GOVERNMENT ARTS COLLEGE (Autonomous),

(Re-accredited with 'A' Grade by NAAC and Affiliated to Bharathidasan University, Tiruchirappalli)

KARUR - 639 005.

UG

COURSE STRUCTURE

Course Structure under CBCS System

(Applicable to the Candidates admitted from the Academic Year 2021 – 2022 onwards)

B.Sc.,

MATHEMATICS

GOVERNMENT ARTS COLLEGE (Autonomous),

KARUR - 639 005

Course structure under CBCS system

VISION

It is our vision to persuade every mind in this temple of learning to tirelessly seek the truth to face the challenges of the times and honestly participate in the establishment of universal peace, progress and love.

MISSION

It is our mission to create in everyone an honest searching mind to be ready for value-based creative citizenship for regional, national and global peace and progress.

UG AND RESEARCH DEPARTMENT OF MATHEMATICS

ABOUT THE DEPARTMENT

The department of mathematics has been started in the year 1967-68 affiliated to university of Madras. In the year 1981-82 the post graduate course in mathematics was started. From 1984-85 all courses in this department come under Bharathidasan University. In 2009-10 the department upgraded as a research department by admitting M.Phil. and Ph.D. scholars. Currently 10 staff members are working in the department out of which five faculty members with Ph.D. includes Topology, Fuzzy Topology, Algebra, Fuzzy Algebra, Fuzzy Matrix Theory, Operations Research etc., The department organizes workshops and seminars periodically.

VISION

To persuade every one's mind in Search of the real meaning of the infinity through hard work.

MISSION

To create in everyone a honest and creative mathematician for regional, national and global progress.

Programme: B. Sc. Title: Mathematics Medium: Tamil/ English

Programme Learning Objectives

- To have a comprehension of the instruments required to have the option to quantitatively examine and comprehend the common and social world,
- To be able to take care of issues, think scientifically, and reason quantitatively.
- To be able to get to and convey Mathematical data.
- To take an interest effectively in Mathematics related occasions in particular Conferences/Seminars/Workshops and Quiz programs.

Programme Outcomes

Area information: Demonstrate information on essential ideas, standards and uses of the particular science discipline.

Logical and Technical Skills: Ability to deal with/utilize suitable apparatuses/strategies/gear with a comprehension of the standard working methods, wellbeing perspectives/impediments.

Basic reasoning and Problem settling: Identify and basically break down appropriate issues in the important order utilizing proper instruments and strategies just as ways to deal with come to feasible end results/arrangements.

Individual and collaboration: Exhibit the possibility to successfully achieve assignments freely and as a part or pioneer in various groups, and in multidisciplinary settings.

Powerful Communication: Communicate successfully in spoken and composed structure just as through electronic media with mainstream researchers just as with society on the loose.

Society: Analyse the effect of logical and innovative advances on nature and society and the requirement for reasonable improvement.

Morals: Commitment to proficient morals and duties.

Deep rooted learning: Ability to participate in long lasting learning with regards to the fast advancements in the control.

Programme Specific outcomes:

PSO1: Explicate the concepts of pure and applied Mathematics by demonstrating the knowledge and understanding of the mathematical principles in multidisciplinary environments.

PSO2: Demonstrate a computational ability in solving a wide array of mathematical problems.

PSO3: Utilize mathematical skills of the logical and scientific approach.

PSO4: Appreciate the beauty of Mathematics with the attainment of proficiency in problem solving, computational skills, critical thinking, technical and quantitative reasoning.

REGULATIONS

Mathematics is a key to success in the field of science and engineering. Mathematics plays an important role in the context of globalization of Indian economy, modern technology, and computer science and information technology. Today, students need a thorough knowledge of basic principles, methods, results and a clear perception of the power of mathematical ideas and tools to use them effectively in modelling, interpreting and solving the real-world problems. The syllabus of this program is aimed at preparing the students with the latest developments and put them on the right track to fulfil the present requirements.

COMMENCEMENT OF THIS REGULATION

This regulation shall take effect from the academic year 2021 – 2022, i.e, for the students who areadmitted to the first year of the course during the academic year 2021 – 2022 and thereafter.

ELIGIBILITY FOR ADMISSION

A Pass in the Higher Secondary Examination of Tamil Nadu Higher Secondary Board or some other Board accepted by the Syndicate as equivalent thereto with Mathematics (other than Businessmathematics) as one of the subjects.

DEFINITIONS

Programme: Program means a course of study leading to the award of the degree in a discipline.

Course: Course refers to the subject offered under the degree programme.

What is Credit system?

Weightage to a course is given in relation to the hours assigned for the course. The following Table shows the correlation between credits and hours. However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of **140 (+4)** credits as mentioned in the table below. The total number of minimum courses offered by a department is given in the course pattern.

UNDER GRADUATE COURSEPATTERN (2021 ONWARDS)

PART	SEMESTER	SPECIFICATION	NO. OF COURSES	HOURS	CREDITS	TOTAL CREDITS
I	I - IV	Part- I	4	22	12	24
II	I - IV	Part II	4	22	12	
III	I - VI	Core course theory	13	69	62	94
	I - IV	Allied Course	4	20	12	
		Allied Course practical	2	11	8	
	V - VI	Elective Course	3	15	12	
IV	I - VI	Value Education Environmental Studies Soft Skills Development	3	6	6	24
	I - III	Value Added Course (CLP)	2	4	2	
		Extra Credit Course (MOOC'S)	1	-	2	
	III - IV	Non Core Elective	2	4	4	
	IV-V	Skill Based Elective - Theory	2	4	7	
	IV - V	Skill Based Elective - Practical	1	2	3	
V	VI	Gender Education	1	1	1	2
		Extension Activities	1	-	1	
TOTAL			**43**	**180**	**140 (+4)**	**140 (+4)**

Course Pattern

The Undergraduate degree course consists of five vital components. They are as follows:

Part – I : Language (Tamil)

Part - II: General English

Part - III: Core Course (Theory) Allied, Core Electives)

Part - IV: Value Education, Value Added Course, Extra Credit Course, Environmental Studies, Non Core Elective and Soft Skills Development.

Part - V: Gender Education and Extension Activities (NSS, NCC, Sports and Games, PEC, FAPA, YRC, EE, RRC, RC, LC and CC).

Core Courses

A core course is the course offered by the parent department related to the major subjects, components like theories, practical's, Project work, field visits and etc.

Non Core elective

Non Core elective Core should be shared by the various Departments of college. This course should be opted by all the students belonging to the particular Department. Each department of the respective college should allocate themselves the schedule and the units of the course.

Core Elective

The core elective course is also offered by the parent department. The objective is to provide choice and flexibility within the department. There are THREE core electives. They are offered in different semesters according to the choice of the college.

Extra Credit Courses

In order to facilitate the students gaining extra credits, the extra credit courses are given. There are two extra credit courses - Massive Open Online Courses (MOOC) and Skill-based Course - offered in the IV and V Semesters respectively. According to the guidelines of UGC, the students are encouraged to avail this option of enriching by enrolling themselves in the MOOC provided by various portals such as SWAYAM, NPTEL, etc. Skill based course is offered by the department apart from their regular class hours.

Value Education Courses

There are four courses offered in the first, second, fifth and sixth semesters for the First year and Third year students.

Non-Major Elective / Skill Based Elective

These courses are offered in two perspectives as electives "Within college".

Subject Code Fixation

The following code system (9 characters) is adopted for Under Graduate courses:

Year of Revision	UG Code of the Dept	Semester	Specification of Part	Running number in the part
↓	↓	↓	↓	↓
21	**U21**	***x***	***x***	***xx***
21	**UMM**	**1**	**x**	**1**

For example:

I B.Sc. Mathematics - Differential Calculus

The code of the paper is **U21MM1C1.**

Thus, the subject code is fixed for other subjects.

EXAMINATION

Continuous Internal Assessment (CIA):

UG - Distribution of CIA Marks	
Passing Minimum: 40 Marks	
THEORY CIA MAXMIMUM = 25	THEORY CIA MINIMUM = 10
PRACTICAL CIA MAXIMUM = 40	PRACTICAL CIA MINIMUM = 16

End - Semester Tests

Centralized - Conducted by the office of Controller of Examinations.

Semester Examination

Testing with Objective and Descriptive questions.

Section - A: 10 Questions x 2 Marks = 20 Marks (No Choice - Two questions from each unit)

Section - B: 5 Questions x 5 Marks = 25 Marks (Either… or Type - One pair from each unit)

Section - C: 3 Questions x 10 Marks = 30 Marks (3 Out of 5 - One question from each unit)

Duration of Examination:

3- Hours examination for courses.

Grading System

1. Grading

Once the marks of the CIA and the end-semester examination for each ofthe courses are available, they will be added. The marks thus obtained, will then be graded as per the scheme provided in Table 1.

From the second semester onwards the total performance within a semester and the continuous performance starting from the first semester are indicated by **Semester Grade Point Average (GPA)** and **Cumulative Grade Point Average (CGPA),** respectively. These two are calculated by the followingformulae

$$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{1=1}^{n} C_i} \quad WAM\,(Weighted\ Average\ Marks) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$$

Where, 'C_i' is the Credit earned for the Course - i,

'G_i' is the Grade Point obtained by the student for the Course 'i'.

'M' is the marks obtained for the course 'i', and

'n' is the number of Courses **Passed** in that semester.

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

2. Classification of Final Results

i) For each of the three parts, there shall be separate classification on the basis of the CGPA, as indicated in the following Table - 2.

ii) For the purpose of Classification of Final Results, the Candidates who earn CGPA 9.00 and above shall be declared to have qualified for the Degree as 'Outstanding'. Similarly, the candidates who earn the CGPA between 8.00 - 8.99, 7.00 - 7.99, 6.00 - 6.99 and 5.00 - 5.99 shall be declared to have qualified for their Degree in the respective programmes as 'Excellent', 'Very Good', 'Good' and 'Above Average' respectively.

iii) Absence from an examination shall not be taken as an attempt.

Table - I - Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above but below 90	9	A+
70 and above but below 80	8	A
60 and above but below 70	7	B+
50 and above but below 60	6	B
40 and above but below 50	5	C
Below 40	0	RA

Table – 2 – Final Result

CGPA	Classification of Final Results	Corresponding Grade
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re - Appearance

Credit based weighted Mark System is adopted for individual semesters and cumulative semesters in the column 'Marks Secured' (for 100).

Declaration of Result:

Mr./Ms. _____ has successfully completed the Under Graduate in _____ programme. The candidate's Cumulative Grade Point Average (CGPA) in Part - III is _____ and the class secured is _____ by completing the minimum of 140 credits. The candidate has acquired _____ (if any) extra credits offered by the parent department courses.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR – 639 005

(Re-accredited with A Grade by NAAC and Affiliated to Bharathidasan University Tiruchirappalli)

B.Sc. MATHEMATICS COURSE STRUCTURE UNDER CBCS SYSTEM

(For the candidates admitted from the year 2021-2022 onwards)

SEMESTER	PART	COURSE	COURSE TITLE	COURSE CODE	INSTR.HOURS WEEK	CREDIT	EXAM HOURS	MARKS INT	MARKS ESE	TOTAL
I	I	Tamil - I	Tamil – I	**U21L1T1**	5	3	3	25	75	100
	II	English – I	English – I	**U21L1E1**	5	3	3	25	75	100
	III	Core Course – I	Differential Calculus	**U21MM1C1**	5	5	3	25	75	100
		Core Course – II	Integral Calculus and Fourier Series	**U21MM1C2**	4	5	3	25	75	100
		First Allied Course – I	Allied Physics – I	**U21PH1A1**	5	3	3	25	75	100
		First Allied Course - II	Allied Physics – II (Practical)	-	2	-	-	-	-	-
	IV	Value Education	Value Education	**U21VE1**	2	2	3	25	75	100
	IV	Value added Course	CLP/SAP (Special Assistance Programme) SAP Applicable for B.Sc.(CS) & B.Com(CA)	-	2					
					30	**21**				**600**
II	I	Tamil – II	Tamil – II	**U21L2T2**	6	3	3	25	75	100
	II	English – II	English– II	**U21L2E2**	6	3	3	25	75	100
	III	Core Course – III	Classical Algebra	**U21MM2C3**	6	5	3	25	75	100
		First Allied Course – II	Allied Physics II (practical)	**U21PH2A2P**	3	4	3	40	60	100
		First Allied Course – III	Allied Physics III	**U21PH2A3**	5	3	3	25	75	100
	IV	Environmental Studies	Environmental Studies	**U21ES2**	2	2	3	25	75	100
	IV	Value added Course	CLP/SAP (Special Assistance Programme) SAP Applicable for B.Sc.(CS) & B.Com(CA)		2	2				
					30	**20 (2)**				**600**
III	I	Tamil – III	Tamil- III	**U21L3T3**	6	3	3	25	75	100
	II	English – III	English – III	**U21L3E3**	6	3	3	25	75	100
	III	Core Course – IV	Vector Calculus, Analytical Geometry and Trigonometry	**U21MM3C4**	6	5	5	25	75	100
		Second Allied Course -I	Mathematical Statistics – I	**U21ST3A1**	6	3	3	25	75	100
		Second Allied Course -II	Mathematical Statistics Practical Using R	-	4	-	-	-	-	-
	IV	Non Core Elective- I	Fundamentals of information technology	**U21CS3N1**	2	2	3	25	75	100
	IV	Extra Credit Course	Massive Open Online Course (MOOC)			(2)				
					30	**16** (2)				**500**

IV	I	Tamil – IV	Tamil- IV	**U21L4T4**	5	3	3	25	75	100
	II	English – IV	English –IV	**U21L4E4**	5	3	3	25	75	100
	III	Core Course – V	Statics	**U21MM4C5**	5	5	3	25	75	100
		Core Course – VI	Differential Equations and Laplace Transform	**U21MM4C6**	5	5	3	25	75	100
		Second Allied Course-II	Mathematical Statistics Practical Using R	**U21ST4A2P**	2	4	3	40	60	100
		Second Allied Course-III	Mathematical Statistics – II	**U21ST4A3**	4	3	3	25	75	100
	IV	Skill Based Elective- I	Mat Lab – A / Quantitative Aptitude- B	**U21MM4S1A/B**	2	4	3	25	75	100
	IV	Non Core Elective- II	Web Designing	**U21CS4N2**	2	2	3	25	75	100
					30	**29**				**800**
V	III	Core Course – VII	Algebra – I	**U21MM5C7**	5	5	3	25	75	100
		Core Course – VIII	Real Analysis – I	**U21MM5C8**	5	5	3	25	75	100
		Core Course – 1X	Complex Analysis	**U21MM5C9**	5	4	3	25	75	100
		Core Course – X	Dynamics	**U21MM5C10**	5	4	3	25	75	100
		Core Elective I	Graph theory- A / Astronomy -B	**U21MM5E1A/B**	4	4	3	25	75	100
	IV	Skill Based Elective II	Programming in C-A / Introduction to Latex-B	**U21MM5S2A/B**	2	3	3	25	75	100
		Skill Based Elective III	Programming in 'C' Practicals - A/ Latex Practicals - B	**U21MM5S3A/B P**	2	3	3	40	60	100
		Soft Skills Development	Soft Skill Development	**U21SSD3**	2	2	3	25	75	100
					30	**30**				**800**
VI	III	Core Course – XI	Algebra – II	**U21MM6C11**	6	5	3	25	75	100
		Core Course – XII	Real Analysis – II	**U21MM6C12**	6	5	3	25	75	100
		Core Course – XIII	Operation Research	**U21MM6C13**	6	4	3	25	75	100
		Core Elective – II	Numerical Methods – A Formal Languages and Automata theory-B	**U21MM6E2A/B**	5	4	3	25	75	100
		Core Elective – III	Discrete Mathematical Structure - A Fuzzy Mathematics - B	**U21MM6E3A/B**	6	4	3	25	75	100
	V	Extension Activities	Extension Activities (NSS/ NCC / RRB / YRC / Fine Arts/ Environmental Education / Population, Education Club / Rotract club/ Leo Club /Sports & Games)			1				
			Gender Education	**U21EA4**	1	1	3	25	75	100
					30	**24**				**600**
	TOTAL				**180**	**140 (+4)**				**3900**

CHAIRMAN
BOARD OF STUDIES

CONTROLLER OF EXAMINATIONS

Allied Subjects for B.Sc. Mathematics

Any two of the following subjects (Physics / Chemistry / Statistics) can be chosen as allied subjects.

- **Elective Course:** There are 3 Elective Courses offered for B.Sc. Mathematics students. One course from each set should be selected for each elective course. That is, Select one paper from Group –A for Elective Course-I, one paper from Group –B for Elective Course II and one paper from Group - C for Elective Course III.

Name of The Course	Paper Code
Group A	
1. Graph Theory	U21MM5E1A
2. Astronomy	U21MM5E1B
Group B	
1. Numerical Methods	U21MM6E2A
2. Formal Languages and Automata Theory	U21MM6E2B
Group C	
1. Discrete Mathematics	U21MM6E3A
2. Fuzzy Mathematics	U21MM6E3B

- **Skill Based Elective Course:** This course aims to impart advanced and recent developments in the concerned discipline. Select any one set of the skill based Elective course.

Set 1	Set 2
1. Matlab (U21MM4S1A) 2. Programming in C (U21MM5S2A) 3. Programming in C Practical(U21MM5S3AP)	1. Quantitative Aptitude(U21MM4S1B) 2. Latex(U21MM5S2B) 3. Latex – Practical (U21MM5S3BP)

- **Non-Major Course:** Irrespective of the discipline the student can select papers that are offered by other disciplines as non-major course. Select any one department for two non-core elective courses from Statistics, Physics, Chemistry, Computer Science, Botany, Zoology, Nutrition and Dietetics

CREDIT : 5 **COURSE CODE : U21MM1C1**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS - I SEMESTER - CORE COURSE – I

(For the candidates admitted from the year 2021-2022 onwards)

DIFFERENTIAL CALCULUS

COURSE OBJECTIVES:

1. Get exposed to the various concepts of Differential Calculus like n^{th} derivatives, maxima and minima.
2. Apply differentiation to find envelope, curvature and pedal equation of a curve.
3. Develop problem solving skills.

UNIT- I	**SUCCESSIVE DIFFERENTIATION:** The n^{th} derivative –Standard results – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product – A complete formal proof by induction.
UNIT- II	**MAXIMA AND MINIMA:** A geometrical proof of Theorems PARTIAL DIFFERENTIATION, ERRORS AND APPROXIMATIONS**:** Maxima and Minima of functions of two variables – Working rule – Lagrange's method of undetermined multipliers.
UNIT -III	**ENVELOPES, CURVATURE OF PLANE CURVES:** Method of finding the envelopes – Curvature – Circle, radius and centre of curvature – Cartesian formula for the radius of curvature.
UNIT -IV	**ENVELOPES, CURVATURE OF PLANE CURVES:** The Coordinates of the centre of curvature – Radius of curvature when the curve is given in polar co-ordinates – p- r equations; pedal equation of a curve.
UNIT - V	**LINEAR ASYMPTOTES:** Definition–Asymptotes parallel to the axis –Special cases – Asymptotes by inspection – Intersection of a curve with its asymptotes.

TEXT BOOK:

S.Narayanan&T.K.Manicavachagom Pillay, Calculus,VolumeI,S.Viswanathan(Printers & Publishers), Pvt., Ltd., 2011, Chennai.

Unit	Chapter& Section
I	Chapter3: Sections 1.1 to 1.6& 2.1 to 2.2
II	Chapter 5: Sections1 to 5; Chapter 8: Sections 4 to 5
III	Chapter 10: Sections 1.1 to 1.3 & 2.1 to 2.3
IV	Chapter 10: Sections 2.4 & 2.6 to 2.8
V	Chapter 11: Sections 1 to 4 & 6 to 7

REFERENCE BOOKS:

1. Dr.S.Sudha, Calculus, First edition (1998), Emerald Publishers, Chennai.
2. S.C.Arora& Ramesh Kumar, A Text Book of CALCULUS, First edition (1984), PitambarPublishing Company, New Delhi.
3. R.K. Ghosh, K.C.Maity, An Introduction to Analysis, Differential Calculus, Part I, Tenth edition(1999),Books andAllied(P)Ltd, Calcutta.
4. ShantiNarayanan,P.K.Mittal,Differential Calculus, Tenth Revised Edition(2005),S.Chand&Company, Pvt., Ltd.,New Delhi.
5. T. M. Apostal,Calculus, Volume I,Secondedition,WileyPublications,New Delhi.

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COURSE OUTCOME:

Upon successful completion of **Differential Calculus**, Students will be able to

CO 1 Compute n^{th} derivatives of algebraic & trigonometric functions. Evaluate n^{th}derivative of product of two functions using Leibnitz formula.

CO 2 Find maxima and minima of functions of two independent variables. Use Lagrange's multiplier method to solve constrained optimization problem. Apply PDE to find Jacobian of a given multiple variable.

CO 3 Demonstrate and compute envelopes, radius and centre of curvature.

CO 4 Discuss Co-ordinates of centre of curvature, p-r equation and pedal equation of a curve.

CO 5 Explain and evaluate the asymptotes.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**2**	**1**
CO 2	**3**	**3**	**2**	**2**
CO 3	**3**	**2**	**3**	**1**
CO 4	**3**		**1**	**1**
CO 5	**3**	**3**	**2**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: K.KALPANA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT : 5 **COURSE CODE : U21MM1C2**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – I SEMESTER - CORE COURSE – II

(For the candidates admitted from the year 2021-2022 onwards)

INTEGRAL CALCULUS AND FOURIER SERIES

COURSE OBJECTIVES:

1. Get exposed to the concepts of reduction formulae and Fourier Series
2. Apply double and triple integral to find the area and volume.
3. Understand the concepts of Beta and Gamma functions and their applications.

UNIT -I	**INTEGRATION**: Reduction formulae – Bernoulli's formula
UNIT- II	**MULTIPLE INTEGRALS:** Definition of the Double integral – Evaluation of the double integral.
UNIT- III	**MULTIPLE INTEGRALS:** Triple integrals – Application of multiple integrals.
UNIT -IV	**IMPROPER INTEGRALS: BETA AND GAMMA FUNCTIONS**: Definition – Convergence of $\Gamma(n)$ – Recurrence formula of Gamma functions – Properties of Beta functions – Relation between Beta and Gamma functions.
UNIT -V	**FOURIER SERIES:** Fourier series of periodic functions, Fourier series of odd and even functions. Half range fourier series – change of interval – combination of series.

TEXT BOOKS:

1. S. Narayanan and T. K. ManicavachagomPillay, Calculus II, S.Viswanathan (Printers&Publishers), Pvt., Ltd., 2010, Chennai.
2. S. Narayanan and T.K. Manicavachagom Pillay, Calculus III, S.Viswanathan(Printers & Publishers), Pvt., Ltd., 2007, Chennai.

Unit	Book, Chapter& Section
I	Book1, Chapter 1: Sections 13,13.1-13.10,14,15.1
II	Book 1, Chapter 5: Sections 2.1 & 2.2
III	Book 1, Chapter 5: Sections 4,5.1 to 5.3
IV	Book1, Chapter 7: Sections 2.1 to 2.3,3,4
V	Book2, Chapter 6: Sections1 to 7

REFERENCEBOOKS:

1. P. Kandasamy and K. Thilagavathi, Mathematics for B.Sc., Volume II (2004), S.Chand & Company, Ltd, New Delhi.
2. T. M. Apostol, Calculus II, Fourth edition (1991), John Wiley and Sons, Inc.,NewYork.
3. S.C.Arora& Ramesh Kumar, A Text Book of CALCULUS, First edition (1984), Pitambar PublishingCompany,New Delhi.
4. Shanti Narayan,P.K.Mittal,Integral Calculus,Tenth Revised Edition (2005), S.Chand& Company, Ltd.,New Delhi.
5. R.K.Ghosh,K.C.Maity, An Introduction to Analysis, IntegralCalculus,Part-I, Ninth edition(1999),Books and Allied(P) Ltd, Calcutta.

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COURSE OUTCOME:

Upon successful completion of **Integral Calculus and Fourier series**, Students will be able to

CO 1 Derive reduction formula and thereby evaluate some standard integrals.

CO 2 Apply change of variable method to evaluate double integral.

CO 3 Utilize double and triple integral to compute area and volume of the solid.

CO4 Explain the properties of Beta and Gamma function and apply it to compute the integral.

CO 5 Identify odd and even function. Use that to determine Fourier series expansion of the given function.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**2**		**2**
CO 2	**3**	**3**	**2**	**1**
CO 3	**3**	**2**	**2**	**2**
CO 4	**3**	**2**		**3**
CO 5	**3**	**2**	**1**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
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K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: R. AMALA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5 **COURSE CODE: U21MM2C3**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – II SEMESTER - CORE COURSE – III

(For the candidates admitted from the year 2021-2022 onwards)

CLASSICAL ALGEBRA

COURSE OBJECTIVES:

1. Sum the Series using Binomial, Exponential and Logarithmic series.
2. Compute the inverse of the matrix using Cayley Hamilton Theorem.
3. Understand the basic concepts of Theory of Numbers.

UNIT- I	**BINOMIAL THEOREM:** Application of the Binomial Theorem to the summation of series. **EXPONENTIAL AND LOGARITHMIC SERIES:** Summation – Series which can be summed up by the logarithmic series.
UNIT -II	**THEORY OF EQUATIONS:** Remainder Theorem –In an equation with real coefficients, imaginary roots occur in pairs – In an equation with rational coefficients irrational roots occur in pairs – Relations between the roots and coefficients of equations – Symmetric function of the roots.
UNIT - III	**THEORY OF EQUATIONS:** Transformations of Equations – Reciprocal equation – To increase or decrease the roots – Descartes' Rule of signs – Horner's method.
UNIT - IV	**MATRICES:** A Matrix – Scalar Multiplication of a matrix – Equality of matrices – Addition of matrices – Subtraction of matrices – Symmetric matrix – Multiplication of matrices – Inverse matrix – Orthogonal matrix –System of non-homogenous linear equations.
UNIT- V	**THEORY OF NUMBERS:** Prime and composite numbers –Divisors of a given number N – Euler's function $\Phi(n)$ – The highest power of a prime p contained in n! – The product of r consecutive integers is divisible by r! – Congruences – Properties of Congruences – Fermat's Theorem – Wilson's Theorem.

TEXT BOOKS:

1. T.K.Manicavachagam Pillay,T. Natarajan and K.S.Ganapathy, Algebra Volume-I,S.Viswanathan(Printers &Publishers),Pvt.,Ltd., 2010, Chennai.
2. T.K. Manicavachagam Pillay, T. Natarajan and K.S.Ganapathy, Algebra Volume – II,S.Viswanathan(Printers & Publishers),Pvt.,Ltd., 2010, Chennai.

Unit	Book, Chapter& Section
I	Book 1, Chapter 3: Section 10; Book 1, Chapter 4: Sections 3 &9
II	Book1, Chapter 6: Sections 1 to 12
III	Book1, Chapter 6: Sections 15 to 17, 24&30
IV	Book 2, Chapter 2: Sections 1 to 8, 9.1,16
V	Book2, Chapter 5: Sections 1,6 to 8,10 to 13,16,17

REFERENCE BOOKS:

1. P.R.Vittal and V.Malini,Algebra and Trigonometry(2003),Margam Publishers,Chennai.
2. Dr.A.Singaravelu, Algebra and Trigonometry, Vol I &II (2003), Meenakshi Agency,Chennai.
3. Dr.S.Arumugam, Prof. A.Thangapandi Isaac, Classical Algebra (2003), New gamma Publishing House, Palayamakottai.
4. H.K. Dass, H.C.Saxena, M.D.Raisingghania, Matrices (1999), S.Chand& Company Pvt., Ltd., New Delhi.
5. Dr. Sudir K. Pundir, Dr. RimplePundir, Theory of numbers, Third Revised edition(2012),Pragati Prakashan, Meerut.

CHAIRMAN –BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of **Classical Algebra**, Students will be able to

CO1 Sum the series using Binomial, Exponential and Logarithmic expansions.

CO2 Analyse the relation between root and coefficients of a polynomial equation. Form the equations using symmetric roots of a given equation

CO3 Find an approximation of roots of cubic equation by Horner's method.

CO4 Compute the inverse of a matrix using Cayley Hamilton Theorem, eigen values and eigen vectors of a matrix.

CO5 Analyse and interpret the concept of numbers, divisibility, Congruence, Euler function, Fermat's and Wilson's theorem.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**2**	**3**	**3**
CO 2	**3**	**2**	**1**	
CO 4	**3**	**3**	**2**	**3**
CO 5	**3**	**2**		**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: K.KALPANA

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5	**COURSE CODE: U21MM3C4**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. MATHEMATICS – III SEMESTER - CORE COURSE – IV

(For the candidates admitted from the year 2021-2022 onwards)

VECTOR CALCULUS, ANALYTICAL GEOMETRY AND TRIGONOMETRY

COURSE OBJECTIVES:

1. Understand the fundamental concepts of vector differentiation.
2. Compute line, Surface & volume integral by using Green's, Stokes & Gauss Divergence theorem.
3. Compute the Fourier Transform of a continuous function.
4. Know the principles and concepts of Trigonometry

UNIT -I	**VECTOR DIFFERENTIATION**: Gradient, Curl and Divergence - Directional Derivative – Divergence and curl of a vector point function – Vector Identities.
UNIT -II	**VECTOR INTEGRATIONS**: Evaluation of line integral - Surface integral and volume integral - Application of Green's theorem - Gauss-Divergence theorem - Stokes' theorem (proofs of theorems not included) -Problems.
UNIT- III	**PLANE:** First degree equation - Determination of a plane - Plane perpendicular to a given direction – Planes parallel to given lines and through given points – Equations $P + \lambda P' = 0$ – Second degree homogeneous equation – Coplanarity of the lines through a point – Perpendicular to a plane – Positions of points with reference to a plane – Bisector planes of the angles between two given planes – Volume of a tetrahedron – Sums. **STRAIGHT LINES:** Equations of a straight line – Conditions for various situations of a line – 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 – Sums.
UNIT -IV	**SPHERE:** Equation of a sphere – Standard equation of a sphere – Results based on the properties of a sphere – Tangent plane to a sphere - Radical plane - Equations of a circle – Equations $S + \lambda P = 0$ and $S + \lambda S' = 0$ – Sums. **CONE:** Cone – Equation of a cone – Cone whose vertex is at the origin – Quadric cone with vertex at the origin_- General quadric cone - Sums.
UNIT -V	**EXPANSIONS:** Expansions of $\cos n\theta$ and $\sin n\theta$ – Expansion of $\tan n\theta$ in powers of $\tan\theta$ – Expansion of $\tan(A + B + C + \cdots)$ – Powers of sines and cosines of θ in terms of functions of multiples of θ– Expansions of $\sin\theta$ and $\cos\theta$ in a series of ascending powers of θ. **HYPERBOLIC FUNCTIONS:** Hyperbolic functions – Relations between hyperbolic functions – Inverse hyperbolic functions.

TEXT BOOKS:

1. P. R. Vittal and V. Malini, Vector Analysis, Margham Publications, 1997, Chennai.

2. P. Duraipandian, Laxmi Duraipandian and D. Muhilan, Analytical Geometry, Emerald Publishers,1986, Chennai.
3. S. Narayanan and T.K. Manickavachagom Pillay, Trigonometry, S. Viswanathan (Printers & Publishers)Pvt.,Ltd., 2010, Chennai.

Unit	Book, Chapter& Section
I	Book1, Chapter 1: Sections All
II	Book 1, Chapter 2 : Sections All
III	Book 1, Chapter 3, 4 : Sections All
IV	Book 2, Chapter 5: Sections All Book 2, Chapter 6: Sections 6.1 to 6.5 & 6.13
V	Book 1, Chapter 3: Sections 1 to 5 Book 1, Chapter 4: Sections All

REFERENCE BOOKS:

1. K.Venkataraman- Engineering Mathematics – Part B, National Publishing Company,Chennai.
2. B.S.Grewl,Higher Engineering Mathematics(2002),Khanna Publishers, NewDelhi.
3. A.Singaravelu, Algebra and Trigonometry Volume I (2003),Meenakshi Agency,Chennai.
4. S.L.Loney, Plane Trigonometry PartII (1982),Cambridge University Press London.
5. Dr.M.D. Raisinghania,H.C.Saxena,H.K.Dass, Trigonometry(1999), S. Chand & company Pvt Ltd, New Delhi.

CHAIRMAN- BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of **Vector Calculus and Analytical Geometry**, Students will be able to

CO 1 Discuss the Basic concepts of gradient, Scalar Potential, Directional Derivative, Divergence and Curl.

CO 2 Evaluate line integral, surface integral and volume integral.

CO 3 Apply Green's theorem, Gauss-Divergence theorem, Stokes theorem to evaluate Area and Volume.

CO 4 Discuss the geometrical concept of planes, straight line, sphere and cones.

CO 5 Determine the hyperbolic functions and inverse hyperbolic function and study the relation between them

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**		**2**	**1**
CO 5	**3**	**3**	**3**	**2**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: K.KALPANA

CHAIRMAN- BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **COURSE CODE: U21ST3A1**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.
B.Sc. MATHEMATICS – III SEMESTER - SECOND ALLIED COURSE – I
(For the candidates admitted from the year 2021-2022 onwards)

MATHEMATICAL STATISTICS – I

COURSE OBJECTIVES:
The aim of this course is to introduce the concept of discrete and continuous random variables, probability functions, expectations, moment generating functions and some discrete and continuous distributions and should have developed skills to apply them to various real life situations.

UNIT - I	**Random variables and Distribution Functions:** Two Dimensional Random variables - Two Dimensional or Joint Probability Mass function - Two Dimensional Distribution Function – Marginal Distribution Functions – Joint Density Function – Marginal Density Function – The Conditional Distribution Function and Conditional Probability Density Function – Simple Problems. **Mathematical Expectation:** Introduction – Mathematical Expectation or Expected Value of Random Variable – Expected Value of Function of a Random Variable – Properties of Expectation.
UNIT -II	**Mathematical Expectation:** Properties of Variance – Covariance – Variance of a Linear Combination of Random Variables – Moments of Bivariate Probability Distributions – Conditional Expectation and Conditional Variance – Simple Problems. **Moment Generating Functions:** Moment Generating Functions- Properties of Moment Generating Functions – Uniqueness Theorem of Moment Generating Functions – Cumulants – Properties of Cumulants (self study) – Simple Problems.
UNIT- III	**Moment Generating Functions:** Characteristic Function (self study) – Properties of Characteristic Function – Chebychev's inequality – Simple Problems. **Special Discrete Probability Distributions:** Binomial Distribution – Moments of Binomial Distribution – Recurrence Relation for the Moments of Binomial Distribution – Moment Generating Function of Binomial Distribution – Additive Property of Binomial Distribution – Simple Problems. Poisson Distribution – Moments of Poisson Distribution – Recurrence Relation of Moments of the Poisson Distribution – Moment Generating Function of Poisson Distribution – Characteristic Function of the Poisson Distribution – Cumulants of the Poisson Distribution – Additive or Reproductive Property of Independent Poisson Variates - Simple Problems.
UNIT -IV	**Special Continuous Probability Distributions:** Normal Distributions – Chief Characteristics of the Normal Distribution – M.G.F. of Normal Distribution – C.G.F. of Normal Distribution – Moments of Normal Distribution – A linear Combination of Independent Normal Variates – Simple Problems. Rectangular Distribution – Moments of Rectangular Distribution – M.G.F. of Rectangular Distribution – Characteristic Function of Rectangular Distribution – Mean Deviation about Mean – Simple Problems.
UNIT- V	**Special Continuous Probability Distributions:** Gamma Distribution – M.G.F. of Gamma Distribution – C.G.F. of Gamma Distribution – Additive Property of Gamma Distribution – Beta Distributions of first kind – Constants of Beta Distributions of first kind – Beta Distributions of second kind – Constants of Beta Distributions of second kind – Exponential Distribution – M.G.F. of Exponential Distribution – Simple Problems.

TEXT BOOKS:

Gupta S.C. and Kapoor V.K, Fundamentals of Mathematical Statistics, Eleventh Edition S.Chand& Sons, 2009.

Unit	Chapter& Section
I	Chapter 5: Sections 5.5, 5.5.1 to 5.5.5 Chapter 6: Sections 6.1 to 6.4
II	Chapter 6: Sections 6.5, 6.6, 6.6.1, 6.8, 6.9. Chapter 7: Sections 7.1, 7.1.2, 7.1.3, 7.2, 7.2.1.
III	Chapter 7: Sections 7.3, 7.3.1, 7.5. Chapter 8: Sections 8.4, 8.4.1, 8.4.2, 8.4.6, 8.4.7, 8.5, 8.5.2, 8.5.4, 8.5.5, 8.5.8.
IV	Chapter 9: Sections 9.2, 9.2.2, 9.2.5, 9.2.6, 9.2.7, 9.2.8, 9.3 to 9.3.4.
V	Chapter 9: Sections 9.5 to 9.5.3, 9.6, 9.6.1, 9.7, 9.7.1, 9.8, 9.8.1.

REFERENCE BOOKS:

1. Hogg R.V. and Craigh A.G, Introduction to Mathematical Statistics,Pearson Education publications, 2004.
2. Veerarajan.T,Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt.Ltd, 2017.
3. Vital P.R, Mathematical Statistics,Margham Publications, 2004.

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of **Mathematical Statistical-I**, Students will be able to

CO1 Distinguish types of studies and their limitations and strengths.

CO2 Understand random variables and probability distributions.

CO3 Know the difference between discrete and continuous random variables.

CO4 Compute expected value and variance of discrete and continuous random variables.

CO5 Acquire the knowledge by using Binomial distribution, Poisson distribution etc.

Nature of Course			
Knowledge and Skill		Employability oriented	✓
Skill oriented		Entrepreneurship oriented	✓

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			**2**
CO 2	**3**		**2**	
CO 3	**3**		**2**	**2**
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**		**3**	**2**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K1	A – 10 x 2 marks	50	20	75	Nil
K1, K2	B – 5 x 5 marks (with internal choice)	200	25		
K2, K3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER : K.KALPANA

CHAIRMAN –BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5 **COURSE CODE: U21MM4C5**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – IV SEMESTER - CORE COURSE - V

(For the candidates admitted from the year 2021-2022 onwards)

STATICS

COURSE OBJECTIVES:

1. Understand the basic concepts of forces and friction acting on a static body.
2. Study the equilibrium of a particle and momentum of force acting on a rigid body.
3. Get familiarized with the concepts of couple and evaluate mass centre.

UNIT -I	**Force:** Newton's laws of motion – Resultant of two forces on a particle – **Equilibrium of a Particle:** Equilibrium of a particle – Limiting equilibrium of a particle on an inclined plane.
UNIT- II	**Forces on a Rigid Body:** Moment of a force – General motion of a rigid body – Equivalent Systems of forces – Parallel forces – Forces along the sides of a triangle.
UNIT -III	**Forces on a Rigid Body:** Couples – **A Specific Reduction of Forces:** Reduction of coplanar forces into a force a couple – Problems involving frictional forces.
UNIT- IV	**Centre of Mass:** Centre of mass – Finding mass center.
UNIT -V	**Hanging Strings:** Equilibrium of a uniform homogeneous string – Suspension bridge.

TEXT BOOKS:

P. Duraipandian, LaxmiDuraipandian and MuthamizhJayapragasam, Mechanics, 6th Revised Edition, S. Chand and Company Ltd, New Delhi, 2005.

Unit	Chapter& Section
I	Chapter 2: Sections All Chapter 3: Sections All
II	Chapter 4: Sections 4.1 to 4.5
III	Chapter 4: Section 4.6, Chapter 5: Sections All (omit 5.2.1)
IV	Chapter 6: Sections 6.1 & 6.2 (Omit 6.2.3 and 6.2.4)
V	Chapter 9: Sections All

REFERENCE BOOKS:

1. A.V. Dharmapadam, Statics, S.Viswanathan Printers &Publishers Ltd, Chennai, (2006).
2. K. Viswanath Naik & M.S. Kasi, Statics**,** Emerald Publishers Chennai, 1987.
3. S.G. Venkatachalapathy, Statics, Margham Publications, Chennai, 2005.
4. Golden Maths Series, Statics, N.P.Bali, FirewallMedia, An Imprint of laxmi Publications Pvt. Ltd, New Delhi .
5. A.R.Vasishtha&R.K.Gupta, Statics, Krishna's Educational Publishers, Meerut.

CHAIRMAN–BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

CO 1 Discuss the fundamental concepts of forces and friction and to find the resultant of two or more forces acting on a particle.

CO 2 Apply the concepts of Lami's Theorem to determine the equilibrium of a particle under three or more forces. Discuss the Limiting Equilibrium of a particle on an Inclined Plane.

CO 3 Explain the concepts of Forces on a Rigid Body. Investigate the Resultant of Like and unlike parallel forces and Varignon's theorem to find the Moment of a force.

CO 4 Discuss the Basic concepts of Hanging strings.

CO 5 Evaluate the Centre of Mass for the Plane area, Circle, Cone, Hemisphere.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			
CO 2	**3**	**3**		**3**
CO 3	**3**	**2**	**3**	**3**
CO 4	**3**	**2**		**3**
CO 5	**3**	**3**	**3**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: S.MURUGAMBIGAI

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5 **COURSE CODE: U21MM4C6**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – IV SEMESTER - CORE COURSE - VI

(For the candidates admitted from the year 2021-2022 onwards)

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORM

COURSE OBJECTIVES:

1. Distinguish ordinary differential equations from partial differential equations.
2. Solve second order differential equations.
3. Determine the solution of exact differential equation using Integrating factor.
4. Apply Laplace Transform to solve differential equations

UNIT - I	**EQUATIONS OF THE FIRST ORDER AND OF THE FIRST DEGREE:** Variable separable– Homogeneous equations - Bernoulli's equation. **EQUATIONS OF FIRST ORDER, BUT OF HIGHER DEGREE:** Equations solvable for p – Equations solvable for y – Equations solvable for x –Clairaut's form.
UNIT - II	**LINEAR EQUATION WITH CONSTANT COEFFICIENTS**: Definitions – The operator D – Complementary function of a linear equation with constant coefficients – Particular Integral. **LINEAR EQUATION WITH VARIABLE COEFFICIENTS**: Linear equations with variable coefficients, Variation of Parameters.
UNIT - III	**EQUATIONS OF THE FIRST ORDER AND OF THE FIRST DEGREE:** Exact differential equations. **SIMULTANEOUS DIFFERENTIAL EQUATIONS:** Solutions of $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$– Methods for solving$\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$. **TOTAL DIFFERENTIAL EQUATIONS:** Rule for integrating $Pdx+Qdy+Rdz=0$ – Some examples can be worked easily by a judicious grouping of the terms.
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 I – Standard II – Standard III – Standard IV; Clairaut's form.
UNIT- V	**THE LAPLACE TRANSFORMS:** Definitions. Piecewise continuity – Sufficient conditions for the existence of the Laplace Transform. Inverse Transform, Properties – Application of Laplace Transform to solution of the first and second order linear differential equations (with constant coefficients).

TEXT BOOKS:

1. S.Narayanan &T.K. ManickavachagamPillay, Differential Equations and its Applications, Revised Ninth Edition (1985), S.Viswanathan (Printers & Publishers),Pvt., Ltd., 2006, Chennai.
2. S. Narayanan and T.K. Manickavachagom Pillay, Calculus Volume III, S.Viswanathan(Printers & Publishers) Pvt., Ltd., 2007, Chennai

Unit	Chapter& Section
I	Book 1, Chapter2: Sections1,2,5; Chapter 4: Sections1 to 3
II	Book 1, Chapter 5: Sections 1 to 5; Chapter8: Section 4
III	Book 1, Chapter 2: Section 6 Chapter 6: Section 3& 4 Chapter 11: Section 1.3&1.4
IV	Book 1, Chapter12: Sections1 to 4,5.1 to 5.4
V	Book 2, Chapter 5: Sections All

REFERENCE BOOKS:

1. P.R.Vittal, Differential Equations and Laplace transformations, First edition (2004),Margham Publications, Chennai.
2. Zafar Ahsan, Differential equations and their applications, Second edition (2006), Prentice Hall of India Pvt., Ltd., New Delhi.
3. Richard Bronson, Gabriel B. Costa, Differential Equations, Third edition (2000), Schaum's Outlines, McGraw Hill Education, NewYork.
4. Dr.M.D.Raisinghania, Ordinary and Partial Differential Equations, Revised Ninth edition (2005), S.Chand & Company Ltd., New Delhi.
5. M.K.Venkataraman, Higher Engineering Mathematics, III-B (1998), National Publishing Co.,Chennai

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of Differential Equations, Students will be able to

CO 1 Analyze and solve the first order differential equation.

CO 2 Compute Complementary function and Particular integral for the Linear equation with constant Co-efficients.

CO 3 Compute Complementary function and Particular integral for the Linear equation with variable Co-efficients. Discuss the method of variation of Parameters.

CO 4 Evaluate the solution of exact equations, Total Differential Equations, Lagrange's Equation.

CO 5 Compute the Laplace Transforms and Inverse Laplace Transforms of various basic mathematical functions

Nature of Course			
Knowledge and Skill		Employability oriented	✓
Skill oriented		Entrepreneurship oriented	✓

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**		
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: K.KALPANA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21ST4A2P**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. MATHEMATICS – IV SEMESTER - SECOND ALLIED COURSE - II

(For the candidates admitted from the year 2021-2022 onwards)

MATHEMATICAL STATISTICS PRACTICAL USING R

COURSE OBJECTIVES:

To enable students to be equipped with the knowledge of R- Programming and apply it to compute statistical measures.

1. Diagrammatic representation of data by subdivided and multiple Bar diagram, pie chart.
2. Graphical representation of frequency data Rod & Spike graph, frequency polygon. Less than and more than O gives.
3. Correlation and rank correlation between two variables.
4. Regression lines of X on Y and Y on X.
5. Measures of central tendency: Mean, Median& Mode.
6. Measures of central tendency: Skewness and Kurtosis.
7. Fitting of distribution Binomial, Poisson and Normal.
8. Chi-Square test of Goodness of fit.
9. Test of Significant difference between two means and two proportions.
10. Paired t- test.

TEXT BOOK:

Sudha G. Purohit, Sharad D. Gore and Shailaja R. Deshmukh, Statistics using R , Second Edition (2015), Narosa Publishing House, New Delhi.

REFERENCE BOOKS:

1 Gupta S.C.and KapoorV.K.: Fundamendals of Mathematical Statistics–Sultan Chand & Sons.

2 R.S.N. Pillaiand Bagavathi, Practical statistics, Second edition(2013)

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of **Mathematical Statistics Practical Using R Software**, Students will be able to Effectively use 'R' software

CO 1 Critically evaluate the underlying assumptions of analysis tools.

CO 2 Discuss critically the uses and limitations of statistical analysis PO.

CO 3 Solve a range of problems using the techniques covered.

CO 4 Derive at statistical inferences from various distributions.

CO 5 Understand and critically discuss the issues surrounding sampling and significance

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**3**	**3**
CO 2	**3**		**3**	
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**		**3**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1, K 2, K 3	3 /5 x1 5 marks (with internal choice)	500	45	60	
Record			15		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: Dr. A. VADIVEL

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **COURSE CODE: U21ST4A3**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. MATHEMATICS – IV SEMESTER - SECOND ALLIED COURSE - III

(For the candidates admitted from the year 2021-2022 onwards)

MATHEMATICAL STATISTICS – II

COURSE OBJECTIVES:

The objective of this paper is to introduce the concepts about correlation, regression, sample theory, sampling distributions and theory of estimation.

UNIT- I	**Correlation:** Introduction – Meaning of Correlations – Scatter Diagram – Karl Pearson's Coefficient of Correlation – Limits for Correlation Coefficient – Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution – Rank Correlation – Spearman's Rank Correlation Coefficient – Problems Only (no derivations). **Linear Regression:** Introduction – Linear Regression – Regression Coefficients – Properties of Regression Coefficients – Angle Between Two Lines of Regression (self study) – Simple Problems.
UNIT- II	**Large Sample Theory:** Introduction – Types of Sampling – Purposive Sampling – Random Sampling – Simple Sampling – Stratified Sampling – Parameter and Statistic – Sampling Distribution of a Statistic – Standard Error – Tests of Significance – Null and Alternative Hypothesis – Errors in Sampling – Critical Region and Level of Significance – One –tailed and Two – tailed tests – Critical Values or Significant Values – Procedure for testing of Hypothesis – Tests of Significance for Large Samples – Sampling of Attributes – Test of Significance for Single Proportion – Test of Significance for Difference of Proportions – Simple Problems.
UNIT -III	**Large Sample Theory:** Sampling of Variables – Test of Significance for Single Mean – Test of Significance for Difference of Means (self study) – Simple Problems. **Chi – Square Distribution:** Applications of Chi - Square Distribution – Inferences about a Population Variance – Goodness of Fit Test – Test of Independence of Attributes – Contingency Tables – Simple Problems.
UNIT -IV	**t, F, z Distributions:** Applications of t-Distribution, t-test for Single Mean – t-test for Difference of Means – t-test for Testing the Significance of an Observed Sample Correlation Coefficient – Applications of F-distribution – F-test for Equality of Two Population Variances – Simple Problems.
UNIT -V	**Theory of Estimation:** Introduction – Characteristic of Estimators – Unbiasedness – Consistency – Efficient Estimators – Sufficiency – Cramer – Rao inequality – Simple Problems – Methods of Estimation – Method of Maximum Likelihood Estimation – Properties of Maximum Likelihood Estimators – Method of Moments – Simple Problems.

TEXT BOOKS:

Gupta S.C. and Kapoor V.K, Fundamentals of Mathematical Statistics, Eleventh Edition, S.Chand& Sons, 2009.

Unit	Chapter& Section
I	Chapter 10: Sections 10.1, 10.2, 10.3, 10.4, 10.4.1, 10.5, 10.7, 10.7.1. Chapter 11: Sections 11.1, 11.2, 11.2.1, 11.2.2, 11.2.3.
II	Chapter 14: Sections 14.1, 14.2, 14.2.1, 14.2.2, 14.2.3, 14.2.4, 14.3, 14.3.1, 14.3.2, 14.4, 14.4.1 – 14.4.5, 14.5, 14.6, 14.7, 14.7.1, 14.7.2.
III	Chapter 14: Sections 14.8, 14.8.3, 14.8.4. Chapter 15: Sections 15.6, 15.6.1, 15.6.2, 15.6.3.
IV	Chapter 16: Sections 16.3, 16.3.1, 16.3.2, 16.3.4, 16.6, 16.6.1.
V	Chapter 17: Sections 17.1, 17.2, 17.2.1, 17.2.2, 17.2.3, 17.2.4, 17.3, 17.6, 17.6.1, 17.6.3.

REFERENCE BOOKS:

1. Hogg R.V. and Craigh A.G, Introduction to Mathematical Statistics,Pearson Education publications, 2004.
2. Veerarajan.T, Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt., Ltd, 2017.
3. Vital P.R, Mathematical Statistics,Margham Publications, 2004.

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COURSE OUTCOME:

Upon successful completion of **Mathematical Statistical-II**, Students will be able to

CO1 Understand the meaning of correlation, regression and its properties.

CO2 Analyse the concepts of sampling techniques and procedure for testing of hypothesis for large samples.

CO3 Demonstrate the use of chi-square distribution

CO4 Apply the concepts of t, F, z-distributions and its applications.

CO5 Describe important theoretical results and understand how they can be applied to answer statistical questions.

Nature of Course			
Knowledge and Skill		Employability oriented	✓
Skill oriented		Entrepreneurship oriented	✓

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	**3**
CO 2	**3**	**3**	**2**	
CO 3	**3**			
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**		**2**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: R.AMALA

CHAIRMAN -BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM4S1A**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.
B.Sc. MATHEMATICS – IV SEMESTER - SKILL BASED ELECTIVE - I
(For the candidates admitted from the year 2021-2022 onwards)

MATLAB

COURSE OBJECTIVES:

1. Use **Matlab** for interactive computations.
2. Familiar with memory and file management in **Matlab**.
3. Generate plots and export this for use in reports and presentations.
4. To program scripts and functions using the **Matlab** development environment.

UNIT - I	**Mathematical Modeling, Numerical Methods, and Problem Solving:** A simple Mathematical Model – Conservation laws in Engineering and Science – Numerical Methods.
UNIT - II	**MATLAB Fundamentals:** The MATLAB Environment – Assignment – Mathematical operations – Use of Built – In Functions – Graphics – Other Resources – Case study – Exploratory Data Analysis.
UNIT -III	**Programming with MATLAB:** M-Files – Input – Output – Structured Programming – Nesting and Indentation.
UNIT - IV	**Programming with MATLAB:** Passing Functions To M - Files – CaseStudy : Bungee Jumper Velocity.
UNIT - V	**Roundoff and Truncation Errors:** Errors – Round Off Errors – Truncation Errors – Total Numerical Error –Blunders – Model Errors – Data Uncertainty problems.

TEXT BOOK:

Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineers AndScientists, TATAMcGraw -Hill Publishing company Ltd., 2007.

Unit	Chapters& Section
I	Chapter 1: Sections All
II	Chapter 2:Sections All
III	**C**hapter 3: Sections 3.1 to 3.4
IV	Chapter 3: Sections 3.5 to 3.6
V	Chapter 4: Sections All

REFERENCE BOOKS:

1. Stanley, Technical Analysis and applications with Matlab, Printed and bounded in India by Barkhanath printers, Delhi, I indian Reprint 2007.
2. Brian -R.Hunt, Ronald l.LipsmanJonathan, M. Rosenberg,Aguide to MatlabForBeginnners and Experienced users, Printed in India at Raplika press PvtLtd., Kundly, CambridgeUniversity press, Reprint 2005.

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COURSE OUTCOME:

Upon successful completion of **MATLAB**, Students will be able to

CO 1 Understand the need for simulation/implementation for the verification of mathematical functions.

CO 2 Understand the main features of the MATLAB program development environment to enable their usage in the higher learning.

CO 3 Implement simple mathematical functions/equations in numerical computing environment such as MATLAB.

CO 4 Interpret and visualize simple mathematical functions and operations thereon using plots/display.

CO 5 Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**2**	
CO 2	**3**		**2**	
CO 3	**3**	**3**		**3**
CO 4	**3**		**2**	
CO 5	**3**	**3**		**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM4S1B**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – IV SEMESTER - SKILL BASED ELECTIVE – I

(For the candidates admitted from the year 2021-2022 onwards)

QUANTITATIVE APTITUDE

COURSE OBJECTIVES:

1. To enhance the problem solving skills and to improve the basic mathematical skills.
2. To help students who are preparing for any type of competitive examinations

UNIT -I	Numbers – HCF and LCM – Decimal Fractions -Simplification -Average - Problems on numbers.
UNIT -II	Problems on Ages- Surds and Indices – Percentage – Profit and Loss - Ratio and Proportion – Partnership.
UNIT- III	Chain Rule - Time and Work – Pipes and Cistern – Time and Distance.
UNIT- IV	Problems on trains – Boats and Streams - Simple Interest – Compound Interest – Logarithm.
UNIT -V	Area – Volume and Surface Areas –- Data Interpretation : Tabulation – Bar Graphs – Pie Charts – Line Graph.

TEXT BOOK:

R. S. Aggarwal, **"Quantitative Aptitude"**, S. Chand & Company Ltd., Ram Nagar, New Delhi,2011.

UNITS	CHAPTERS
Unit I	Chap 1, 2, 3, 4, 6 & 7
Unit II	Chap 8, 9, 10, 11,12 &13
Unit III	Chap 14, 15, 16& 17
Unit IV	Chap 18, 19, 21, 22 & 23.
Unit V	Chap 24, 25, 36, 37, 38 &39

REFERENCE BOOK:

1. Abhijit Guha, **"Quantitative Aptitude for Competitive Examinations"**, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2008.

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COURSE OUTCOME:

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

CO 1 Remembering the numbers.

CO 2 Define surds and indices. Recalling the various areas that is problems on ages, percentage, profit and loss and ratio and proportion.

CO 3 Solve the problems on time and distance, work and wages, pipes and cisterns.

CO 4 Recalling simple interest, compound interest and logarithm.

CO 5 To improve the problem solving skill on areas, volumes and data interpretation.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			
CO 2	**3**		**2**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**2**	**2**	**2**
CO 5	**3**	**3**	**2**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5 **COURSE CODE: U21MM5C7**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. MATHEMATICS – V SEMESTER - CORE COURSE - VII

(For the candidates admitted from the year 2021-2022 onwards)

ALGEBRA – I

COURSE OBJECTIVES:

1. To introduce the concept of Algebra from the basic set theory and Functions, etc.
2. To introduce the concept of Group theory and Rings.

UNIT -I	**PRELIMINARY NOTIONS:** Mappings – The integers. **GROUP THEORY:** Definition of a group – Some examples of groups – Some preliminary lemmas.
UNIT -II	**GROUP THEORY:** Subgroups –A counting principle – Normal subgroups and Quotient groups – Homomorphisms.
UNIT -III	**GROUP THEORY:** Automorphisms – Cayley's Theorem – Permutation groups.
UNIT -IV	**RING THEORY:** Definition and examples of rings – Some special classes of rings –Homomorphisms – Ideals and quotient rings.
UNIT- V	**RING THEORY:** More ideals and quotient rings – The field of quotients of an integral domain –Euclidean Rings –The particular Euclidean ring.

TEXT BOOK:

I.N.Herstein,Topicsin Algebra, 2nd Edition, John Wiley& Sons, 1975.

Unit	Chapter& Section
I	Chapter 1: Sections 1.2& 1.3 Chapter 2: Sections 2.1 to 2.3
II	Chapter 2:Sections 2.4 to 2.7
III	**C**hapter 2: Sections 2.8 to 2.10
IV	Chapter 3: Sections 3.1 to 3.4
V	Chapter3: Sections3.5 to 3.8

REFERENCE BOOKS:

1. M.L.Santiago, Modern Algebra, McGraw Hill Education India Pvt Ltd.
2. S.Arumugam and others, Modern Algebra, New Gamma publishing House, Palayamkottai.
3. Vishvanathan Nayak, Modern Algebra, Emerald Publishers, Reprint 1992.

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COURSE OUTCOME:

Upon successful completion of **Algebra-I**, Students will be able to

CO 1 Acquire knowledge about the concepts of Sets, Groups and Rings.

CO2 Analyze and demonstrate examples of subgroups, normal subgroups and quotient groups

CO3 Prove Cayley's theorem and understand its applications

CO4 Understand homomorphism, inner automorphism and their properties

CO5 Understand Quotient Rings, Ideals and their existence with examples

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			**2**
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**		
CO 5	**3**	**3**	**2**	**2**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5 **COURSE CODE: U21MM5C8**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – V SEMESTER - CORE COURSE - VIII

(For the candidates admitted from the year 2021-2022 onwards)

REAL ANALYSIS - I

COURSE OBJECTIVES:

1. Get acquainted with analytic approach of real numbers.
2. Explore sequence and series, the various limiting processes viz. continuity, differentiability and integrability.
3. Understand the topological properties of a metric space.

UNIT- I	**Sets and Functions:** Sets and elements – Operations on sets –Functions –Real-valued functions –Equivalence. Countability – Real numbers – Least upperbounds.
UNIT -II	**Sequences of Real Numbers:** Definition of sequence and subsequence – Limit of a sequence – Convergent sequences – Divergent sequences – Bounded sequences –Monotone sequences.
UNIT -III	**Operations of Sequences:** Operations on convergent sequences – Operations on divergent sequences –Limit superior and limit inferior –Cauchy sequences.
UNIT -IV	**Series of Real Numbers:** Convergence and divergence –Series with non-negative terms – Alternating series – Conditional convergence and absolute convergence – Rearrangements of series – Tests for absolute convergence – Series whose terms form a non-increasing sequence – The class l^2.
UNIT -V	**Limits and Metric Spaces:** Limit of a function on a real line – Metric spaces – Limits in metric spaces - **Continuous Functions on Metric Spaces:** Functions continuous at a point on the real line-Reformulation –Functions continuous on a metric space.

TEXT BOOKS:

Richard R. Goldberg, Methods of Real Analysis, Oxford&IBHPublishingC. Pvt. Ltd, Kolkata, 1970.

Unit	Chapter& Section
I	Chapter 1: Sections 1 to 7
II	Chapter 2:Sections 2.1 to 2.6
III	**C**hapter 2: Sections 2.7 to 2.10
IV	Chapter 3: Sections 3.1 to 3.7 & 3.10
V	Chapter 4: Sections All, Chapter 5: Section 5.1 to 5.3

REFERENCE BOOKS:

1. WalterRudin, Principles of Mathematical Analysis,TataMcGrawHill.
2. TomMApostol, MathematicalAnalysis, NarosaPublishing House.

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COURSE OUTCOMES:

Upon successful completion of **Real Analysis-I**, Students will be able to

CO 1 Understand the basic properties of Real Analysis.

CO 2 Apply the concept of limit to sequences, series and functions.

CO 3 Apply the concepts of continuity, and metric spaces

CO 4 Apply the limit to various functions.

CO 5 Reverse Triangle Inequalities for the Euclidean distance function on R^n

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			
CO 2	**3**	**2**	**3**	**3**
CO 3	**3**	**2**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**			**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: Dr. A. VADIVEL

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM5C9**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – V SEMSESTER - CORE COURSE - IX

(For the candidates admitted from the year 2021-2022 onwards)

COMPLEX ANALYSIS

COURSE OBJECTIVES:

1. Get introduced to analytic functions.
2. Expand complex function using Taylor & Laurent Series.
3. Evaluate complex integrals using residues

UNIT - I	**Analytic Functions:** Functions of complex variable – Mappings – Mappings by the exponential function– Limits – Theorems on limits – Limits involving the point at infinity – Continuity – Derivatives – Differentiation formulas – Cauchy-Riemann equations – Sufficient conditions for differentiability – Polar coordinates – Analytic functions – Examples – Harmonic functions
UNIT -II	**Integrals :**Derivatives of functions w(t) – Definite integrals of functions w(t) – Contours – Contour integrals – Examples – Upper bounds for moduli of contour integrals – Antiderivatives – Examples – Cauchy-Goursat theorem (statement only) – Simply and multiply connected domains – Cauchy Integral formula – Derivatives of Analytic functions – Liouville's theorem and the fundamental theorem of Algebra – Maximum modulus principle
UNIT- III	**Series:** Taylor series – Examples – Laurent series – Examples – **Residues and Poles:** Residues – Cauchy's residue theorem – Using a single residue – The three types of isolated singular points – Residues at poles – Examples – Zeros of Analytic functions – Zeroes and Poles.
UNIT- IV	**Applications of Residues:** Evaluation of Improper integrals – Example – Improper integrals from Fourier analysis – Jordan's lemma – Definite integrals involving sines and cosines – Argument principle – Rouche's theorem.
UNIT -V	**Mapping by Elementary Functions:** Linear transformations – The transformation w =1/z – Mappings by 1/z – Linear fractional transformations – An implicit form – Mappings of the upper half plane – The transformation w= sin z - Mappings by z^2 and branches of $z^{1/2}$ – Conformal Mapping: Preservation of angles.

TEXT BOOKS:

James Ward Brown and Ruel V. Churchill, Complex variables and applications, 7th edition, Mc Graw Hill Higher Education, New York, 2003.

Unit	Chapter& Section
I	Chapter 2: Sections 11 to 25
II	Chapter 4:Sections 36 to 44, 46 to 50
III	**C**hapter5:Sections53 to 56 Chapter 6: Sections 62 to 69
IV	Chapter 7: Sections 71 to 74, 78 to 80
V	Chapter8: Sections 83 to 90, Chapter9: Section 94

REFERENCE BOOKS:

1. H.A. Priestley, Introduction to Complex Analysis, 2nd Edition (2006), Oxford Indian).
2. S. Ponusamy, Foundation of Complex Analysis (2000), Narosa Publishing House, New Delhi.
3. B.S.Tyagi, Functions of a Complex Variable (2018), Kedar Nath and Ram Nath Publishers, Meerut.
4. S.Arumugam, A.Thangapandi Isaac, A. Somasundaram, Complex Variable, Scitech Publications, Chennai.
5. P. Duraipandian and Laxmi Duraipandian, Complex Analysis (1976), Emerald Publishers, Chennai.
6. L.V.Ahlfors, Complex Analysis, 3rd Edition (2000), McGraw Hill Publishing Company Pvt. Ltd, New Delhi.

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of **Complex Analysis**, Students will be able to

CO 1 Represent complex numbers algebraically and geometrically, define and analyse the concept of analyticity and apply it to derive Cauchy-Riemann equations.

CO 2 Define conformal mapping and find the mapping that maps three distinct points on the z-plane to three distinct points on the w-plane by applying bilinear transformation.

CO 3 Evaluate complex integrals directly by using Cauchy-Goursat theorem and study the various applications of Cauchy's Integral formula.

CO 4 Represent functions as Taylor and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using Residue theorem.

CO 5 Evaluate complex contour integrals by applying Cauchy –integral formula and its various versions.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**2**	**3**
CO 5	**3**	**3**	**2**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning.

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: Dr. A. VADIVEL

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM5C10**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – V SEMESTER - CORE COURSE - X

(For the candidates admitted from the year 2021-2022 onwards)

DYNAMICS

COURSE OBJECTIVES:

1. Understand the fundamental concepts of velocity and acceleration.
2. Understand the Work done in stretching an elastic string Simple Harmonic motion.
3. Study the motion of Projectiles, Impact of Spheres and Central Orbits.

UNIT- I	**Kinematics:** Basic units – Velocity – Acceleration – Coplanar motion - **Work, Energy and Power:** Work – Conservative field of force – Power.
UNIT -II	**Rectilinear Motion under Varying Force:** Simple harmonic motion – **Projectiles:** Forces on a projectile – Projectile projected on an inclined plane.
UNIT -III	**Impact:** Impulsive force – Impact of sphere – Impact of two smooth spheres – Impact of a smooth sphere on a plane – Oblique impact of two smooth spheres.
UNIT -IV	**Central Orbits:** General orbits – Central orbit.
UNIT -V	**Moment of Inertia:** Moment of inertia – Cases – Perpendicular axis theorem – Parallel axis theorem – Problems.

TEXT BOOKS:

P. Duraipandian, LaxmiDuraipandian and MuthamizhJayapragasam, Mechanics, 6th Revised Edition, S. Chand and Company Ltd, New Delhi, 2005.

Unit	Chapter& Section
I	Chapter 1: Sections All Chapter 11: Section All
II	Chapter 12:Sections 12.1 Chapter 13: Sections 13.1 & 13.2
III	Chapter 14: Section All
IV	Chapter 16: Sections 16.1 & 16.2
V	Chapter 17: Sections All

REFERENCE BOOKS:

1. A.V. Dharmapadam, Dynamics, Fifth edition (1996), S.Viswanathan Printers &Publishers Pvt Ltd.
2. Dr.Viswanath Naik, K & M.S. Kasi, Dynamics**,** First edition (1987), Emerald Publishers Chennai.
3. S.G. Venkatachalapathy, Dynamics, (2005), Margham Publications, Chennai-17.
4. Golden Maths Series, Dynamics, N.P.Bali, Firewall Media, An Imprint of laxmi Publications Pvt. Ltd, New Delhi.
5. A.R.Vasishtha&R.K.Gupta,Dynamics, Krishna's Educational Publisher, Meerut.

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of **Dynamics**, Students will be able to

CO 1 Acquire knowledge about the basic concepts of Kinematics and determine Speed and Shortest distance between the particles.

CO 2 Apply the fundamental concepts of Work, Energy and Power to Calculate Work done, frictional resistance and Kinetic energy. Discuss Simple Harmonic Motion to find period and Amplitude.

CO 3 Analyze the motion of Projectiles and their results. Discuss the Direct Impact and Oblique impact of two Spheres.

CO 4 Critique the Concepts of Central Orbits, Differential equation of a central Orbit and Kepler's law of planetary motion.

CO 5 Determine Moment of Inertia for various geometrical shapes by using Parallel and Perpendicular axis theorem.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**		**2**
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**			**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: Dr. A. VADIVEL

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM5E1A**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.
B.Sc. MATHEMATICS - V SEMESTER - ELECTIVE COURSE – I
(For the candidates admitted from the year 2021-2022 onwards)

GRAPH THEORY

COURSE OBJECTIVES:

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non linear differential equations when ordinary analytical methods fail.

UNIT - I	**Introduction - Paths and Circuits:** Isomorphism – Subgraphs – A puzzle with multicolored cubes.
UNIT - II	**Paths and Circuits:** Walk, Paths and Circuits – Connected graphs, Disconnected graphs and Components – Euler graphs – Operations on graphs – More on Euler graphs – Hamiltonian paths and circuits – The traveling salesman problem.
UNIT -III	**Trees:** Trees – Some properties of trees – Pendant vertices in a tree – Distance and centers in a tree – Rooted and binary trees – On counting trees – Spanning trees.
UNIT -IV	**Fundamental Circuits:** Fundamental circuits – Finding all spanning trees of a graph – Spanning trees in a weighted graph. **Cut-sets and Cut-vertices:** Cut-sets – Some properties of a Cut-set – All Cut-sets in a graph.
UNIT -V	**Cut-sets and Cut-vertices:** Fundamental circuits and cut-sets – Connectivity and Separability. **Planar and Dual Graphs:** Combinatorial Vs Geometric graphs – Planar graphs – Kuratowski's two graphs – Different Representations of a planar graph.

TEXT BOOK:

Narsingh Deo, "Graph theory with applications to engineering and computer science", Prentice – Hall, Inc., Englewood Cliffs, N. J, 1974.

Unit	Chapter& Section
I	Chapter 1: All Chapter 2: Sections 2.1 to 2.3
II	Chapter 2:Sections 2.4 to 2.10
III	**C**hapter 3:Sections 3.1 to 3.7
IV	Chapter 3: Sections 3.8 to 3.10 Chapter 4: Sections 4.1 to 4.3
V	Chapter 4: Sections 4.4, 4.5 Chapter 5: Sections 5.1 to 5.4

REFERENCEBOOKS:

1. R. Balakrishnan and K. Ranganathan, Ä Text Book of Graph Theory, Springer – Verlag,New York, 2012.
2. G. Chartrand and L. Lesneik Foster, Graphs and Digraphs, CRC Press, 4th edition, BocaRaton, 2006.
3. F. Harary, Graph Theory, Narosa Publishing House, New Delhi, 2001.

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COURSE OUTCOME:

Upon successful completion of **Graph Theory**, Students will be able to

CO 1 Solve problems using basic graph theory
CO 2 Identify induced subgraphs, cliques, matchings, covers in graphs
CO 3 Determine whether graphs are Hamiltonian and/or Eulerian
CO 4 Solve problems involving vertex and edge connectivity, planarity and crossing numbers

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**3**	**3**
CO 2	**3**		**3**	
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**		**3**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)
2.Problem Solving – Group Discussion
3.Quiz – Seminar
4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: S.MURUGAMBIGAI

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM5E1B**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – V SEMESTER – ELECTIVE COURSE – I

(For the candidates admitted from the year 2021-2022 onwards)

ASTRONOMY

COURSE OBJECTIVES:

1. To introduce the exciting world of astronomy to the students.
2. To help the students to study spherical trigonometry in the field of astronomy.
3. To understand the movements of the celestial objects.

UNIT -I	Relevant properties of sphere and formulae in spherical trigonometry (no proof, no problems) - Celestial sphere and diurnal motion - Celestial coordinates-sidereal time.
UNIT -II	Morning and evening stars -circumpolar stars- diagram of the celestial sphere - zones of earth -perpetual day-dip of horizon-twilight.
UNIT-III	Refraction - laws of refraction -tangent formula-Cassini's formula - horizontal refraction- geocentric parallax -horizontal parallax.
UNIT-IV	Kepler's laws - verification of 1st and 2nd laws in the case of earth - Anomalies -Kepler's equation - Seasons -causes -kinds of years.
UNIT -V	Moon-sidereal and synodic months - elongation - phase of moon - eclipses-umbra and penumbra - lunar and solar eclipses - ecliptic limits - maximum and minimum number of eclipses near a node and in a year - Saros.

TEXT BOOK:

S. Kumaravel, and SusheelaKumaravel, *Astronomy*, 8th Edition, SKV Publications, 2004.

Unit	Section
I	Sections39to 79
II	Sections80to90, 106 to 116
III	Sections 117 to 144
IV	Sections 146 to 162, 173 to 178
V	Sections 229 to 241, 256 to 275

REFERENCE BOOK:

G. V. Ramachandran, Text Book of Astronomy, Mission Press, Palayamkottai, 1965.

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COURSE OUTCOME:

Upon successful completion of **Astronomy**, Students will be able to

CO 1 Describe the classification of stars, stellar evolution, interstellar matter, galaxies etc.
CO 2 Explain practical application of observational techniques,
CO 3 Solve problems with scientific reasoning and critical thinking skills.
CO 4 Understand the impact of astronomical bodies and formations on earth and climate.
CO 5 Communicate astronomical concepts and theories effectively.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	
CO 2	**3**	**2**	**3**	**3**
CO 3	**3**	**3**		**3**
CO 4	**3**	**2**	**2**	**2**
CO 5	**3**	**2**	**2**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)
2.Problem Solving – Group Discussion
3.Quiz – Seminar
4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: S.MURUGAMBIGAI

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **COURSE CODE: U21MM5S2A**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.
B.Sc. MATHEMATICS – V SEMESTER - SKILL BASED ELECTIVE – II
(For the candidates admitted from the year 2021-2022 onwards)

PROGRAMMING IN 'C'

COURSE OBJECTIVES:

1. Develop programming skill in 'C' language.
2. Understand the basic concepts of Operators and expressions in C – Language.
3. Get familiarized with the concepts of arrays and functions in C- programming.

UNIT -I	**Constants, Variables, and Data Types**: Introduction– Character set – C tokens – Keywords and identifiers –Constants – Variables – Data types- Declaration of variables – Declaration of storage class – Assigning values to variables – Defining symbolic constants – Declaring a variable as constant.
UNIT -II	**Operators and Expressions:** Introduction – Arithmetic operators – Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operator – Bitwise operators – Special operators – Arithmetic expressions – Evaluation of expressions – Precedence of Arithmetic operators – Some computational problems – Type conversions in expressions.
UNIT -III	**Decision Making and Branching:** Introduction – Decision making with IF statement – Simple IF statement – The IF….ELSE statement – Nesting of IF….ELSE statement – The ELSE IF ladder – The switch statement – The ?: operator – The GOTO statement.
UNIT- IV	**Decision Making and Looping:** Introduction – The WHILE statement – The DO statement – The FOR statement – Jumps in loops – Concise test expressions – **Arrays**: Introduction – One-dimensional arrays – Declaration of one-dimensional arrays – Two-dimensional arrays – Initializing two-dimensional arrays – Multi-dimensional arrays.
UNIT- V	**Character Arrays and Strings**: Introduction – declaring and initializing string variables – Reading strings from terminals – Writing strings to screen – Arithmetic operations on characters.

TEXT BOOK:

E. Balagurusamy, Programming in ANSI C, 4th Edition, McGraw Hill Education IndiaPrivate Limited, 2007.

Unit	Chapter & Section
I	Chapter2:Sections2.1to2.12
II	Chapter3:Sections3.1to3.14
III	**C**hapter5:SectionsAll
IV	Chapter 6: Sections All Chapter 7: Sections 7.1 to 7.7
V	Chapter 8: Sections 8.1 to 8.5

REFERENCE BOOKS:

1. Venugopal ProgramminginC.
2. B.S Gottfied, Programming withC,Schaum'soutlineseries,TMH 2001.
3. Yashvant Kanitkar, Letus'C', BPBPublications.
4. R.S.Bichkar, Programming with C, Universities Press (INDIA) Pvt., Ltd.

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COURSE OUTCOME:

Upon successful completion of **Programming in C** , Students will be able to

CO 1 Demonstrate the fundamental structures of C programming.

CO 2 Discuss conditional and iterative statements to develop C programs.

CO 3 Critique the arrays of complex objects.

CO 4 Analyze the loops and decision making statements, user defined function to solve the problems.

CO 5 Utilize the concepts of Data types and operators.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented	✓	Entrepreneurship oriented	✓

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	**2**
CO 2	**3**		**2**	
CO 3	**3**		**2**	
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**		**3**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)
2.Problem Solving – Group Discussion
3.Quiz – Seminar
4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **COURSE CODE: U21MM5S2B**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.
B.Sc. MATHEMATICS – V SEMESTER - SKILL BASED ELECTIVE - II
(For the candidates admitted from the year 2021-2022 onwards)

INTRODUCTION TO LATEX

COURSE OBJECTIVES:
To create understanding of the LaTeX

UNIT -I	Basic LaTex – Sample document and Key Concepts – type style – environments – Lists – Contering –tables – verbatim – vertical and horizontal spacing.
UNIT- II	Typesetting Mathematics – Examples – Equation environments – Fonts, hats and underlining – braces –arrays and matrices – Customized commands – theorems like environments.
UNIT - III	Math miscellaxy – Math Styles – Bold Math – Symbols for number sets – binomial coefficient.
UNIT- IV	Further essential LaTex – Document classes and the overall structure – titles for documents – Sectioning commands.
UNIT -V	Miscellaneous extras – Spacing – Accented characters – Dashes and hyphens – quotation marks – troubleshooting – Pinpointing the error – common errors – warning messages.

TEXT BOOK:
David F Griffiths and Desmond J. Higham, Learning LaTex, SIAM (Society for Industrial and AppliedMathematics) Publishers, PhidelPhia, 1996.

Unit	Chapter& Section
I	Chapter 2: Sections 2.1 to 2.4
II	Chapter 3:Sections 3.1 to 3.7
III	**C**hapter 3: Sections 3.8 to 3.12
IV	Chapter 4: Sections 4.1 to 4.3
V	Chapter 4: Sections 4.4 to 4.5

REFERENCE BOOKS:

1. Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.
2. L. Lamport. LATEX: A Document Preparation System, User's Guide and Reference Manual. Addison-Wesley, New York, second edition, 1994

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COURSE OUTCOME:

By the end of this course the students will have the ability to:

CO 1 Download and install a comprehensive LATEX distribution.

CO 2 Create basic types of LATEX documents (article, report, letter, book).

CO 3 Format words, lines, and paragraphs, design pages, create lists, tables, references, and figures in LATEX.

CO 4 Typeset complicated mathematics: beginning with basic formulas (inline) and centered and numbered equations (display math) and aligning multi-line equations. In particular, you will learn how to typeset mathematics symbols such as roots, arrows, Greek letters, and a wide variety of mathematical operators. Furthermore, you will learn how to build complex math structures such as fractions, stacked expressions, and matrices.

CO 5 Import graphics, as well as: building diagrams, enhancing figures, and plotting functions, using the graphics packages :pstricks, and PGF/tikZ.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			
CO 2	**3**		**2**	**2**
CO 3	**3**		**3**	**2**
CO 4	**3**		**3**	
CO 5	**3**		**2**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)

2.Problem Solving – Group Discussion

3.Quiz – Seminar

4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **COURSE CODE: U21MM5S3AP**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – V SEMESTER - SKILL BASED ELECTIVE - III

(For the candidates admitted from the year 2021-2022 onwards)

PROGRAMMING IN 'C' PRACTICALS

COURSE OBJECTIVE:

To provide a practical exposure to the students on 'C' language.

Writing 'C' programs for the following:

1. Program to find roots of a quadratic equation.
2. Program to reverse the digits of a number and also to find their sum.
3. Program to generate prime numbers between any two given numbers.
4. Program to find the GCD & LCM of two numbers.
5. Program to find integer power of a number.
6. Program to evaluate $1 + x + x^2 + x^3 + ... + x^n$.
7. Program to read the cost price and selling price and calculate the Profit or loss and also the loss percentage or profit percentage.
8. Program to print election result after checking the eligibility of age.
9. Program to calculate mean and standard deviation of a given set of numbers using arrays.
10. Program to sort a given set of numbers in ascending order by interchange sort.
11. Program to find the transpose and trace of a matrix.
12. Program to find matrix addition and subtraction.
13. Program to find multiplication of matrices.
14. Program to assign grade to the average mark obtained by a student.
15. Program to accept a line of text and to count the number of vowels, consonants and special characters and number of words in the text.
16. Program to get a string and check it for a Palindrome using string handling function and without string handling function.
17. Program to get two strings and concatenate the strings and get the length of the strings.
18. Program using function sub- program, ternary operator and recursive function to find the factorial of a given number.
19. Program using function, to find the binomial co-efficient for a given n and r.
20. Program using function, to generate Fibonacci series.

TEXT BOOK:

E. Balagurusamy, Programming in ANSI C, 4thEdition, McGraw Hill Education India Private Limited, 2007.

REFERENCE BOOKS:

1. Venugopal Programming in C.
2. B.S Gottfied, Programming with C, Schaum'soutlineseries,TMH 2001.
3. Yashvant Kanitkar, Letus'C', BPB Publications.
4. R.S.Bichkar, Programming with C,Universities Press(INDIA)Pvt., Ltd.

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO1 Build the logic and develop a solution for a problem statement in C-language.
CO2 Design algorithms for difficult problems
CO3 Implement the algorithms in practice
CO4 Understanding a functional hierarchical code organization
CO5 Define and manage data structures based on problem subject domain

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	**2**
CO 2	**3**		**3**	**2**
CO 3	**3**		**3**	**3**
CO 4	**3**		**3**	
CO 5	**3**		**3**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1, K 2, K 3	3 /5 x1 5 marks (with internal choice)	500	45	60	
Record			15		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **SUBJECT CODE: U21MM5S3BP**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.
B.Sc. MATHEMATICS – V SEMESTER - SKILL BASED ELECTIVE - III
(For the candidates admitted from the year 2021-2022 onwards)

LATEX PRACTICALS

COURSE OBJECTIVE:

To provide a practical exposure to the students on LATEX.

LIST OF PRACTICALS
Write Latex program for the following

1. Type a Document in different alignments (Left, Right, Center, Justify).
2. Type a Letter for applying a job.
3. Type your own Bio – Data.
4. Draw a Table structure.
5. Type a given Mathematical expression using Differentiation, Integration and Trigonometry.
6. Type a given Mathematical expression using all expression.
7. Type a given expression using all inequalities.
8. Type of given Article.
9. Draw any picture and insert in LateX file.
10. Type a given Question paper
11. Convert one LateX file into power point presentation.

TEXT BOOKS:

David F Griffiths and Desmond J. Higham, Learning LaTex, SIAM (Society for Industrial and Applied Mathematics) Publishers, PhidelPhia, 1996.

REFERENCE BOOKS:

1. Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.
2. L. Lamport. LATEX: A Document Preparation System, User's Guide and Reference Manual. Addison- Wesley, New York, second edition, 1994.

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Build the logic and develop a document in LATEX.

CO 2 Design documents for books.

CO 3 Draw figures in LATEX.

CO 4 Explains how to obtain **LaTeX**.

CO 5 Lists LaTeX **compatible operating systems.**

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	**3**
CO 2	**3**		**3**	**2**
CO 3	**3**			**2**
CO 4	**3**		**3**	**3**
CO 5	**3**			**2**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)
2.Problem Solving – Group Discussion
3.Quiz – Seminar
4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1, K 2, K 3	3 /5 x1 5 marks (with internal choice)	500	45	60	
Record			15		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5 **COURSE CODE: U21MM6C11**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – VI SEMESTER - CORE COURSE - XI

(For the candidates admitted from the year 2021-2022 onwards)

ALGEBRA – II

COURSE OBJECTIVES:

Students will acquire knowledge about the Vector Spaces, Dual spaces, Inner product spaces, linear transformations and finite fields.

UNIT - I	**Vector Spaces and Modules:** Elementary basic concepts – Linear independence and bases.
UNIT - II	**Vector Spaces and Modules:** Dual spaces - Inner Product Space.
UNIT -III	**Vector Spaces and Modules:** Modules. **Linear Transformations:** The Algebra of linear transformations.
UNIT- IV	**Linear Transformations:** Characteristic roots – Matrices.
UNIT -V	**Selected Topics:** Finite Fields.

TEXT BOOKS:

I.N.Herstein, Topics in Algebra, 2nd Edition, John Wiley& Sons, 1975.

Unit	Chapter& Section
I	Chapter 4:Sections4.1 to 4.2
II	Chapter 4:Sections 4.3to 4.4
III	**C**hapter 4:Section 4.5 **C**hapter 6:Section 6.1
IV	**C**hapter 6:Section 6.2 to 6.3
V	Chapter 7: Sections 7.1

REFERENCE BOOKS:

1. N.S.Gopalakrishnan,UniversityAlgebra,NewAgeInternationalPublications,Wiley EasternLtd.
2. JohnB.Fraleigh, First courseinAlgebra, AddisonWesley.
3. R.Balakrishnaand N.Ramabadran,Text Book of Algebra, VikasPublishingCo.
4. S.Arumugam,Algebra, NewGammaPublishing House, Palayamkottai.

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COURSE OUTCOME:

Upon successful completion of **Algebra-II**, Students will be able to

CO 1 Explain the concept of dimension of a vector space.

CO 2 Express vector spaces in different dimensions.

CO 3 Understand base concept of a vector space and properties of vectors on the base.

CO 4 Find the matrix representing a linear transformation.

CO 5 Discuss all possible finite fields with important properties.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	**2**
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**		**3**	
CO 4	**3**	**3**		**3**
CO 5	**3**	**3**	**3**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)

2.Problem Solving – Group Discussion

3.Quiz – Seminar

4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: K.SUDHA

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 5 **COURSE CODE: U21MM6C12**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.
B.Sc. MATHEMATICS – VI SEMESTER – CORE COURSE - XII

(For the candidates admitted from the year 2021-2022 onwards)

REAL ANALYSIS – II

COURSE OBJECTIVES: Students will gain knowledge about

1. The Real Numbers and the Analytic Properties of Real-Valued Functions.
2. The Analytic concepts of Connectedness, Compactness, Completeness and Calculus.

UNIT -I	**Continuous Functions on Metric Spaces:** Open sets –Closed sets – Discontinuous function on R^1 – **Connectedness, Completeness and Compactness:** More about open sets –Connected sets.
UNIT -II	**Connectedness, Completeness and Compactness:** Bounded sets and totally bounded sets – Complete metric spaces – Compact metric spaces –Continuous functions on a compact metric spaces – Continuity of inverse functions – Uniform continuity.
UNIT-III	**Riemann integral:** Sets of measure zero – Definition of the Riemann integral – Existence of the Riemann integral –Properties of Riemann integral – Derivatives.
UNIT-IV	**Calculus:** Rolle's theorem –The law of mean – Fundamental theorems of calculus – Improper integrals – Improper integrals (continued).
UNIT -V	**Sequences and Series of Functions:** Point wise convergence of sequences of functions – Uniform convergence of sequences of functions.

TEXT BOOKS:

RichardR. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing C. Pvt. Ltd, Kolkata, 1970.

Unit	Chapter& Section
I	Chapter5:Sections5.4to5.6, Chapter6:Sections6.1 to 6.2
II	Chapter6:Sections6.3to6.8
III	**C**hapter7:Section7.1to7.5
IV	Chapter 7: Sections 7.6 to 7.10
V	Chapter 9: Sections 9.1 to 9.2

REFERENCE BOOKS:

1. Walter Rudin, Principles of Mathematical Analysis,Tata Mc Graw Hill.
2. Tom M Apostol, Mathematical Analysis, NarosaPublishing House.

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

Upon successful completion of **Real Analysis-II**, Students will be able to

CO 1 Understand the concepts of continuous functions on metric spaces, connectedness, completeness and compactness

CO 2 Acquire knowledge about the basic concepts of sets of measure zero.

CO 3 Analyze the Riemann integral in detail.

CO 4 Define the basic definitions of sequences and series of functions.

CO 5 Demonstrate an understanding of the theory of sequences and series, continuity, differentiation and integration.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**			
CO 5	**3**	**3**	**3**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: Dr. A. VADIVEL

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM6C13**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – VI SEMESTER - CORE COURSE – XIII

(For the candidates admitted from the year 2021-2022 onwards)

OPERATIONS RESEARCH

COURSE OBJECTIVES:

1. To introduce certain OR techniques such as LPP, Transportation problems, Assignment problems, game theory and networking models.
2. To help the students to develop logical reasoning for applying mathematical tools to managerial and real-life oriented problems.

UNIT -I	**Linear Programming Problem:** Mathematical formulation – Graphical solution – Simplex Method - Artificial variable technique – Concept of Duality – Primal and Dual Problems – Duality – Dual Simplex Method.
UNIT -II	**Transportation Problem:** Introduction – General transportation problem – The transportation table – Duality in transportation problem – Loops in transportation tables LP formulation of the transportation problem – Solution of a transportation problem – Finding an initial basic feasible solution – Test for optimality – Degeneracy in transportation problem – Transportation algorithm (MODI Method).
UNIT-III	**Assignment Problem**: Introduction – Mathematical formulation of the problem – The assignment method – Special cases in assignment problems – A typical assignment problem – The travelling salesman problem.
UNIT-IV	**Games and Strategies:** Introduction – Two-Person Zero-Sum Games – Some basic terms – The Maximin - Minimax Principle – Games without Saddle Points-Mixed Strategies – Graphical Solution of 2xn and mx2 games – Dominance Property.
UNIT- V	**Network Scheduling by PERT / CPM:** Introduction – Network and basic components – Logical sequencing – Rules of Network Construction – Critical path analysis – Probability considerations in PERT – Distinction between PERT and CPM.

TEXT BOOKS:

Kanti Swarup, P.K.Gupta and Manmohan, Operations Research, Sultan Chand & Sons, 9thedition, 2001.

Unit	Chapter& Section
I	Chapters 2, 3, 4 & 5 (Omit sections 5.5, 5.6 & 5.8)
II	Chapter 10: Sections 10.1 to 10.11
III	Chapter 11: Section All
IV	Chapter 17: Sections 17.1 to 17.7
V	Chapter 21: Sections All

REFERENCE BOOKS:

1. Gupta.P.K. and D.S.Hira, Operations Research, S.ChandandCompany.
2. MokhtarS. Bazaraa, JohnJ.Jarvis and Hanif D.Sherali, Linear Programming and Network Flows, 2ndEd.,John Wiley and Sons, India, 2004.
3. Hillier, F.S. and G.J.Lieberman, Introductionto Operations Research, 9thEd.,Tata McGraw Hill, Singapore,2009.
4. HamdyA.Taha, Operations Research, An Introduction, 8th Ed., Prentice Hall India,2006.
5. Hadley, G. Linear Programming, Narosa Publishing House, New Delhi, 2002.

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Solve linear programming problem using Simplex Method

CO 2 Apply the notions of linear programming in solving transportation problems

CO 3 Acquire knowledge in formulating Assignment problem

CO 4 Understand the theory of games for solving simple games.

CO 5 Know distinction between PERT & CPM

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**		**3**
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**		**3**	**2**
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**		**3**	**2**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)

2.Problem Solving – Group Discussion

3.Quiz – Seminar

4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. **Application**

COURSE DESIGNER: R.VIJAYALAKSHMI

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM6E2A**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. MATHEMATICS – VI SEMESTER - ELECTIVE COURSE – II

(For the candidates admitted from the year 2021-2022 onwards)

NUMERICAL METHODS

COURSE OBJECTIVES:

1. To have an in-depth knowledge of various advanced methods in numerical analysis.
2. To use numerical techniques to get numerical solutions of equations like transcendental and non linear differential equations when ordinary analytical methods fail.

UNIT -I	**The Solution of Numerical Algebraic and Transcendental Equations:** The bisection method – Iteration method – Regula Falsi method – Newton's Raphson method. **Solution of simultaneous linear algebraic equations direct methods:** Gauss Elimination method –Jacobi method – Gauss Seidel method of iteration.
UNIT -II	**Finite Differences:** First differences – Express any value of y in terms of y_n and the backward differences of y_n – Differences of a polynomial – Factorial polynomial – Error propagation in a difference table – Finite integration – Summation of series.
UNIT- III	**Interpolation (For equal intervals):** Introduction – Gregory - Newton's forward interpolation formula - Gregory - Newton's backward interpolation formula **Central Difference Interpolation Formula (For equal intervals):** Central difference and central difference table – Central difference Interpolation formula – Gauss's forward interpolation formula – Gauss's backward interpolation formula –Stirling's formula – Bessel's formula. **Interpolation with unequal intervals:** Introduction – Divided differences – Properties of divided differences – Relation between divided differences and forward differences – Newton's divided difference formula – Lagrange's interpolation formula –Different form of Lagrange's interpolation formula.
UNIT-IV	**Numerical Differentiation and Integration:** Introduction – Newton's forward difference formula to get the derivative – Newton's backward difference formula to compute the derivative – Derivative using Stirling's formula – Newton-Cote's formula – Trapezoidal rule – Geometrical interpretation – Truncation error in Trapezoidal rule - Simpson's one-third rule –Simpson's three-eighths rule– Weddle's rule.
UNIT-V	**Difference Equations:** Definition – Order and degree of difference equation – Linear difference equation –To find complementary function of $f(E)y_x = \varphi(x) - In$ working Problems – To find particular integral of $f(E)y_x = \varphi(x)$. **Numerical solution of ordinary differential equations:** Introduction – Power series approximation – Pointwise methods – Solution by Taylor series (Type 1) – Taylor series method for simultaneous first order differential equations – Taylor series method for second order differential equation – Euler's method –Runge-Kutta method – Second order Runge-Kutta method.

TEXT BOOK:

P. Kandasamy, K. Thilagavathy and K. Gunavathy - "Numerical Methods", S.Chand& Company Ltd., 2010, New Delhi.

Unit	Chapter& Section
I	Chapter 3: Sections 1 to 4 Chapter 4: Sections 2, 8 to 9
II	Chapter 1: Sections 1.4 to 1.6
III	Chapter 3: Sections 3.2, 3.7
IV	Chapter 3: Section 3.3 Chapter 4: Section 4.6
V	Chapter 4: Sections 4.1 to 4.3

REFERENCE BOOKS:

1. M.K.Venkataraman, Numerical Methods in Science and Engineering,The National Publishing company, Madras, 2009.
2. R.W.Hamming, Numerical Methods for Scientists and Engineers, Dover Publications, USA. 1987.
3. R. L. Burden and J. DouglesFaires, Numerical Analysis, 9thedn., Brooks/Cole, Cengage Learning, USA. 2011.
4. Arumugam, Issac and Somasundaram, Numerical Analysis with Programming in C, New Gamma Publishing House, June 2015

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO1 Derive numerical methods for approximating the solution of the problems of algebraic and transcendental equations and ordinary differential equations.

CO2 Implement a variety of numerical algorithms using appropriate technology

CO3 Get practical knowledge of polynomial interpolation.

CO4 Solve the ordinary differential equations by using the methods of Euler and Runge Kutta.

CO5 Learn numerical solution of differential equations

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**2**	**3**
CO 2	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**2**	
CO 4	**3**	**3**		**2**
CO 5	**3**	**2**	**3**	

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: S.MURUGAMBIGAI

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **SUBJECT CODE: U21MM6E2B**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. MATHEMATICS – VI SEMESTER – ELECTIVE COURSE – II

(For the candidates admitted from the year 2021-2022 onwards)

FORMAL LANGUAGES AND AUTOMATA THEORY

COURSE OBJECTIVES:

1. Introduce concepts in automata theory and theory of computation
2. Identify different formal language classes and their relationships
3. Design grammars and recognizers for different formal languages
4. Prove or disprove theorems in automata theory using its properties
5. Determine the decidability and intractability of computational problems

UNIT -I	**Finite Automata**: Deterministic Finite Accepters – Non deterministic Finite Accepters - Equivalence of Deterministic and Non deterministic Finite Accepters - Reduction of the Number of States in Finite Automata.
UNIT -II	**Regular Languages and Regular Grammars:** Regular Expressions – Connection Between Regular Expressions and Regular Languages – Regular Grammars.
UNIT-III	**Context Free Languages**: Context Free Grammars – Parsing and Ambiguity – Context free Grammars and Programming Languages. **Properties of Context Free Languages**: Two Pumping lemmas – Closure Properties and Decision Algorithms for context free languages.
UNIT- IV	**Pushdown Automata**: Non deterministic Pushdown Automata – Pushdown Automata and Context Free Languages – Deterministic Pushdown Automata and Deterministic Context Free Languages – Grammars for Deterministic Context Free Languages.
UNIT- V	**Discrete numerical functions and generating functions:** Introduction – Manipulation of numerical functions - Asymptotic behavior of numerical functions – Generating functions – Combinatorial Problems.

TEXT BOOKS:

1. An Introduction to Formal Languages and Automata ,Narosa publication
2. Elements of Discrete mathematics C.L. Liu 2nd edition McGraw-Hill.

Unit	Chapter& Section
I	Chapter 2: Sections 2.1 to 2.4
II	Chapter 3: Sections 3.1 to 3.3
III	Chapter 5: Sections 5.1 to 5.3 Chapter 8: Sections 8.1 to 8.2
IV	Chapter 7: Sections 7.1 to 7.4
V	Chapter 9[2]: Sections 9.1 to 9.5

REFERENCE BOOKS:

1. Rani Siron money, Formal Languages, CLS publications.
Venkatraman M.K., Sridharan.N.&N.Chandrasekaran,-Discrete Mathematics, National Publishing & Co.,2000.

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Acquire a fundamental understanding of the core concepts in automata theory and formal languages.

CO 2 Ability to design grammars and automata (recognizers) for different language classes.

CO 3 Ability to identify formal language classes and prove language membership properties.

CO 4 Ability to prove and disprove theorems establishing key properties of formal languages and automata.

CO 5 Acquire a fundamental understanding of core concepts relating to the theory of computation and computational models including (but not limited to) decidability and intractability.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	
CO 2	**3**		**3**	
CO 3	**3**		**3**	
CO 4	**3**	**3**	**3**	**3**
CO 5	**3**	**2**	**3**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)
2.Problem Solving – Group Discussion
3.Quiz – Seminar
4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: S.MURUGAMBIGAI

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT:4 **COURSE CODE: U21MM6E3A**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. MATHEMATICS – VI SEMESTER - ELECTIVE COURSE – III

(For the candidates admitted from the year 2021-2022 onwards)

DISCRETE MATHEMATICAL STRUCTURE

COURSE OBJECTIVES:

To enable students to

1. Develop construction and verification of mathematical Statements.
2. Gain fundamental knowledge about lattices and Boolean Algebra.

UNIT -I	**Mathematical logic:** Statement and Notation - Connectives – Normal forms.
UNIT -II	**Mathematical logic:** The Theory of inference for the statement calculus – The Predicate calculus – Inference theory of the predicate calculus.
UNIT- III	**Algebraic Structures**: Semigroups and Monoids - Group Codes.
UNIT- IV	**Algebraic Structures:** Grammars and Languages - Finite State Machines.
UNIT- V	**Lattices and Boolean Algebra:** Introduction – Boolean algebra – Boolean functions.

TEXT BOOKS:

J. P. Trembley and R. Manohar, Discrete Mathematical Structures With applications to Computer Science, Tata Mc Graw Hill, New Delhi, 1997.

Unit	Chapter& Section
I	Chapter 1: Sections 1.1 to 1.3
II	Chapter 1: Sections 1.4 to 1.6
III	Chapter 3: Sections 3.2, 3.7
IV	Chapter 3: Section 3.3 Chapter 4: Section 4.6
V	Chapter 4: Sections 4.1 to 4.3

REFERENCE BOOKS:

1. Ralph P.Grumaldi Pearson Edelen-Discrete and Combinational Mathematics-an Applied Introduction (IV Edn.).
2. Maluino A and Leech- Digital Principles and Application Mcgraw Hill.
3. Venkataraman, M.K.and others–Discrete Mathematics–2000,The National Publishing Company

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO1 Acquire knowledge about the basic concepts of Discrete Mathematics and its applications.

CO 2 Apply logically valid forms of arguments to avoid logical errors by studying mathematical logic.

CO 3 Construct truth table for the given proposition. Interpret tautology and contradictions. Demonstrate logical operator.

CO 4 Define and describe grammars and languages.

CO 5 Understand abstract algebra, posets, lattices, Boolean algebra and their applications in the field of engineering and computer science.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	
CO 2	**3**		**3**	
CO 3	**3**		**3**	**2**
CO 4	**3**		**3**	
CO 5	**3**		**3**	**2**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER: S. MURUGAMBIGAI

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM6E3B**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. MATHEMATICS – VI SEMESTER - ELECTIVE COURSE – III

(For the candidates admitted from the year 2021-2022 onwards)

FUZZY MATHEMATICS

COURSE OBJECTIVES:

1. This course introduces students to the basic concepts of modeling in systems using fuzzy sets.
2. The concepts of fuzzy sets are introduced and their role in applications of semantic interpreters, control systems and reasoning systems.

UNIT- I	F**rom Classical (Crisp) Sets To Fuzzy Sets:** Introduction: Crisp Sets: An Overview - Fuzzy Sets: Basic Types - Fuzzy Sets: Basic Concepts - Characteristics and Significance of the Paradigm Shift. **Fuzzy Sets Versus Crisp Sets:** Additional Properties of alpha-Cuts - Representations of Fuzzy Sets -Extension Principle for Fuzzy Sets.
UNIT- II	**Operations On Fuzzy Sets:** Types of Operations - Fuzzy Complements - Fuzzy Intersections: t-Norms - Fuzzy Unions: t-Conorms - Combinations of Operations - Aggregation Operations.
UNIT- III	**Fuzzy Arithmetic**: Fuzzy Numbers - Linguistic Variables - Arithmetic Operations on Intervals - Arithmetic Operations on Fuzzy Numbers - Lattice of Fuzzy Numbers - Fuzzy Equations.
UNIT- IV	**Fuzzy Relations:**Crisp versus Fuzzy Relations - Projections and Cylindric Extensions - Binary Fuzzy Relations - Binary Relations on a Single Set - Fuzzy Equivalence Relations - Fuzzy Compatibility Relations - Fuzzy Ordering Relations - Fuzzy Morphisms - Sup-i Compositions of Fuzzy Relations - Inf-ω_i Compositions of Fuzzy Relations.
UNIT- V	**Engineering Applications**: Introduction - Civil Engineering - Mechanical Engineering - Industrial Engineering - Computer Engineering - Reliability Theory – Robotics.

TEXT BOOKS:

George J.Klirand BoYuan,-Fuzzy Sets and Fuzzy Logic Theory and Applications .Prentice Hall of India,2002,New Delhi.

Unit	Chapter
I	Chapter 1 & 2
II	Chapter3
III	Chapter4
IV	Chapter5
V	Chapter16

REFERENCEBOOKS:

George J.Klir, Tina.A. Folger – FuzzySets, Uncertain tyandInformations –Prentice HallofIndia,2003.

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Learn crips and fuzzy set theory

CO 2 Recognize fuzzy logic membership function.

CO 3 Make applications on Fuzzy logic membership function and fuzzy inference systems.

CO 4 Decide the difference between crips set and fuzzy set theory.

CO 5 Recognize fuzzy logic fuzzy inference systems

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**3**	
CO 2	**3**		**3**	
CO 3	**3**		**3**	
CO 4	**3**		**2**	
CO 5	**3**		**3**	
Average				

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER: S.MURUGAMBIGAI

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT : 3 **COURSE CODE: U21MM1A1**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR - 639 005.

B.Sc. - I SEMESTER - FIRST ALLIED COURSE – I

(FOR COMPUTER SCIENCE MAJOR)

(For the candidates admitted from the year 2021-2022 onwards)

APPLIED MATHEMATICS – I

(ALGEBRA AND CALCULUS)

COURSE OBJECTIVES:

1. To train the students to solve the problems in theory of equations.
2. To learn the basic concepts in the differentiation and integration.

UNIT -I	Theory of Equation: Relation between roots and coefficients - Transformation of equation - Diminishing, Increasing & Multiplying the roots by a constant – Forming Equations with the given roots – Rolle's theorem, Descartes rule of signs (statement only) - Simple problems.
UNIT -II	Singular matrices – Inverse of a non-singular matrix using Adjoint method - Rank of a matrix - Consistency – Characteristic equation – Eigen values, Eigen Vectors –Cayley Hamilton theorem (Proof not needed) - Simple applications only.
UNIT -III	Differentiation : Maxima & Minima - Concavity – Convexity – Points of inflexion - Partial differentiation – Euler's theorem - Total Differential coefficient (proof not needed) - Simple problems only.
UNIT-IV	Evaluation using integration by parts - Properties of definite integrals – Fourier series in the range $(0, 2\pi)$ & $(-\pi, \pi)$ - Odd & Even functions - Fourier Half Range Sine and Cosine series.
UNIT-V	Differential Equations: Variables Separable - Linear equations - Second order of types a D^2 + bD +cy = F(X) where a, b, c are constants and F(X) is one of the following types (i) e^{kx} (ii) sin kx (or) cos kx (iii) x^n, n being an integer **(**iv) e^{kx} f(x).

TEXT BOOKS:

1. T. K. Manickavasagam Pillai & Others, **"Algebra Vol. I"**, S.V. Publications,2010, Revised Edition.
2. T.K. Manickavasagam Pillai & Others, **"Algebra Vol. II"**, S.V. Publications,2010, Revised Edition.
3. S. Narayanan, T. K. Manickavasagam Pillai, **"Calculus Vol. I"**, S.V. Publications, 2003.
4. S. Narayanan, T. K. Manickavasagam Pillai, **"Calculus Vol. II"**, S.V. Publications, 2003.
5. S. Narayanan, T. K. Manickavasagam Pillai, **"Calculus Vol. III"**, S.V. Publications, 2003.

REFERENCE BOOKS:

1. M. L. Khanna, **"Differential Calculus"**, Jaiprakashnath and Co Meerut – 2004.
2. P. Kandasamy, K. Thilagavathy, **"Allied mathematics"**, S. Chand & Co. Ltd.,2010.

UNITS	CHAPTERS	SECTIONS
Unit I	Chap 6 (Text Book 1)	Sec 11,15,17,20,24,25
Unit II	Chap 2 (Text Book 2)	Sec 8,8.1,11,14,16,16.3
Unit III	Chap 5 (Text Book 3) Chap 8 (Text Book 3)	Sec 1.5,2 Sec 1.1,1.2,1.3-1.6,4.1
Unit IV	Chap 1 (Text Book 4) Chap 6 (Text Book 5)	Sec 11,12 Sec 1,2,3,4,5.1,5.2
Unit V	Chap 1 (Text Book 5) Chap 2 (Text Book 5)	Sec 2.1,2.4 Sec 1,2,3,4 (a),(b),(c),(d)

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Train the students to solve the problems in Theory of Equations

CO 2 Apply Cayley Hamilton theorem for finding the inverse of square matrices

CO 3 Get exposed to the basic concepts of differentiation and integration

CO 4 Expand given function in Fourier series.

CO 5 Acquire the knowledge about differential equations

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented		Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**2**	**2**
CO 2	**3**	**3**		**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**		**2**
CO 5	**3**			

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)

2.Problem Solving – Group Discussion

3.Quiz – Seminar

4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM2A2P**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. - II SEMESTER - FIRST ALLIED COURSE – II

(FOR COMPUTER SCIENCE MAJOR)

(For the candidates admitted from the year 2021-2022 onwards)

APPLIED MATHEMATICS – II (PRACTICALS)

(NUMERICAL METHODS)

COURSE OBJECTIVES:

1. To learn the knowledge about an algebraic and transcendental equations.
2. Develop the students for solving the problems by using various methods.

UNIT- I	Solution of Algebraic and Transcendental Equations: Bisection method – Iteration Method - Regula falsi method – Newton Raphson Method –Simple Problems.
UNIT- II	Solution of Simultaneous Linear Algebraic Equations: Gauss-Elimination Method –Gauss-Jordan Method – Gauss-Jacobi method – Gauss-Seidal Method.
UNIT- III	Interpolations: Linear interpolation – Gregory – Newton forward and backward interpolation formula – Lagrange interpolation formula (for unequal intervals).
UNIT- IV	Numerical Differentiation and Integration: Newton's formula to compute derivative –Numerical Integration – A General Quadrature formula – Trapezoidal Rule - Simpson's 1/3rd Rule – Simpson's 3/8th rule.
UNIT- V	Numerical Solutions of ODE – Taylor's series Method – Euler Method – Second order and Fourth order Runge-Kutta Methods – Predictor and Corrector methods –Milne's predictor – Corrector formula.

TEXT BOOK:

1. P.K. Kandasamy, K. Thilagavathi& K. Gunavathi, **"Numerical Methods"**, S.Chand & Co Ltd. Second Revised Edition 2003.

REFERENCE BOOKS:

1. S. S. Sastry, **"Introductory Methods of Numerical Analysis"**, Prentice Hall of India Pvt. Ltd., New Delhi, Third Edition, 2002.
2. M. K. Venkataraman, **"Numerical Methods in Science and Engineering"**, Nationalising Company, 2007.

UNITS	CHAPTERS	SECTIONS
Unit I	Chap 3	Sec 3.1 to 3.4
Unit II	Chap 4	Sec 4.1, 4.2, 4.8, 4.9
Unit III	Chap6 Chap 8	Sec 6.1to 6.3 Sec 8.1 to 8.7
Unit IV	Chap 9	Sec 9.1to 9.3, 9.7 to 9.9, 9.13, 9.14
Unit V	Chap 11	Sec 11.6, 11.7, 11.9, 11.12, 11.13, 11.16, 11.17

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Get exposed to the basic concepts of algebraic and transcendental equations.
CO 2 Apply various methods for solving the above equations.
CO 3 Apply various methods for solving simultaneous linear algebraic equations
CO 4 Train the students to calculate numerical differentiation and integration.
CO 5 Apply various methods for finding the numerical solution of ordinary differential equation.

Nature of Course			
Knowledge and Skill		Employability oriented	✓
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**2**	**2**
CO 2	**3**	**3**		**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**		**2**
CO 5	**3**	**3**		**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)
2.Problem Solving – Group Discussion
3.Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1, K 2, K 3	3 /5 x1 5 marks (with internal choice)	500	45	60	
Record			15		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **COURSE CODE: U21MM2A3**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. - II SEMESTER - FIRST ALLIED COURSE – III

(FOR COMPUTER SCIENCE MAJOR)

(For the candidates admitted from the year 2021-2022 onwards)

APPLIED MATHEMATICS – III

(OPERATIONS RESEARCH)

COURSE OBJECTIVES:

1. To learn the basic concepts about Linear Programming Problem, Transportation Problem, Assignment Problem, Sequencing Problem and Network.
2. Develop the problem solving skill on the above problems.

UNIT - I	Operations Research: Introduction – Role of computers in O.R – Linear Programming formulation - Graphical solution of two variables – Canonical and standard forms of Linear Programming Problems.
UNIT - II	Simplex Methods – Algorithms – Simplex Method for <=, >= Constrains – Big M Method – Two Phase Method.
UNIT - III	Transportation Problems: Algorithms – Degeneracy in Transportation Problem – Unbalanced Transportation Problem – Assignment Problem– Algorithms – Unbalanced Assignment Problem.
UNIT- IV	Sequencing Problems: Problem with n jobs and two machines – Problems with n jobs and three machines.
UNIT - V	Network – Fulkerson's rule – CPM-PERT Calculations.

TEXT BOOK:

1. Kantiswarup, P.K. Gupta & Manmohan, **"Operations Research"**, Sultan &Chand Publishers, New Delhi, 2014.

REFERENCE BOOK:

1. Hira and Gupta, "Operations Research", S.Chand& Co. Ltd., 1999.

UNITS	CHAPTERS	SECTIONS
Unit I	Chap1 Chap2	Sec 1.1,1.2,1.6,1.8 Sec 2.1- 2.6
Unit II	Chap3	Sec 3.1 to 3.5
Unit III	Chap 6 Chap7	Sec 6 - 6.1, 6.2, 6.4, 6.5, 6.7, 6.9 Sec 7.1 to 7.3
Unit IV	Chap10	Sec 10.1 to10.4
Unit V	Chap 21	Sec 21.1 to 21.7

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Acquire the basic concepts of Linear Programming Problem.

CO 2 Apply various methods for finding an optimum solution of LPP.

CO 3 Apply various algorithms for finding an optimum solution for the transportation and an assignment problems.

CO 4 Understand the basic concepts of sequencing problem.

CO 5 To learn the basic concepts of network and develop the problem solving skill.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented		Entrepreneurship oriented	✓

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**2**	**2**
CO 2	**3**	**3**		**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**			**2**
CO 5	**3**	**3**		**3**
Average				

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4 .Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 4 **COURSE CODE: U21MM1A4/ U21MM3A1**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. – I/III SEMESTER - FIRST ALLIED COURSE – I

(FOR PHYSICS, CHEMISTRY & GEOLOGY MAJOR)

(For the candidates admitted from the year 2021-2022 onwards)

ALLIED MATHEMATICS - I

(ALGEBRA, 3D AND TRIGONOMETRY)

COURSE OBJECTIVES:

1. To learn the basic concepts of Algebra
2. To learn the basic needs of Trigonometry

UNIT I	Binomial, Exponential and Logarithmic series (Formulae only) - Summation and approximation related problems
UNIT II	Symmetric, Skew symmetric, Orthogonal, Hermitian, Skew Hermitian and Unitary matrices - Characteristic equation, Eigen values, Eigen vectors - Cayley Hamilton's theorem (proof not needed)- Simple problems only.
UNIT III	Equation of a Sphere -Tangent plane - Plane section of a sphere - Finding the center and radius of the circle of intersection (simple problems only).
UNIT IV	Expansion of sin nθ, cos nθ, tan nθ (n being a positive integer) - Expansion of $sin^n\theta$, $cos^n\theta$ in a series of sines and cosines of multiples of θ (θ- gives in radians) - Expansion of sin θ, cos θ and tan θ in terms of powers (only problems in all the above)
UNIT V	Euler's formula for $e^{i\theta}$- Definition of Hyperbolic functions – Formulae involving Hyperbolic functions - Relation between Hyperbolic and circular functions - Expansion of sinhx, coshx, tanhx in powers of x – Seperation of real and imaginary part of sin$(x+iy)$, cos$(x+iy)$, tan$(x+iy)$, $\sinh(x+iy)$,cosh$(x+iy)$, tanh$(x+iy)$, $\sinh^{-1}(x+iy)$, $\cosh^{-1}(x+iy)$, $\tanh^{-1}(x+iy)$.

TEXT BOOKS:

1. T. K. Manickavasagam Pillai, T. Natarajan, K. S. Ganapathy, **"Algebra Vol. I"** S. Viswanathan Private Limited, Chennai-2010.
2. T. K. Manickavasagam Pillai, T. Natarajan, K. S. Ganapathy, **"Algebra Vol. II"** S. Viswanathan Private Limited, Chennai-2010.
3. T. K. Manickavasagam Pillai, **"Analytical Geometry of 3D and Vector Calculus"**, New Gamma Publishing House, 2010.
4. S. Narayanan, T. K. Manickavasagam Pillai, **"Trigonometry"** S. Viswanathan Private Limited and Vijay Nicole Imprints Pvt. Ltd.2010.

REFERENCE BOOKS:

1. Arumugam & Isaac, **"Analytical geometry of 3D and Integral calculus"**, New Gamma Publications, 2011.
2. Arumugam & Isaac, **"Trigonometry and Fourier series"**, New Gamma Publications.

UNITS	CHAPTERS	SECTIONS
Unit I	Chap 3 (Text book 1) Chap 4 (Text book 1)	Sec 1,2,4-10,14Sec 1,2,3,5,6
Unit II	Chap 2 (Text Book 2)	Sec 6.1-6.3,16,16.3
Unit III	Chap 4 (Text Book 3)	Sec 1-8
Unit IV	Chap 3(Text Book 4)	Sec 1,2,3,4,4.1,5
Unit V	Chap 4 (Text Book 4)	Sec 1,2,2.1-2.3

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Find the summation and approximation of Binomial, Exponential and Logarithmic series

CO 2 Classify the different types of matrices and also find the eigen values and eigen vectors of the given matrix

CO 3 Develop the problem solving skill on sphere

CO 4 Find the expansions of trigonometrical functions

CO 5 Find the expansion of hyperbolic functions

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**2**	**2**
CO 2	**3**	**3**		**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**		**2**
CO 5	**3**	**3**		**2**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1.Lecture (Chalk and Talk – OHP – LCD)

2.Problem Solving – Group Discussion

3.Quiz – Seminar

4.Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **SUBJECT CODE: U21MM2A5P /U21MM4A2P**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. – II/IV SEMESTER - FIRST ALLIED COURSE – II

(FOR PHYSICS, CHEMISTRY & GEOLOGY MAJOR)

(For the candidates admitted from the year 2021-2022 onwards)

ALLIED MATHEMATICS - II (PRACTICAL)

(CALCULUS AND FOURIER SERIES)

COURSE OBJECTIVES:

1. To learn the basic need for their major concepts
2. To train the students in the basic Integrations

UNIT- I	Successive Differentiation: nth derivative of standard functions (Derivation not needed) Simple problems only - Leibnitz theorem (proof not needed) and its applications. Curvature and radius of curvature in Cartesian Coordinates only (proof not needed) - Simple problem only
UNIT -II	Integrating by parts – Bernoulli's formula - Evaluation of integrals of types $\int \frac{dx}{a+b\cos x}$ 2. $\int \frac{dx}{a+b\sin x}$ 3. $\int \frac{(a\cos x+b\sin x+c)}{(p\cos x+q\sin x+r)}dx$
UNIT -III	General Properties of Definite integrals - Evaluation of Definite integrals of types 1. $\int_a^b \sqrt{(x-a)(b-x)}\,dx$ 2. $\int_a^b \frac{dx}{\sqrt{(x-a)(b-x)}}$ 3. $\int_a^b \sqrt{\frac{(x-a)}{(b-x)}}dx$ Reduction formula when n is a positive integer for $\int_a^b e^{ax}x^n dx$ 2. $\int_a^b \sin^n x\,dx$ 3. $\int_a^b \cos^n x\,dx$ 4. $\int_0^{\frac{\pi}{2}} \cos^n x\,dx$ 5. $\int_0^{\frac{\pi}{2}} \sin^n x\,dx$ 6. $\int_0^{\frac{\pi}{2}} \sin^m x\cos^n x\,dx$(Proof not needed for 6 only)
UNIT - IV	Evaluation of Double and Triple integral in simple cases – Changing the order and Evaluating the Double integration. (Cartesian Coordinates only)
UNIT -V	Definition of Fourier series - Finding Fourier Co-efficients for a given periodic function with period2π- Use of Odd and Even functions in evaluation of Fourier Co-efficients - Half range sine and cosine series.

TEXT BOOKS:

1. T. K. Manickavasagam Pillai, S. Narayanan, **"Calculus Vol. I"** S. Viswanathan Private Limited, 2011.
2. T. K. Manickavasagam Pillai, S. Narayanan, **"Calculus Vol. II"** S. Viswanathan Private Limited, 2011.
3. T. K. Manickavasagam Pillai, S. Narayanan, **"Calculus Vol. III"** S. Viswanathan Private Limited, 2011.

REFERENCE BOOKS:

1. Allied Mathematics A.Singaravelu..
2. Allied Mathematics, Paper II P.Kandasamy, K.Thilagavathy, S.Chand& Company Ltd.

UNITS	CHAPTERS	SECTIONS
Unit I	Chap 3 (Text Book 1) Chap 10 (Text Book 1)	Sec 1.1-1.5,2.1,2.2 Sec 2.1-2.3
Unit II	Chap 1 (Text Book 2)	Sec 12,15.1,9
Unit III	Chap 1 (Text Book 2)	Sec 11,8 (ix),13.1,13.3-13.5
Unit IV	Chap 5 (Text Book 2)	Sec 1,2.1,2.2,4
Unit V	Chap 6 (Text Book 3)	Sec 1-4,5.1,5.2

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Find the higher derivatives of given functions

CO 2 Evaluate the different types of integrals

CO 3 Demonstrate the integrals by using Reduction formula

CO 4 Evaluate line, surface and volume integrals

CO 5 Expand the Fourier expansion for given function

Nature of Course			
Knowledge and Skill	✓	Employability oriented	
Skill oriented		Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**2**	**2**
CO 2	**3**	**3**		**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**		**2**
CO 5	**3**	**3**		**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1, K 2, K 3	3 /5 x1 5 marks (with internal choice)	500	45	60	
Record			15		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 3 **COURSE CODE: U21MM2A6/ U21MM4A3**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. – II/IV SEMESTER - FIRST ALLIED COURSE – III

(FOR PHYSICS, CHEMISTRY & GEOLOGY MAJOR)

(For the candidates admitted from the year 2021-2022 onwards)

ALLIED MATHEMATICS - III

(ODE, PDE, LAPLACE TRANSFORMS AND VECTOR ANALYSIS)

COURSE OBJECTIVES:

1. To learn the basic needs for their major concepts
2. To train the students in PDE and Laplace Transforms

UNIT -I	Ordinary Differential Equation of first order but of higher degree –Equations solvable for x , solvable for *dx/dy*, Clairaut's form (simple cases only) – Linear equations with constant coefficients – Finding Particular integrals in the cases of e *kx*, sin (kx) , cos(kx) (where k is a constant), xk where k is a positive integer , and e *f* (*x*) *kx*where f(x) is any function of x-(only problems in all the above –No proof needed for any formula).
UNIT -II	Formation of Partial differential equations by eliminating constants and by elimination of arbitrary functions – definition of general , particular & complete solutions –Singular integral (geometrical meaning not required) – Solutions of first order equations in the standard forms- f (p , q) = 0 , f (x , p , q) = 0 , f (y , p , q) = 0 , f (z ,p , q) = 0, f1 (x, p) = f2 (y , q) , z = xp+yq+f(p,q) - Lagrange's method of solving Pp+Qq = R , where P,Q,R are functions of x,y,z – (Geometrical Meaning is not needed)-(only problems in all the above – No proof needed for any formula).
UNIT- III	Laplace Transform – Definition – L(e^{at}) ,L(cos(at)) , L (sin (at)) L(t^n) , where n is a positive integer. Basic theorems in Laplace Transforms (formula only)- L [e^{-at}cos bt], L[e^{-at} sin bt], L [e^{-at} f (t)] – L [f (t)], L[f' (t)], L [f" (t)].
UNIT- IV	Inverse Laplace Transforms related to the above standard forms – Solving Second Order ODE with constant coefficients using Laplace Transforms.
UNIT -V	Gradient of a vector – directional derivative – unit normal vector - tangent plane – Divergence-Curl – solenoidal & irrotational vectors – Double operators – Properties connecting grad., div., and curl of a vector.

TEXT BOOKS:

1.S. Narayanan, T.K. Manicavachagam Pillai, Calculus, Vol. III, S. Viswanathan Pvt Limited, 2003 M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut-2004.

2. Calculus Volume III Gilbert Strang, Massachusetts Institute of Technology Edwin "Jed" Herman, University of Wisconsin-Stevens Point

REFERENCE BOOKS:

1. Arumugam &Issac, "Analytical geometry of 3D and Integral calculus", New Gamma Publications, 2011.
2. Arumugam &Issac, "Trigonometry and Fourier series", New Gamma Publications.

UNITS	CHAPTERS	SECTIONS
Unit I	Chap 1(Text Book 1) Chap 2 (Text Book 1)	Sec 5,5.1-5.4,6.1 Sec 1-4 (a),(b),(c),(d)
Unit II	Chap 4 (Text Book 1)	Sec 1,2,2.1,2.2,3,5,5.1-5.4
Unit III	Chap 5 (Text Book 1)	Sec 1-5
Unit IV	Chap 5 (Text Book 1)	Sec 6-8
Unit V	Chap 2 (Text Book 2)	Sec 2.1 to 2.4

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Gain the knowledge about solving an ordinary differential equation of first order but of higher degree

CO 2 Expand the formation of partial differential equations by eliminating arbitrary constant and by eliminating arbitrary function

CO 3 Demonstrate the Laplace transform on various functions

CO 4 Solving the second order ODE with constant coefficients using Laplace transforms.

CO 5 Find the derivatives of vector functions

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented		Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**3**	**2**	**2**
CO 2	**3**	**3**		**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**		**2**
CO 5	**3**	**3**		**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall
Knowledge Level 2. Understanding
Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 2 **COURSE CODE: U21MM3N1 / U21MM3N3**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. - III SEMESTER – NON CORE ELECTIVE – I/III

(For the candidates admitted from the year 2021-2022 onwards)

(FOR COMPUTER SCIENCE / STATISTICS MAJOR)

QUANTITATIVE APTITUDE – I

COURSE OBJECTIVES:

1. To enhance the problem solving skills and to improve the basic mathematical skills.
2. To help students who are preparing for any type of competitive examinations

UNIT -I	Numbers – HCF – LCM – Problems on numbers.
UNIT -II	Decimal Fractions and Simplification.
UNIT -III	Surds and Indices – Percentage – Profit and Loss.
UNIT -IV	Ratio and Proportion – Partnership – Allegation or Mixture.
UNIT-V	Average – Problems on Age.

TEXT BOOK:

1. R. S. Aggarwal, **"Quantitative Aptitude"**, S. Chand & Company Ltd., Ram Nagar, New Delhi, 2007.

REFERENCE BOOK:

1. Abhijit Guha, **"Quantitative Aptitude for Competitive Examinations"**, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2008.

UNITS	CHAPTERS
Unit I	Chap 1, 2 & 7
Unit II	Chap 3& 4
Unit III	Chap 9, 10 & 11
Unit IV	Chap 12, 13 & 20
Unit V	Chap 6& 8

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Remembering the numbers.
CO 2 Recalling the decimal fractions.
CO 3 Define surds and indices. Compute the various problems in the above two.
CO 4 Classify allegation or mixture.
CO 5 Recalling the average. To solve the problems on ages.

Nature of Course			
Knowledge and Skill	✓	Employability oriented	✓
Skill oriented	✓	Entrepreneurship oriented	

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**			
CO 2	**3**		**2**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**2**	**2**	**2**
CO 5	**3**	**3**	**2**	**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

Knowledge level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A – 10 x 2 marks	50	20	75	Nil
K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

CREDIT: 2 **COURSE CODE: U21MM4N2/ U21MM4N4**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-639 005.

B.Sc. - IV SEMESTER – NON CORE ELECTIVE – II

(FOR COMPUTER SCIENCE / STATISTICS MAJOR)

(For the candidates admitted from the year 2021-2022 onwards)

QUANTITATIVE APTITUDE – II

COURSE OBJECTIVES:

1. To enhance the problem solving skills and to improve the basic mathematical skills.
2. To help students who are preparing for any type of competitive examinations

UNIT -I	Chain Rule – Time –Work and Wages – Pipes and Cisterns.
UNIT- II	Simple Interest – Compound Interest – Logarithm.
UNIT- III	Time and Distance – Trains – Boats and Streams
UNIT- IV	Area – Volume and Surface Area of Solid Figures – Clocks.
UNIT- V	Data Interpretation : Tabulation – Bar Graphs – Pie Charts – Line Graph.

TEXT BOOK:

1. R. S. Aggarwal, **"Quantitative Aptitude"**, S. Chand & Company Ltd., Ram Nagar, New Delhi, 2007.

REFERENCE BOOK:

1.Abhijit Guha, **"Quantitative Aptitude for Competitive Examinations"**, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2008.

UNITS	CHAPTERS
Unit I	Chap 14, 15 & 16
Unit II	Chap 21, 22 & 23
Unit III	Chap 17, 18 & 19
Unit IV	Chap 24, 25 & 28
Unit V	Chap 36, 37, 38 &39

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME:

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

CO 1 Classify pipes and cisterns.

CO 2 Recalling the interest and logarithm.

CO 3 Solving many problems in boat and stream.

CO 4 Remembering area and volume of solid figures.

CO 5 Classify the data interpretation

Nature of Course			
Knowledge and Skill		Employability oriented	✓
Skill oriented	✓	Entrepreneurship oriented	✓

MAPPING – COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**		**2**	**2**
CO 2	**3**		**2**	**3**
CO 3	**3**	**3**	**3**	**3**
CO 4	**3**	**3**		**2**
CO 5	**3**	**3**		**3**

Key: Strongly Correlated – 3 Moderately Correlated – 2 Weakly Correlated – 1 No Correlation – 0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk – OHP – LCD)
2. Problem Solving – Group Discussion
3. Quiz – Seminar
4. Peer Learning

QUESTION PAPER PATTERN – UG

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K 1, K 2	B – 5 x 5 marks (with internal choice)	200	25		
K 2, K 3	C – 3/5 x 10 marks	500	30		

All question papers can be framed in the following cognitive levels

Knowledge Level 1. Recall

Knowledge Level 2. Understanding

Knowledge Level 3. Application

COURSE DESIGNER:

CHAIRMAN – BOS **CONTROLLER OF EXAMINATIONS**

jug; Gs;spfs; : 2	ghlf; FwpaPL : U21VE1

muR fiyf;fy;Y}up (jd;dhl;rp)> f&H - 639 005.

fiyapay; - mwptpay; kw;Wk; tzpftpay; gl;ltFg;G

(2021 - 2022 Mk; fy;tpahz;L Kjy; gapYk; khztHfSf;FupaJ)

gFjp 4 - Kjy; gUtk;

kjpg;Gf;fy;tp (VALUE EDUCATION)

ghlj;jpl;l Nehf;fq;fs;

1. tho;f;iff;Fj; Njitahd tpOkpaq;fis (Values) khzth;fSf;Ff; fw;gpj;jy;.
2. rka ey;ypzf;fj;jpd; Njitia khzth;fSf;F vLj;Jiuj;jy;.

myF - 1	tho;tpay; fy;tp Xu; mwpKfk; - jdpkdpj newpKiwfs; - rKjha newpKiwfs; - Md;kPf newpKiwfs; - tho;tpay; newpfspd; %yq;fs; - tho;tpay; newpfspd; mtrpak; - ed;dlj;ijAk; ew;nray;fSk; - ew;gz;Gfs; cUthf;fk;.
myF - 2	r%f ew;gzp - r%f eyg;gzpj;jpl;lq;fs; - rKjhaj; jPikfs; Fwpj;j tpopg;Gzu;T - Nghij kUe;JfSf;F mbikahjy; - kJg;gof;fk; - Gifg;gpbj;jy; - jw;nfhiy.
myF - 3	,e;J rkaj;jpd; Nghjidfs; - ,];yhk; Nghjpf;Fk; newpfs; - fpwpj;Jtk; Nghjpf;Fk; newpfs; - rkar; rhh;gpd;ik - rka ey;ypzf;fk;.
myF - 4	fhe;jpabfspd; mfpk;ir nfhs;if - md;id njurhtpd; njhz;Lfs; - jd;dykpd;ikapd; tbtk; ngUe;jiyth; fhkuhrh;.
myF - 5	r%fePjp - kdpj cupikfSk; mtw;wpd; ghJfhg;Gk; - kfspu;f;F vjpuhd td;Kiwfs; - ehl;bd; xUikg;ghL.

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

Course outcome

By the end of this course, Students will be able to

To enhance the understanding of human physical and mental health and ability to maintain it well to the life and beyond.

Nature of Course			
Knowledge oriented		Employability oriented	
Skill oriented		Entrepreneurship oriented	

MAPPING

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Course Outcome	**Programme Outcomes (POs)**			**Programme Specific Outcomes (PSOs)**					**Mean Score**
	PO1	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**4**	**3**	**4**	**4**	**3**	**4**	**3**	**4**	**3.63**
CO2	**3**	**2**	**3**	**3**	**4**	**3**	**2**	**3**	**2.87**
CO3	**3**	**4**	**2**	**3**	**2**	**3**	**3**	**3**	**2.75**
CO4	**3**	**4**	**3**	**4**	**4**	**3**	**4**	**3**	**3.5**
Mean Overall Score									**3.18**

Result: Total Score for this course is = 3.18 [High Relationship]

Mapping Scale

Mapping	1 - 20	21 - 40	41 - 60	61 - 80	81 - 100
Scale	1	2	3	4	5
Relation	0.01 - 1.0	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mapping Score

Mean Score of COs = 29/8 = 3.63	**Mean Overall Score for COs = 12.75/4 = 3.18**

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

jug; Gs;spfs; : 1	ghlf; FwpaPL : U21EA4

muR fiyf;fy;Y}up (jd;dhl;rp)> f&H - 639 005.

fiyapay; - mwptpay; kw;Wk; tzpftpay; gl;ltFg;G

(2021 - 2022 Mk; fy;tpahz;L Kjy; gapYk; khztHfSf;FupaJ)

gFjp 5 - Mwhk; gUtk;

ghypd rkj;Jtk; (GENDER STUDIES)

ghlj;jpl;l Nehf;fq;fs;

1. Mz;fSk; ngz;fSk; xUtUf;nfhUtu; gyk; kw;Wk; gytPdk; gw;wp mwpe;J nfhs;sr; nra;jy;.
2. ,U ghypdj;jtu;fsplKk; nrwpt+l;lg;gl;l tho;f;iff;fhd czu;jpwid tsu;j;jy;.
3. ghypd rkr;rPu; #oy; kw;Wk; ngz;fSf;F mjpfhukspj;jy; Nehf;fpa mZFKiw khw;wj;ij Cf;Ftpj;jy;.

myF - 1	**ghypdk; njhlh;ghd Nfhl;ghLfs;:** ghypay; - ghypdk; - clw;$W hPjpapy; epUzapj;jy; - Mzhjpf;fk; - ngz;zpak; - ghypd ghFghL - ghypd Ntiyg; ghFghL - ghypd xUgbj;jhdth;fs; - ghypd czh;t+l;ly; - ghypd rktha;g;G - ghypd rkj;Jtk; - ghypd ikaePNuhl;lkhf;fy; - mjpfhug;gLj;Jjy;.
myF - 2	**kfsphpay; - ghypd rkj;Jtf;fy;tp** - gy;fiyf;fof khdpaf;FOtpd; topfhl;Ljy;fs; - VohtJ Ie;jhz;Ljpl;lk; Kjy; gjpNdhuhtJ Ie;jhz;Ljpl;lk; tiu - ghypd rkj;Jtf;fy;tp : nga;[pq; khehL kw;Wk; ngz;fSf;F vjpuhd midj;J td;KiwfisAk; xopg;gjw;fhd rh;tNjr cld;gbf;if - ePf;Fk; xg;ge;jk; - 1979 (CEDAW) rl;lj;jpy; ngz;fSf;F Mjuthdtw;iw ,izj;jy; my;yJ cl;gLj;Jjy; - ngz;fSf;F vjpuhdtw;iw xJf;Fjy;.
myF - 3	**ghypay; ghFghl;bw;fhd jsq;fs;:** FLk;gk; - ghypd tpfpjhr;rhuk; - fy;tp - MNuhf;fpak; - MSik - kjk; - Ntiytha;g;G - re;ij - Clfq;fs; - murpay; - rl;lk; - FLk;g td;Kiw - ghypay; Jd;GWj;jy; - muR nfhs;iffs; kw;Wk; jpl;lq;fs;.

myF - 4	**ngz;fs; Nkk;ghL kw;Wk; ghypd rkj;Jt Nkk;ghL:** ngz;fSf;fhd rkj;Jt Kaw;rpfs; - rh;tNjr ngz;fSf;fhd rfhg;jk; - rh;tNjr ngz;fSf;fhd Mz;L - ngz;fspd; Nkk;ghl;bw;fhd Njrpaf; nfhs;iffs; - ngz;fs; mjpfhu Mz;L 2001 - rh;tNjrf; nfhs;iffis ika ePNuhl;lkhf;fy;.
myF - 5	**ngz;fs; ,af;fq;fs; kw;Wk; ghJfhg;G epWtd Vw;ghLfs;:** Njrpa kw;Wk; khepy kfsph; Mizak; - midj;J kfsph; fhty; epiyaq;fs; - FLk;g ePjpkd;wq;fs; - FLk;g td;KiwapypUe;J ngz;fisg; ghJfhf;Fk; rl;lk; 2005 - gzpaplq;fspy; ngz;fs; kPjhd ghypay; Jd;GWj;jy;fisj; jLg;gjw;fhd cr;rePjpkd;w topfhl;Ljy;fs; - tprhfh jPh;g;G - jha;Nra; eyr;rl;lk; - ngz;rpRit fUtpy; fz;lwptijj; jil nra;Ak; rl;lk; 1994 - <t;Brpq; - ngz;fisj; njhy;iy nra;jy; jLg;Gr; rl;lk; - kfsph; Ra cjtpf;FOf;fs; - gQ;rhaj;J mikg;GfSf;fhd 73 kw;Wk; 74tJ rl;lj;jpUj;jk;.

NO. OF CREDITS: 1	**COURSE CODE: U21EA4**

GOVERNMENT ARTS COLLEGE (AUTONOUMOUS), KARUR - 639005

ALL UG COURSES - VI SEMESTER - PART - V

(For the candidates admitted from the year 2021 - 22 onwards)

GENDER STUDIES (ghypd rkj;Jtk;)

COURSE OBJECTIVES:

- ❖ To make boys and girls aware of each others strengths and Weakness.
- ❖ To develop sensitivity towards both genders in order to lead an ethically enriched life.
- ❖ To promote attitudinal change towards a gender balanced ambience and women empowerment.

UNIT - I	**Concepts of Gender:** Sex - Gender - Biological Determinism - Patriarchy - Feminism - Gender Discrimination - Gender Division of labour - Gender Stereotyping - Gender Sensitivity - Gender Equity - Equality - Gender Mainstreaming - Empowerment.
UNIT - II	**Women's Studies vs Gender Studies:** UGC's Guidelines - VII to XI Plans - Gender Studies: Beijing Conference and CEDAW - Exclusiveness and Inclusiveness.
UNIT - III	**Areas of Gender Discrimination** : Family - Sex Ratio - Literacy - Health - Governance - Religion Work Vs Employment - Market - Media - Politics - Law - Domestic Violence - Sexual Harassment - State Policies and Planning .
UNIT - IV	**Women Development and Gender Empowerment** : Initiatives - International Women's Decade - International Women's Year - National Policy for Empowerment of Women - Women Empowerment Year 2001 - Mainstreaming Global Policies .

UNIT - V	**Women's Movements and Safeguarding Mechanism** : In India National / State Commission for Women(NCW) - All Women Police Station - Family Court - Domestic Violence Act - Prevention of Sexual Harassment at Work Place Supreme Court Guidelines - Maternity Benefit Act - PNDT Act - Hindu Succession Act 2005 - Eve Teasing Prevention Act - Self Help Groups - 73rd and 74th Amendment for PRIS.

Books for Reference:

1. Bhasin Kamala, Understanding Gender : Gender Basics , New Delhi : Women Unlimited, 2004
2. Krishna Sumi, (ed.,),Livelihood and Gender : Equity in Community Resource Management, New Delhi : Sage Publication ,2004
3. Mohanty Manoranjan(ed.,) Class ,Caste ,Gender : Readings in Indian Government and Politics - 5,New Delhi : Sage Publications ,2004.
4. F.rhkpJiu kw;Wk; ,uhjhfpUl;bzd;> ngz;fs; eyd; fhf;Fk; rl;lq;fs;> kJiu : Account Test Center: 2007.
5. td[h kw;Wk; rpahkh Re;jup> ngz;fSf;fhd rl;lq;fs;> nrfe;jpuhghj;: cyfj;Njhoik ikak;.
6. FLk;g td;KiwapypUe;J ngz;fis ghJfhf;Fk; rl;lk; 2005 - ifNaL> jpUr;rp.

CHAIRMAN - BOS **CONTROLLER OF EXAMINATIONS**

COURSE OUTCOME
To know the difference understanding Gender to treat other genders with goodness.

Nature of Course			
Knowledge oriented		Employability oriented	
Skill oriented		Entrepreneurship oriented	

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CO2	**3**	**2**	**3**	**3**	**4**	**3**	**2**	**3**	**2.87**
CO3	**3**	**4**	**2**	**3**	**2**	**3**	**3**	**3**	**2.75**
CO4	**3**	**4**	**3**	**4**	**4**	**3**	**4**	**3**	**3.5**
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