	 4 2	 25 40	 75 60
	Part IV	18UMTS21	**SEC -1** Fundamentals of Accounting	2	2	40	60
			TOTAL	**30**	**24**	**800**	

Semester		Course Code	Courses	Hours per week	Credits	Total Marks	
						Int.	Ext.
III	Part I	18UTAG31	Tamil/ Hindi III	6	3	25	75
	Part II	18UENG31	English III	6	3	25	75
	Part III	18UMTC31	**Core Course -5** Statics	3	3	25	75
		18UMTC32	**Core Course -6** Sequences and Series	4	3	25	75
		18UAMA31	**Allied-Course -II** Operations Research	6	4	25	75
	Part IV	18UMTS31P	**SEC -2** MAT LAB – Practical	2	2	40	60
		18UMTN31	**NMEC-1** Quantitative Aptitude	2	2	40	60
	Part IV	18UGHR31 18UGWS32	**Generic Elective -1** 1.Human Rights 2. Women Studies	0	1	40	60
		18UGEC41	**Generic Elective -2** Constitution of India	1	-	-	
		18UGEM42	Modern Economics				
		18UGEA43	Adolescent Psychology				
		18UGED44 18UGED44N	Disaster Management Disaster Management				
			TOTAL	**30**	**21**	**800**	

Semester		Course Code	Courses	Hours per week	Credits	Total Marks	
						Int	Ext
IV	Part I	18UTAG41	Tamil /Hindi IV	6	3	25	75
	Part II	18UENG41	English IV	6	3	25	75
	Part III	18UMTC41	**Core Course - 7** Dynamics	3	3	25	75
		18UMTC42	**Core Course - 8** Trigonometry and Vector Calculus	4	3	25	75
			Allied Course – II				
		18UAMA41	Programming in C	4	4	25	75
		18UAMA41P	C - Practical	2	2	40	60
	Part IV	18UMTS41	**SEC -3** Transforms	2	2	40	60
		18UMTN41	**NMEC-2** Statistics and Operations Research	2	2	40	60
		18UMTI41G	Internship/Field Project	0	1	100	-
			Generic Elective -2	1	1	100	-
		18UGEC41	Constitution of India				
		18UGEM42	Modern Economics				
		18UGEA43	Adolescent Psychology				
		18UGED44 18UGED44N	Disaster Management Disaster Management				
	Part V		Extension Activities	-	1	-	
			TOTAL	**30**	**25**	**1000**	

Semester		Course Code	Courses	Hours per week	Credits	Total Marks	
						Int.	Ext.
V	Part III	18UMTC51	**Core Course – 9** Modern Algebra	5	4	25	75
		18UMTC52	**Core Course - 10** Real Analysis	5	4	25	75
		18UMTC53	**Core Course – 11** Numerical Methods	5	4	25	75
		18UMTC54	**Core Course – 12** Statistics – I	4	4	25	75
		18UMTE51/ 18UMTE52/ 18UMTE53	**DSEC -1** 1. Graph Theory/ 2. Automata Theory/ 3. Stochastic Processes	5	4	25	75
		18UMTOL51	Online Assessment	-	1	50	
	Part IV	18UMTS51	**SEC -4** Summation of Series	2	2	40	60
		18UMTS52	**SEC -5** Mathematical Modelling	2	2	40	60
		18UGES51	Environmental Studies	2	2	100	-
			TOTAL	**30**	**27**	**850**	

Semester		Course Code	Courses	Hours per week	Credits	Total Marks	
						Int.	Ext.
VI	Part III	18UMTC61	**Core Course -13** Linear Algebra	6	4	25	75
		18UMTC62	**Core Course -14** Complex Analysis	6	4	25	75
		18UMTC63	**Core Course -15** Differential Equations and Laplace Transforms	6	4	25	75
		18UMTC64	**Core Course – 16** Statistics – II	5	4	25	75
		18UMTE61/ 18UMTE62/ 18UMTE63	**DSEC -2** 1. Boolean Algebra and Lattices/ 2.Optimization Techniques/ 3. Astronomy	5	4	25	75
		18UMTOL61	Online Assessment	-	1	50	
	Part IV	18UMTS61	**SEC -6** Mathematical Applications	2	2	40	60
			TOTAL	**30**	**23**	**650**	

SEC - Skill Enhancement Course

NMEC - Non – Major Elective Course

DSEC - Discipline Specific Elective Course

COURSE STRUCTURE

Components	Semester						Total Number of Hours/ Credits
	I	II	III	IV	V	VI	
Part I : Tamil /Hindi	6 (3)	6 (3)	6(3)	6 (3)	-	-	24(12)
Part II : English	6(3)	6(3)	6(3)	6 (3)	-	-	24(12)
Part III : Core, Allied and DESC Courses:							
Core Course	4(4)	4(4)	3(3)	4(3)	5(4)	6(4)	26(22)
Core Course	4(4)	4(4)	4(3)	4(3)	5(4)	6(4)	27(22)
Core Course	-	-	-	-	5(4)	6(4)	11(8)
Core Course	-	-	-	-	4(4)	5(4)	9(8)
Core Practical	2(0)	2(2)	-	-	-	-	4(2)
Core Courses Assessment - Online	-	-	-	-	0(1)	0(1)	0(2)
Allied I							
Course	4(4)	4(4)	-	-		-	8(8)
Practical	2(0)	2(2)	-	-	-	-	4(2)
Allied II							
Course	-	-	6(4)	4(4)	-	-	10(8)
Practical	-	-		2(2)			2(2)
Field Project	-	-		0(1)	-	-	0(1)
DSEC	-	-	-	-	5(4)	5(4)	10(8)
Part IV : Non Major Elective and Value Added Courses:							
Value Education	2(2)	-	-	-	-	-	2(2)
Environmental Studies	-	-	-	-	2(2)	-	2(2)
Non Major Elective	-	-	2(2)	2(2)	-	-	4(4)
Generic Elective	-	-	1(0)	1(1)	-	-	2(1)
SEC	-	2(2)	2(2)	2(2)	2(2)	2(2)	10(10)
SEC	-	-	-	-	2(2)	-	2(2)
Human Rights	-	-	-	0(1)	-	-	0(1)
Part V – Extension Activities NSS/ Physical Education/YRC/ RRC/ Science Forum/ ECO Club/Library and Information Science/ Consumer Club/ Fitness Club	-	-	-	0(1)	-	-	0(1)
Total	**30 (20)**	**30 (24)**	**30 (21)**	**30 (25)**	**30 (27)**	**30 (23)**	**180 (140)**

DSEC: Discipline Specific Elective Course **SEC:** Skill Enhancement Course

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VIRUDHUNAGAR - 626 001

B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**MODERN ALGEBRA**	Hours/Week: 5	
Core Course-9		Credits: 4	
Course Code		Internal	External
18UMTC51		**25**	**75**

COURSE OUTCOMES

On completing this course students will be able to

- get a basic idea on functions which is the root in all the branches of Mathematics.
- understand the algebraic structure of a group which has many important applications in Chemistry and Physics.
- know normal subgroups which is used to construct quotient groups of a given group.
- gain the knowledge about the algebraic system with two binary operations which is very useful in cryptography.
- know the fundamental algebraic structure- field which is widely used in algebra, number theory and many other areas of Mathematics.

UNIT I

Relations and Mappings

Relations – Equivalence Relations- Partial order-Functions – Binary Operations.

Groups

Permutation Groups - Subgroups. (15 hours)

UNIT II

Groups continued

Cyclic Groups – Order of an Element- Cosets and Lagrange's Theorem- Euler's Theorem – Fermat's Theorem- Solved Problems. (15 hours)

UNIT III

Groups continued

Normal Subgroups-Examples- Solved Problems- Quotient Groups – Examples-Isomorphism-Automorphism-Inner automorphism - Solved Problems. (15 hours)

UNIT IV

Groups continued

Homomorphisms - Examples-Kernel of a homomorphism-Fundamental theorem of homomorphism- Solved Problems

Rings

Definitions and examples – Elementary Properties of rings- Isomorphism. (15 hours)

UNIT V

Rings continued

Types of Rings – Ring with identity - skew field – Field –Zero divisor- Integral domain-Solved Problems-Characteristic of a Ring. (15 hours)

TEXT BOOK:

Arumugam. S and Thangapandi Isaac.A(2017), *Modern Algebra*, ,SciTech Publications (India) Pvt., Ltd.

Unit	Chapter	Section
I	2	2.1-2.5
	3	3.4 and 3.5
II	3	3.6 -3.8
III	3	3.9 and 3.10
IV	3	3.11
	4	4.1- 4.3
V	4	4.4,4.5

Dr.A.Uma Devi

Course Designer

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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**REAL ANALYSIS**	Hours/Week: 5	
Core Course-10		Credits: 4	
Course Code		Internal	External
18UMTC52		**25**	**75**

COURSE OUTCOMES

On completion of the course, students will be able to

- describe fundamental properties of real numbers that lead to the formal development of real analysis.
- know basic properties of closed sets, open sets, compact sets and metric spaces
- gain in-depth knowledge on the properties of real numbers that allows many interconnections with other mathematical areas.
- differentiate between countable and uncountable sets and give examples for them.
- construct rigorous mathematical proofs of basic results in real analysis

UNIT I

Preliminaries:

Countable sets – Uncountable sets – Inequalities of Holder and Minkowski

Metric Spaces:

Definitions and examples – Bounded sets in a metric space – Open ball in a metric space – Open sets – Subspaces – Interior of a set. (15 hours)

UNIT II

Metric Spaces:

Closed sets – Closure – Limit point – Dense sets.

Complete Metric Space:

Completeness – Baire's Category theorem. (15 hours)

UNIT III

Continuity :

Continuity - Homeomorphism - Uniform continuity (15 hours)

UNIT IV

Connectedness

Definition and examples - Connected subsets of R -Connectedness and continuity. (15 hours)

UNIT V

Compactness:

Compact space – Compact subsets of R – Compactness and continuity. (15 hours)

TEXT BOOK:

Dr. Arumugam.S, Mr.Thangapandi Isaac.A, (2015), *Modern Analysis*, New Gamma Publishing House

Unit	Chapter	Section
I	1	1.2 – 1.4
	2	2.1 – 2.6
II	2	2.7 – 2.10
	3	3.1, 3.2
III	4	4.1 - 4.3
IV	5	5.1 – 5.3
V	6	6.1, 6.2 and 6.4

Dr.P.Sooriyakala
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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**NUMERICAL METHODS**	Hours/Week: 5	
Core Course-11		Credits: 4	
Course Code		Internal	External
18UMTC53		**25**	**75**

COURSE OUTCOMES

On completion of the course, students will be able to

- solve an algebraic or transcendental equation using an appropriate numerical method
- understand the use of interpolation methods to find missing values in given tabulated data.
- select appropriate numerical methods for solving various types of problems in engineering and science.
- comprehend numerical integration and differentiation in solving ODE.
- apply numerical methods to obtain approximate solutions to mathematical problems.

UNIT I

The Solution of Numerical Algebraic and Transcendental Equations

Introduction-The Bisection Method – Method of Succesive Approximations or the Iteration Method – The Method of False Position(Regula Falsi Method) – Newton's Iteration method or Newton– Raphson method

Simultaneous Linear Algebraic Equations

Introduction-Gauss Elimination Method – Gauss Jordan Method –Computation of the Inverse of a matrix using Gauss's elimination method – Iterative Methods

(15 hours)

UNIT II

Finite Differences

Introduction-First Differences – Higher differences – Difference Tables –To express any value of y in terms of initial value y_0 and the differences - Backward differences-To express any value of y in terms of y_n and the backward differences- Central difference Notation – Properties of the operator Δ – Differences of a polynomial – Factorial Polynomials – The Operator E - Relation between the operators E and Δ – Relation between the operators D and Δ - Other Difference Operators - Relation between the operators (15 hours)

UNIT III

Interpolation

Introduction- Linear interpolation – Gregory-Newton Forward Interpolation Formula – Gregory-Newton Backward Interpolation Formula – Equidistant terms with one or more missing values.

Central Difference Interpolation Formulae

Central Difference Tables-Central Difference Interpolation Formulae – Gauss's forward interpolation formula – Gauss's Backward Interpolation Formula – Stirling's Formula

Interpolation with unequal intervals

Divided Differences-Properties of Divided Differences-Newton's interpolation formula for unequal intervals-Lagrange's Interpolation formula (15 hours)

UNIT IV

Numerical Differentiation and Integration

Introduction-Newton's forward difference formula to compute the derivatives - Newton's backward difference formula to compute the Derivatives - Derivatives using Stirling's formula – Maxima and Minima of a tabulated function. (15 hours)

UNIT V

Numerical Differentiation and Integration

Numerical Integration - The Trapezoidal Rule - Truncation error in the Trapezoidal formula - Romberg's method - Simpson's Rule - Truncation error in Simpson's formula – Practical Applications of Simpson's rule. (15 hours)

TEXT BOOK

Venkataraman. M.K. (2013), *Numerical Methods in Science and Engineering*, The National Publishing Co., 5th Edition.

Unit	Chapter	Section
I	3	1- 5
	4	1 – 3 and 6
II	5	1 – 8, 10 – 12 and 14 - 18
III	6	1-5
	7	1-5
	8	1-4
IV	9	1-4 and 6
V	9	7 – 12

Dr.R.P.Aditya

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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**STATISTICS I**	Hours/Week: 4	
Core Course-12		Credits: 4	
Course Code **18UMTC54**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, students will be able to

- determine the few statistical constants to characterize nature of the curve.
- find the correlation coefficient used to measure the degree of relationship between the variables.
- measure qualities that cannot be measured quantitatively.
- calculate index numbers which is an indispensable tool for economics and business.
- understand the basic concept of probability for uncertain events in our daily life.

UNIT I

Moments, Skewness and Kurtosis

Moments – Moment about any point – Central Moment – Karl Pearson coefficient of skewness – Bowley's coefficient of skewness – Kurtosis and its types.

Curve Fitting

Principle of least squares – Fitting a Straight Line – Fitting a Second Degree Parabola.

(13 Hours)

UNIT II

Correlation and Regression

Correlation – Rank Correlation –Regression – Correlation coefficient for a bivariate frequency distribution. (12 Hours)

UNIT III

Theory of Attributes

Attributes – Consistency of Data – Independence and Association of Data. .(11 Hours)

UNIT IV

Index Numbers

Index Numbers – Consumer Price Index Numbers(Cost of living index numbers) – Conversion of Chain Base Index Number into Fixed Base Index Number and conversely.

Analysis of Time Series

Time Series – Components of a Time Series – Measurement of Trends. (13 Hours)

UNIT V

Probability

Probability – Conditional Probability – Properties of Independent Events – Baye's Theorem – Boole's inequality – Theorems and Problems. (11 Hours)

TEXT BOOK

Arumugam & Isaac.(July 2016).*Statistics*.Palayamkottai: New Gamma Publishing House.

Unit	Chapter	Section
I	4	4.1, 4.2
	5	5.1
II	6	6.1, 6.2, 6.3, 6.4
III	8	8.1, 8.2
IV	9	9.1, 9.2, 9.3
	10	10.1, 10.2, 10.3
V	11	11.1, 11.2

Dr.P.Geetha
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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**GRAPH THEORY**	Hours/Week: 5	
DSEC Course-1		Credits: 4	
Course Code **18UMTE51**		Internal 25	External 75

COURSE OUTCOMES
On completion of the course, students will be able to

- model the real world problems using Graph Theory
- apply the concept of graph connectivity theories in network applications, routing transportation networks, network tolerance etc.
- apply Graph Theory concepts such as Eulerian and Hamiltonicity in the area of networks resulting in games, routing communication and security problems.
- apply the concept of planarity in computational geometry and in determining the isomorphism of chemical structures
- execute the graph colouring techniques in real time applications such as Job scheduling, Aircraft scheduling, Time table scheduling etc.

UNIT I
Graphs and Subgraphs
Definition and examples - Degrees - Sub Graphs – Isomorphism - Ramsey Numbers - Independent Sets and Coverings – Matrices – Operations on Graphs. (15 Hours)

UNIT II
Connectedness:
Walks, Trails and Paths - Connectedness and Components – Connectivity. (15 Hours)

UNIT III

Eulerian and Hamiltonian Graphs :

Eulerian Graphs - Hamiltonian Graphs.

Trees:

Characterization of Trees – Center of a Tree. (15 Hours)

UNIT IV

Matchings and Planarity:

Matchings - Matchings in Bipartite Graphs -Definition and Properties. (15 Hours)

UNIT V

Colourability:

Chromatic Number and Chromatic Index - The Five Colour Theorem - Chromatic Polynomials.

(15 Hours)

TEXT BOOK:

Dr.S.Arumugam and S.Ramachandran (May 2017) *Invitation to Graph Theory*, SCITECH Publications.

Unit	Chapter	Section
I	2	2.0 – 2.6 and 2.8, 2.9
II	4	4.0 - 4.2 and 4.4
III	5	5.0 - 5.2
	6	6.0 - 6.2.
IV	7	7.0 - 7.2
	8	8.0 and 8.1
V	9	9.0 – 9.2 and 9.4

Mrs.P.Getchial Pon Packiavathi
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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**AUTOMATA THEORY**	Hours/Week: 5	
DSEC-1		Credits: 4	
Course Code **18UMTE52**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, students will be able to

- improve programmimg skills and software development.
- study various automata such as deterministic and non – deterministic finite state machines, turing machines.
- make connections between theoretical results and regular –expression libraries.
- use standard algorithms to transform automata and languages in various ways.
- Study formal languages of different kinds such as regular and context free languages.

UNIT I

Why study automata theory? - Introduction to formal proof - Additional forms of Proof- Inductive proofs - The central concepts of Automata theory. (15 hours)

UNIT II

An informal picture of finite automata- Deterministic finite automata-Non-deterministic finite automata- An application: Text search-Finite automata with epsilon transitions. (15 hours)

UNIT III

Regular expressions- Finite automata and regular expressions- Applications of regular expressions-Algebraic laws of regular expressions. . (15 hours)

UNIT IV

Proving languages are not regular- Closure properties of regular languages- Decision properties of regular languages- Equivalence and Minimization of automata

. (15 hours)

UNIT V

Context-free grammars- parse trees- Applications of context-free grammar -Ambiguity in grammars and languages- Definition of Push Down Automata- Languages of PDA- Equivalence of PDA's and CFG's Deterministic PDA . . (15 hours)

TEXT BOOK

Hopcroft J.E , Motwani.R, and Ullman J.D (2001) *Introduction to Automata., Languages and Computation,* Pearson Education, Second Edition.

Unit	Chapter	Section
I	1	1.1 – 1.5
II	2	2.1 – 2.5
III	3	3.1 – 3.4
IV	4	4.1 – 4.4
V	5	5.1 – 5.4
	6	6.1 – 6.4

Dr.C.Santhini
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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**STOCHASTIC PROCESSES**	Hours/Week: 5	
DSEC Course-1		Credits: 4	
Course Code **18UMTE53**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, students will be able to

- learn the transition probabilities and their classifications.
- get an idea about Markov chain.
- thoroughly explain the meaning of Markov processes with continuous state space, especially Brownian motion and diffusion processes.
- apply the Poisson process in incoming telephone calls, arrival of customers for services, occurrence of accidents at a certain place etc.
- apply the concept of the birth- death process in Queuing theory.

UNIT I

Random Variables and Stochastic Process:

Generating Functions: Introduction - Probability Generating Functions: Mean and Variance –Sum of (a fixed number of) random variables –Sum of a random number of Discrete Random Variables(Stochastic Sum) –Generating Function of Bivariate Distribution –Stochastic Processes: An introduction -Specification of Stochastic Process. (15 Hours)

UNIT II

Markov Chains:

Definition and Examples - Transition Matrix –Order of a Markov Chain – Markov Chains as Graphs – Higher Transition Probabilities – Generalization of Independent Bernoulli Trails: Sequence of Chain - Dependent Trails - Markov – Bernoulli Chain Correlated Random walk (15 Hours)

UNIT III

Markov Chains Continued:

Stability of a Markov System –Computation of the Equilibrium Probabilities –Graph theoretic Approach –Markov Chain with Denumerable Number of States –Reducible Chains – Finite Reducible Chains with a Single Closed Class – Chain with one single class of Persistent Non-null Aperiodic States -Absorbing Markov Chains (15 Hours)

UNIT IV

Markov Processes with Discrete State Space: Poisson Process and Its Extensions:

Poisson Process: Introduction - Postulates of Poisson Process - Properties of Poisson Process –Poisson Process and Related Distributions – Interarrival Time – Further Interesting Properties of Poisson Process. (15 Hours)

UNIT V

Markov Processes with Discrete State Space: Poisson Process and Its Extensions Continued:

Generalizations of Poisson Process: Poisson Process in Higher Dimensions – Poisson Cluster Process – Pure Birth Process: Yule - Furry Process – Birth-Immigration Process – Time dependent Poisson Processes – Random Variation of the Parameter a – Renewal Process –Birth and Death Process – Particular Cases (15 Hours)

TEXT BOOK

Medhi J(Third Edition, Reprint 2013), *Stochastic Processes*, New Age International Publishers, New Delhi.

Unit	Chapter	Section
I	1	1.1,1.5
II	2	2.1 – 2.3
III	2	2.6 – 2.9 (upto 2.9.3)
IV	3	3.1 , 3.2
V	3	3.3 , 3.4

Mrs.P.Getchial Pon Packiavathi
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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**SUMMATION OF SERIES**	Hours/Week: 2	
SEC-4		Credits: 2	
Course Code **18UMTS51**		Internal 40	External 60

COURSE OUTCOMES

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

- enhance the skill in summing up the various types of series to be applied in higher studies.
- understand the concept of binomial series and use this to find the approximate values
- find the sums of certain exponential series
- understand the use of different forms of logarithmic series
- apply the abstract concept of limits of sequences in applied mathematics.

UNIT I

Binomial Theorem:

Binomial theorem for a rational index (Statement only) – Some important particular cases of the binomial expansion – sign of terms in the Binomial expansion – Numerically greatest term –The method of splitting functions into partial fractions (6 Hours)

UNIT II

Binomial Theorem (Continued):

Application of the Binomial theorem to the summation of series – Sum of coefficients – Expansion of some function of x as a power series in two different ways– Approximate values

(6 Hours)

UNIT III

Exponential and Logarithmic series:

The Exponential theorem (statement only) – Summation-Getting some identities

(6 Hours)

UNIT IV

Exponential and Logarithmic series (continued):

The Logarithmic series (statement only) – Modification of the logarithmic series- sums of the certain series using Logarithmic series- Euler's constant (6 Hours)

UNIT V

Exponential and Logarithmic series (continued):

Series which can be summed up by the logarithmic series- Calculation of logarithms by means of the logarithmic series- The application of the exponential and logarithmic series to limits and approximations (6 Hours)

Text Book:

Manicavachagom pillay.T.K, Natarajan.T, GanapathyK.S(2017), *Algebra Volume I* , Divya Subramanian for Ananda Book Depot.

Units	Chapters	Sections
I	III	5 to 9
II	III	10 to 12, 14
III	IV	2 ,3,3.1,4
IV	IV	5 to 8
V	IV	9 to 11

Dr.M.C.Maheswari
Course Designer

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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**MATHEMATICAL MODELLING**	Hours/Week: 2	
SEC-5		Credits: 2	
Course Code **18UMTS52**		Internal 40	External 60

COURSE OUTCOMES:

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

- assemble a mathematical model for a range of physical situations.
- apply analytical techniques to solve a mathematical model
- frame a first order differential equation for real life problems and solve them.
- draw inferences from models using mathematical techniques including graphs.
- take an analytical approach to problems in day to day life.

UNIT I

Mathematical Modelling: Need, Techniques, Classifications and simple illustrations:

Simple situations requiring mathematical modeling- The Technique of mathematical modelling- Classification of mathematical models- Some characteristics of mathematical models- Mathematical modeling through Geometry (6 Hours)

UNIT II

Mathematical Modelling: Need, Techniques, Classifications and simple illustrations:

Mathematical modeling through Algebra- Mathematical modeling through Trigonometry- Mathematical modeling through Calculus- Limitations of Mathematical modeling (6 Hours)

UNIT III

Mathematical Modelling through Ordinary differential equations of first order:

Mathematical modeling through differential equations-Linear growth and decay models-Non – Linear growth and decay models (6 Hours)

UNIT IV

Mathematical Modelling Through Graphs:

Situations that can be modeled through graphs-Mathematical models in terms of directed graphs-Mathematical models in terms of signed graphs. (6 Hours)

UNIT V

Mathematical Modelling Through Graphs:

Mathematical Modelling in terms of weighted digraphs- Mathematical Modelling in terms of unoriented graphs. (6 Hours)

TEXT BOOK

Kapur, J. N.(Second edition 2015) , *Mathematical Modelling* , New Age International (P) LTD Publishers.

Units	Chapters	Sections
I	I	1.1 to 1.5
II	I	1.6 to 1.9
III	II	2.1 to2. 3
IV	VII	7.1 to 7.3
V	VII	7.4 to 7.5

Dr.M.C.Maheswari
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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester V	**ARITHMETIC ABILITY**	Hours: 0	
Self study paper		Credits: 2	
Course Code **18UMT051**		Internal 50	External ----

COURSE OUTCOMES

On completion of the course, students will be able to

- understand the basic concepts of Quantitative Aptitude.
- acquire satisfactory competency in Aptitude skills.
- improve their employability skills.
- enhance their problem solving skills and reasoning ability.
- compete various exams like CAT, Railway ,GATE, UPSC, TNPSC, Bank etc…

UNIT I

Problems on Ages

UNIT II

Ratio, Proportion and Partnership

UNIT III

Time and Work

UNIT IV

Time and Distance

UNIT V

Permutation and Combinations

TEXT BOOK

Ashish Aggarwal (7th Revised Edition 2014), *Quick Arithmetic*, S.Chand Publications, New Delhi.

Ashish Aggarwal. (7th Revised Edition 2014). *Quick Arithmetic*.New Delhi:S.Chand Publications.

Unit	Chapter
I	13
II	12
III	24
IV	25
V	34

Mrs.P.Getchial Pon Packiavathi

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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester VI	**LINEAR ALGEBRA**	Hours/Week: 6	
Core Course-13		Credits: 4	
Course Code		Internal	External
18UMTC61		**25**	**75**

COURSE OUTCOMES

On completion of the course, students will be able to

- understand the concepts of vector spaces and subspaces.
- recognize the concepts of the span, linear independence, basis, and dimension.
- compute inner products on a vector space and orthogonality in inner product spaces.
- find eigen values and eigen vectors.
- compute the power of a similar matrix.

UNIT I

Vector Spaces

Definition and Examples – Subspaces – Linear Transformation. (18 hours)

UNIT II

Vector Spaces

Span of a set – Linear independence – Basis and Dimension – Rank and Nullity - Matrix of a Linear Transformation. (18 hours)

UNIT III

Inner Product spaces

Definition and Examples – Orthogonality – Orthogonal Complement.

(18 hours)

UNIT IV

Eigen values and Eigen vectors

Characteristic Equation and Cayley Hamilton Theorem - Eigen values and Eigen vectors – Bilinear forms – Quadratic forms.

(18 hours)

UNIT V

Similarity of Matrices

Similarity of Matrices – Diagonalizable Matrix – Diagonalization Theorem – Computation of Power of a Similar Matrix. (18 hours)

TEXT BOOK

1. Arumugam.S, Thangapandi Isaac.A, (2016) *Modern Algebra*, Scitech Publications Pvt., Ltd.

2.Vinit K.Sinha (2015), *Introduction to Matrix Theory*, Narosa Publishing House.

Text Book 1		
Unit	**Chapter**	**Section**
I	5	5.1 – 5.3
II	5	5.4 – 5.8
III	6	6.1 – 6.3
IV	7	7.7,7.8
	8	8.1,8.2
Text Book 2		
V	7	Pages 7.1-7.36

Dr.P.Sooriyakala

Course Designer

V.V. VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Re-accredited with 'A' Grade (3rd Cycle) by NAAC
VIRUDHUNAGAR - 626 001

B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester VI	**COMPLEX ANALYSIS**	Hours/Week: 6	
Core Course-14		Credits: 4	
Course Code		Internal	External
18UMTC62		**25**	**75**

COURSE OUTCOMES

On completing this course students will be able to

- comprehend and construct analytic functions.
- find the image of two dimensional figures using some transformations.
- know the powerful technique Contour integration, that allows them to calculate certain integrals that are otherwise difficult or impossible to do.
- grasp the idea of convergence of a power series which is useful in Analysis.
- understand the concept of residues which is useful in evaluating the values of certain definite integrals.

UNIT I

Limits , Continuity and Analytic Functions:

Limits – Continuity –Derivatives – Differentiation formula – Analytic functions – C-R equations – Harmonic Function. (18 hours)

UNIT II

Conformal mapping and Transformations:

Conformal mapping – Critical point – Transformations- Bilinear transformations – Elementary transformations – Cross ratio (Special Bilinear Transformations is not included). (18 hours)

UNIT III

Definite Integrals:

Properties of Definite integrals – Contour- Line integrals – Cauchy's integral theorem- Cauchy Goursat theorem (Without proof) – Cauchy's integral formula- Derivatives of analytic functions- Morera's theorem – Cauchy's inequality- Lioville's theorem – Fundamental theorem of Algebra – Maximum modulus theorem. (18 hours)

UNIT IV

Power Series:

Abel's Theorem- Cauchy's general principle of convergence for a series – Elementary functions- Taylor's series – Laurent's series – Zeros of an analytic function –Singularities – Riemann's theorem- Weierstrass theorem. (18 hours)

UNIT V

Residues and Poles:

Residues – Calculation of Residues –Cauchy's Residue theorem- Contour integration.

(18 hours)

TEXT BOOK

Manicavachagam Pillai T.K., Dr. Rajagopalan S.P. and Dr. Satanathan R., (Revised Edition 2007), *Complex Analysis* , S.Viswanathan (Printers and Publishers) Pvt., Ltd.

Unit	Chapter	Pages
I	2	21-56
II	3	57-84 and 88-94
III	4	95-138(Excluding proof of Cauchy Goursat theorem)
IV	5	139-172
V	6	173-240

Dr.A.Uma Devi
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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester VI	**DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS**	Hours/Week: 6	
Core Course-15		Credits: 4	
Course Code		Internal	External
18UMTC63		**25**	**75**

COURSE OUTCOMES

On completion of the course, students will be able to

- solve the problems choosing the most suitable method.
- build solutions to differential equations by superposition of known solutions.
- thorough with fundamental concepts of ODE and PDE
- sense the essential difference between ODE and PDE.
- incorporate the concept of Laplace Transform in solving differential equations.

UNIT I

Equations of the First Order and of the First Degree

Linear Equation- Bernouilli's equation - Exact differential equations – Sufficient condition – Practical Rule for solving an exact differential equation – Rules for finding integrating factors. (18 hours)

UNIT II

Equations of the First Order but of Higher Degree

Equations solvable for dy/dx - Equations solvable for y - Equations solvable for x- Clairaut's form.

Linear Equation with Constant Coefficients

Special methods for finding P.I – X is of the form $e^{ax}V$,where V is function of x – X is of the form x^m, m being a positive integer - Linear equation with variable coefficients - Equations reducible to the linear equations. (18 hours)

UNIT III

Linear Equations of the Second order

Complete Solution given a known integral – Reduction to the normal form – Change of the independent variable – Variation of Parameters. (18 hours)

UNIT IV

Partial Differential Equations of the first order

Classification of integrals - Derivation of partial differential equations - Lagrange's method of solving the linear equation- Special methods: Standard forms-Standard form I - Standard form-II - Standard form-III - Standard form-IV: Clairant's form.

(18 hours)

UNIT V

The Laplace Transforms

Results –Some general theorems -The inverse Laplace Transforms – Results under inverse transforms - Solving ordinary differential equation with constan co-efficients – Simultaneous linear differential equations using Laplace Transforms.

(18 hours)

TEXT BOOK

Manickavasagam Pillai. T.K. and Narayanan. S. (2011), *Differential Equations and its Applications,* S.Viswanathan Publications, Reprint 2011.

Unit	Chapter	Section
I	2	4, 5 and 6.1 – 6.4.
II	4	1,2.1,2.2 and 3.1
	5	4.2 (c) , 4.2 (d) , 5 and 6
III	8	1, 2, 3 and 4.
IV	12	1,2,3,4 and 5(5.1-5.4).
V	9	2,4,6,7,8 and 9.

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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester VI	**STATISTICS - II**	Hours/Week: 5	
Core Course-16		Credits: 4	
Course Code **18UMTC64**		Internal 25	External 75

COURSE OUTCOMES
On completion of the course, students will be able to

- distinguish between discrete and continuous random variables.
- apply the binomial distribution in social sciences and poisson distribution to describe the behaviour of rare events.
- know the properties of normal distribution and to find the probability of an event that lies between certain limits.
- test whether there is any significance difference between the sample statistic and the population parameter.
- apply χ^2 –Test to test the population variance, the independence attributes and to test the goodness of fit.
- test the homogeneity of several means using ANOVA technique.

UNIT I

Random Variables

Introduction-Random Variables-Distribution function-Discrete Random Variable-Continuous Random Variable-Probability Density Function-Mathematical Expectations-Mathematical Expectation of continuous random variable. (15 hours)

UNIT II

Random Variables

Moment generating function-properties of moment generating function-cumulant generating function-properties of cumulant generating function-Characteristic function

Some special distributions-

Introduction-Binomial distribution-Poisson distribution-Normal distribution. (15 hours)

UNIT III

Tests of significance (Large Samples)

Introduction-Sampling-Sampling distribution-Testing of hypothesis-Procedure for testing of hypothesis for large samples-Tests-of significance for large samples-

I Test of significance for proportions and percentages

II Test of significance for means

III Test for standard deviation

IV Test of significance for correlation coefficient. (15 hours)

UNIT IV

Tests of significance (Small Samples)

Introduction-Test of significance based on t-distribution(t-test)-Test of significance based on F-test-Test of significance of an observed sample correlation.

Test based on χ^2 - distribution

Introduction - χ^2 -Test - χ^2 -Test to test the goodness of fit-Test for independence of attributes. (15 hours)

UNIT V

Analysis of Variance

Introduction-One criterion of classification-Two criteria of classification.

(15 hours)

TEXT BOOK

Dr. Arumugam S.; Mr.Thangapandi Isaac. (July 2016) A *Statistics* New Gamma Publishing House

UNIT	CHAPTER	SECTION
I	12	12.0 – 12.4
II	12	12.5,12.6
	13	13.0 – 13.3
III	14	14.0 – 14.5
IV	15	15.0 – 15.3
	16	16.0 - 16.3
V	17	17.0-17.2

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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester VI	**BOOLEAN ALGEBRA AND LATTICES**	Hours/Week: **5**	
DSEC -2		Credits: 4	
Course Code **18UMTE61**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, students will be able to

- generalize the concept of ordering the elements of the set.
- acquire knowledge in lattices and its properties applicable in cryptography.
- construct the algebraic structure of lattices which are applied in branches of all sciences.
- understand the concept of Boolean algebra which is the mathematical foundation of switching algebra and its application to computers.
- comprehend Conjunctive Normal Form and Disjunctive Normal Form structures which are useful in electrical networks.

UNIT I

Posets and Lattices

Posets: Diagrammatical Representation of a Poset - Duality - Product of Two Posets - Lattices: Semi-lattices – Sublattices**.** (15 Hours)

UNIT II

Modular and Distributive Lattices

Modular Lattices: Direct Products - Ideal Lattice - Isomorphism Theorem. (15 Hours)

UNIT III

Modular and Distributive Lattices

Distributive Lattices : Direct Products – Characterization Theorem for Distributive Lattice. (15 Hours)

UNIT IV

Boolean Algebras

Representation of a Finite Boolean Algebra – Boolean Rings. (15 Hours)

UNIT V

Boolean Algebras

Boolean Functions – Conjunctive Normal Form. (15 Hours)

TEXT BOOK

Vijay K. Khanna(2018) *Lattices and Boolean Algebras*, Vikas Publishing House Pvt LTD.

Unit	Chapter	Sections/ Pages
I	2	11-15, 16-31, 33-35
II	4	70-82
III	4	82-94
IV	5	96-105, 107-111
V	5	111-124

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B.Sc. MATHEMATICS (SEMESTER)
(2018 -19 onwards)

Semester VI	**OPTIMIZATION TECHNIQUES**	Hours/Week: 5	
DSEC -2		Credits: 4	
Course Code **18UMTE62**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, students will be able to

- get solution to the primal problem using its dual, when it is easier to solve.
- solve different types of Integer Programming Problems.
- determine replacement of items, to minimize the maintenance and investment cost in industries.
- calculate economic order quantity which minimizes the total inventory cost and ordering cost.
- understand and analyze various queueing situations.

UNIT I

Duality in Linear Programming

General Primal - Dual Pair - Formulating a dual problem – Primal-Dual pair in matrix form - Duality Theorems - Complementary slackness theorem - Duality and simplex method.

(15 Hours)

UNIT II

Integer Programming

Introduction – Pure and mixed integer programming problems – Gomory's ALL - I.P.P. method - Construction of Gomory's constraints – Fractional cut method : All Integer LPP – Fractional cut method : Mixed integer LPP – Branch and bound method. (15 Hours)

UNIT III

Replacement Problem and System Reliability

Introduction – Replacement of Equipment/Asset that deteriorates gradually – Replacement Policy when Value of Money does not change with time - Replacement Policy when Value of Money changes with time - Replacement of Equipment that fails suddenly.

(15 Hours)

UNIT IV

Inventory Control – I

Introduction – Types of inventories – Reasons for carrying inventories - The inventory Decisions – Objectives of scientific inventory control – Costs associated with inventories – Factors affecting inventory control – An inventory control problem – The concept of EOQ – Deterministic inventory problems with no shortages - Deterministic inventory problem with shortages. (15 Hours)

UNIT V

Queueing Theory

Introduction – Queueing system – Elements of a queueing system – Operating characteristics of a Queueing system – Deterministic Queueing system – Probability distributions in Queueing systems – Classification of Queueing models – Definition of transient and steady states – Poisson Queueing Syatems: Model I{(M/M/1):(∞/FIFO)}, Model II{(M/M/1):(∞ /SIRO)}, Model III{(M/M/1):(N /FIFO)} (15 Hours)

TEXTBOOK :

Kanti Swarup, P.K.Gupta, ManMohan(Reprint 2014), *Operations Research*, Sultan Chand & Sons, Educational Publishers, NewDelhi.

Unit	Chapter	Section
I	5	5.2 - 5.7
II	7	7.1 - 7.7
III	18	18.1 - 18.3
IV	19	19.1 - 19.11
V	21	21.1 – 21.9 (upto Model III, Page No:610)

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B.Sc. MATHEMATICS (SEMESTER)
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Semester VI	**ASTRONOMY**	Hours/Week: 5	
DSEC -2		Credits: 4	
Course Code **18UMTE63**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, students will be able to

- derive various trigonometric formulas for spherical triangles.
- know about the motion of celestial objects.
- explain how astronomical distance are determined using parallax technique.
- analyze the effect of refraction takes place in celestial bodies.
- understand the Kepler's law of planetary motion, describing the motion of planets around the sun.

UNIT I:

Spherical Trigonometry:

Sphere- Great circles and small circles-Axis and poles of a circle-Distance between two points on a sphere-Angle between two circles-Angular radius or spherical radius-Spherical figures-spherical Triangle-Polar Triangle- Relation between the elements of a spherical triangle and its polar triangle-Some properties of spherical triangles-Principle of duality- Colunar and antipodal triangle-Relations between the sides and angles of a spherical triangle-Cosine formula - Sine formula-Cotangent formula-Supplemental cosine formula-Five parts formula-Functions of half an angle- Functions of half a side- Delambre's analogies-Napler's analogies-Right angled

spherical triangle-Napier's Rules-Spherical co-ordinates-Relation between the spherical and rectangular coordinates-General proof of the cosine formula-Small variations-Formulae in plane Trigonometry-Important Note-Problems- Theorem(statements only). (15 Hours)

UNIT II:

Celestial Sphere, Diurnal Motion:

Astronomy – Celestial sphere-Diurnal motion, celestial axis and equator-Celestial Horizon-Zenith and Nadir-Celestial Meridian-Cardinal points-North and southern hemispheres-Eastern and western hemispheres-Visible and invisible hemispheres-Declination circles-Verticals-Parallactic angle-Transit or culmination-Due east and due west-Due south and due north-Annual motion of the sun, Ecliptic, Obliquity-First point of Aries and First point of Libra-Equinoxes and solstices-Colures.

Celestial Co-ordinates

Horizontal system-Equatorial system-Meridian system-Ecliptic system-To represent the different system of co-ordinates in the same figure-Conversion of co-ordinates-To find the relation between Right Ascension and longitude of the sun-To trace the changes in the co-ordinates of the sun in the course of a year-To find the longitude of the sun on any day-Problems-Sidereal times-West hour angle of a body expressed in time units-Theorem (statements only).

Diurnal Motion:

To find the duration of day time – To find the azimuth of a star at rising -To trace the changes in the azimuth of a star in the course of a day-Problems.

Time for Rising:

Morning and Evening stars-Circumpolar stars-To find the condition that a star is circumpolar- To find the sidereal time of sunrise when the longitude of the sun on the date is known-To find the daily retardation in the sidereal time of sunrise-Problems- Theorem(Statement only).

(15 Hours)

UNIT III

The Earth:

Dip of Horizon – To find an expression for Dip-To find the distance between two mountains whose tops are just visible from each other- Effects of Dip-To find the acceleration in the time of rising of a star due to dip-Problems-Twilight-To find the duration of twilight-To find the condition that twilight may last throughout night-To find the number of consecutive days having twilight throughout night-To find the duration of twilight when it is shortest-Civil, nautical and astronomical twilights-Problems.

Geocentric Parallax:

Parallax-Effects of geocentric parallax-Changes in R.A. and declination of a body due to geocentric parallax-Effect of geocentric parallax on the rising and setting of a celestial body-To find the horizontal parallax of moon by meridian observations-To find the distance of a body when its horizontal parallax is known-Angular diameter-To show that the angular radius of a body varies inversely as its distance from the observer-To find the relation between horizontal parallax and angular radius of a body-Geocentric parallax and Refraction compared-Equatorial horizontal Parallax-Problems. (15 Hours)

UNIT IV

Refraction:

Refraction – Laws of refraction-Astronomical refraction-Tangent formula for refraction-General effects of refraction-To find k-Effects of refraction on the rising and setting of celestial bodies-To find the effect of refraction on the R.A. and declination of a star-To find the effect of refraction on a small horizontal arc-To find the effect of refraction on a small vertical arc-To find the effect of refraction on any small arc-Effect of refraction on the shape of the disc of the sun or full moon-Cassini's Formula-To find Cassini's constants A and B-Horizontal Refraction- To find the acceleration in the time of rising of a body due to refraction-Effect of Refraction on Dip and distance of visible horizon-Influence of temperature and pressure of atmosphere on Refraction-Problems. (15 Hours)

UNIT V

Kepler's Laws:

Kepler's laws of planetary motion-Longitude of perigee-Forward motion of the apse line-To calculate the eccentricity of the earth's orbit around the sun-Verification of Kepler's laws (1) and (2) in the case of the earth-Explanation of third law-Radial and transverse accelerations of a particle describing a plane curve in polar co-ordinates-Newton's deductions from Kepler's laws-To derive Kepler's third law from Newton's law of gravitation-To find the mass of a planet-To fix the position of a planet in its elliptic orbit-To express v as a series of u –Mean Anomaly-To prove m = u - e sin u – To express u as a series in m –To express v in terms of m- To Express m in terms of v – To express the R.A. of sun in terms of its longitude-Geocentric and Heliocentric latitudes and longitudes-To prove that the heliocentric longitude of the earth and geocentric of the sun differ by 180° – Problems. (15 Hours)

TEXT BOOK

Prof.Kumaravelu and Prof. Susheela Kumaravelu (Revised Edition 2011) *Astronomy.*

Unit	**Chapter**	**Section**
I	I	1-38
II	II	39-68,77-79,80-85
III	III,V	106-116,135-145
IV	IV	117-134
V	VI	146-165

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B.Sc. MATHEMATICS (SEMESTER)
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Semester VI	**NUMERICAL METHODS USING C**	Hours/Week: 2	
SEC-6		Credits: 2	
Course Code **18UMTS61P**		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, students will be able to

- solve algebraic and transcendental equations by using Bisection Method , Regula Falsi Method and Newton Raphson Method.
- solve a system of linear equations using Gauss Elimination method.
- estimate the missing data through interpolation methods.
- develop skills in solving the problems involving numerical differentiation and integration.

List of Practical Programs inNumerical Methods using C:

1. Program to find a root of the given equation using bisection method.
2. Program to find a root of the given equation using Regula-Falsi method.
3. Program to find a root of a given equation using Newton Raphson method
4. Program to solve the given system of linear equations by Gauss elimination method.
5. Program to find f(x) at a given point using Newton's interpolation formula.
6. Program to find f(x) at a given point using Lagrange's interpolation formula.
7. Program to evaluate dy/dx at a given point using Newton's differentiation formula.
8. Program to evaluate ∫ f(x) dx using Trapezoidal rule.

9. Program to evaluate $\int f(x)\,dx$ using Romberg's method.

10. Program to evaluate $\int f(x)\,dx$ using Simpson's 1/3 rule.

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