



# **K.M.G. COLLEGE OF ARTS AND SCIENCE** **(AUTONOMOUS)**

Approved by the Government of Tamil Nadu  
Permanently Affiliated to Thiruvalluvar University, Vellore  
Recognized under Section 2(f) and 12(B) of the UGC Act 1956  
Accredited by NAAC (2nd Cycle) with (CGPA of 3.24/4) 'A' Grade

**DEPARTMENT OF MATHEMATICS**

**B.Sc., MATHEMATICS**

**SYLLABUS**  
**(CHOICE BASED CREDIT SYSTEM)**

**Under**

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

**(Effective for the Batch of Students Admitted from 2024-2025)**

## PREFACE

The curriculum of undergraduate Mathematics is the study of quantity, structure, space and change, focusing on problem solving, with wider scope of application in science, engineering, technology, social sciences etc. The purpose of the outcome-based education is meant to provide an exposure to the fundamental aspects in different branches of Mathematics and its applications, keeping in mind the growing needs for higher education, employability, entrepreneurship and social responsibility. The periodical restructuring of the syllabi is carried out to fulfill the requirements of graduate attributes, qualification descriptors, programme learning outcomes and course outcomes. The outcome-based education enriches the curriculum to deliver the basic principles, synthetic strategies, mechanisms and application-oriented learning for the benefit of students. It also includes self-learning module, minor projects and industrial internship to enable students to get equipped for higher studies and employment. The programme also includes training to students for seminar presentation, preparation of internship reports, hands-on training in lab courses, synthesis and its analysis, developing leadership qualities, organization and participation in the interdepartmental academic competitions. The allied papers provide a platform to strengthen the understanding of the core subjects. The non-major elective courses offer chances to learn and augment interest in other related fields. The outcome-based curriculum is intended to enrich the learning pedagogy to global standards. ICT enabled teaching-learning platforms are provided to students along with the interaction of international Mathematicians. The seminars periodically delivered by subject experts and former professors would certainly help the students to update with latest technology/trends in different fields of Mathematics. The OBE based evaluation methods will reflect the true cognitive levels of the students as the curriculum is designed with course outcomes and cognitive level correlations as per BLOOM's Taxonomy.

In pursuit of the Higher Education Department Policy Note 2022-23 Demand 20, Section 1.4, Tamil Nādu State Council for Higher Education took initiative to revamp the curriculum. On 27 July 2022, a meeting was convened by the Member-Secretary Dr. S. Krishnasamy enlightening the need of the hour to restructure the curriculum of both Undergraduate and Post-graduate programmes based on the speeches at the Tamil Nādu Legislative Assembly Budget meeting by the Honourable Higher Education Minister Dr K. Ponmudy and Honourable Finance Minister Dr. P. Thiagarajan. At present there are three different modes of imparting education in most of the educational institutions throughout the globe. Outcome Based Education, Problem Based Education, and Project Based Education.

Now our Honourable Higher Education Minister announced Industry Aligned Education. During discussion, Member Secretary announced the importance of question papers and evaluation as envisaged by the Honourable Chief Secretary to Government Dr, V. IraiAnbu. This is very well imbedded in Revised Bloom's Taxonomy forms three learning domains: the cognitive (knowledge), affective(attitude), and psychomotor (skill). This classification enables to estimate the learning capabilities of students.

Briefly, it is aimed to restructure the curriculum as student-oriented, skill-based, and institution industry- interaction curriculum with the various courses under "Outcome Based Education with Problem Based Courses, Project Based Courses, and Industry Aligned Programmes" having revised Bloom's Taxonomy for evaluating students skills. Three domains:

(i)Cognitive Domain

(Lower levels: K1: Remembering ; K2: Understanding ; K3: Applying; Higher levels: K4: Analysing ; K5: Evaluating; K6: Creating)

(ii) Affective Domain

(iii) Psychomotor Domain

## **ABOUT THE COLLEGE**

The College was founded in the new millennium 2000 by the vision of late Shri.K.M.Govindarajan fondly known as Iyah, with a mission to offer higher education in the fields of Arts and Science to the needy and the poor middle class students of this area and make them fully employable and economically self-reliant. With a humble beginning of launching an elementary school named Thiruvalluvar Elementary School in the year 1952, Iyah groomed it into a Higher Secondary School and later into a college. Education was his soul and breath. The college has grown into a full-fledged educational hub offering 12 under graduate programmes, 8 post graduate programmes, 5 M.Phil research programmes and 4 Ph.D programmes. The college has been accredited with ‘A’ grade by NAAC in 2nd cycle and recognized under section 2(f) & 12(B) of the UGC act 1956. The College is permanently affiliated to Thiruvalluvar University. The College is also acquired the status of Autonomous from the academic year 2024-2025. The College is an associate member of ICT Academy and registered member of NPTEL and Spoken Tutorials of IIT Bombay. The college is also a member of INFLIBNET and NDL.

## **VISION OF THE COLLEGE**

Empower young men and women by educating them in the pursuit of excellence, character building and responsible citizen.

## **MISSION OF THE COLLEGE**

Offer higher education in the fields of Arts, Science & Management to the needy and make them fully self-dependent.

## **QUALITY POLICY OF THE COLLEGE**

KMG Students achieve the best learning results and personal growth with modern education that equip them for working life and a changing society to become deserving citizens.

## **ABOUT THE DEPARTMENT**

The Department of Mathematics was Established in the Year 2007 and made a Steady Growth to the Height of Establishing Post Graduate Level in the Year 2010. The Department offers Research Programme (M.Phil) from 2013. Our Aim is to Promote Students in the field of Mathematics and working Knowledge of Mathematics. Every Year Department Organizes National Conference/Seminar, Association Activities and Special Lecturers

## **VISION OF THE DEPARTMENT**

- To Emerge as a Global Center of Learning, Academic Excellence, and Innovative Research.

## **MISSION OF THE DEPARTMENT**

- Imparting of Quality Mathematics Education and the inculcating of the spirit of Research through Innovative Teaching and Research Methodologies.
- To Provide an Environment where Students can Learn, become Competent users of Mathematics, and Understand the use of Mathematics in Other Disciplines.

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- 1. Professional Excellence:** Graduates will demonstrate competency and excellence in their chosen fields of study, applying theoretical knowledge to practical situations effectively.
- 2. Character Development:** Graduates will exhibit strong moral and ethical character, upholding values of integrity, honesty, and respect for others in both personal and professional endeavors.
- 3. Leadership and Citizenship:** Graduates will emerge as responsible leaders and active citizens, contributing positively to their communities and society at large through their actions and initiatives.
- 4. Continuous Learning:** Graduates will engage in lifelong learning and professional development activities, adapting to evolving technologies, methodologies, and societal needs.
- 5. Self-Dependency and Entrepreneurship:** Graduates will possess the skills and mindset necessary to be self-reliant and entrepreneurial, capable of creating opportunities for themselves and others through innovation and initiative.
- 6. Effective Communication and Collaboration:** Graduates will demonstrate proficiency in communication skills, both verbal and written, and exhibit the ability to collaborate effectively with diverse teams and stakeholders.
- 7. Global Perspective:** Graduates will have a broad understanding of global issues and perspectives, demonstrating cultural sensitivity and adaptability in multicultural environments.

**PROGRAM OUTCOMES (POs)**

On successful completion of the programme, the students will be able to:

POs	Graduate Attributes	Statements
PO1	Disciplinary Knowledge	Acquire detailed knowledge and expertise in all the disciplines of the subject.
PO2	Communication Skills	Ability to express thoughts and ideas effectively in writing, listening and confidently Communicate with others using appropriate media
PO3	Critical Thinking	Students will develop aptitude Integrate skills of analysis, critiquing, application and creativity.
PO4	Analytical Reasoning	Familiarize to evaluate the reliability and relevance of evidence, collect, analyze and interpret data.
PO5	Problem Solving	Capacity to extrapolate the learned competencies to solve different kinds of non-familiar problems.
PO6	Employability and Entrepreneurial Skill	Equip the skills in current trends and future expectations for placements and be efficient entrepreneurs by accelerating qualities to facilitate startups in the competitive environment.
PO7	Individual and Team Leadership Skill	Capability to lead themselves and the team to achieve organizational goals and contribute significantly to society.
PO8	Multicultural Competence	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
PO 9	Moral and Ethical awareness/reasoning	Ability to embrace moral/ethical values in conducting one's life.
PO10	Lifelong Learning	Identify the need for skills necessary to be successful in future at personal development and demands of work place.

### PROGRAM SPECIFIC OUTCOMES (PSOs)

On successful completion of the B.Sc., Mathematics, the students will be able to:

PSOs	Statements
PSO1	Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.
PSO2	Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.
PSO3	To prepare the students who will demonstrate respectful engagement with other’s ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

### Correlation Rubrics:

High	Moderate	Low	No Correlation
3	2	1	-

### Mapping of PSOs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PSO1	3	3	3	3	3	3	2	-	-	2
PSO2	3	2	3	3	3	3	2	-	-	2
PSO3	3	3	3	3	3	3	2	-	-	3



# K.M.G. COLLEGE OF ARTS AND SCIENCE

## (AUTONOMOUS)

### Subject and Credit System- B.Sc., Mathematics

(Effective for the Batch of Students Admitted from 2024-2025)

Semester	Part	Category	Course Code	Course Title	Ins.Hrs/ Week	Credit	Maximum Marks		
							Internal	External	Total
<b>SEMESTER - I</b>	I	Language	AULT10 / AULU 10	General Tamil -I / Urdu - I	6	3	25	75	100
	II	English	AULE10	English- I	6	3	25	75	100
	III	Core – 1	AUCMA11	Algebra & Trigonometry	5	5	25	75	100
	III	Core – 2	AUCMA12	Differential Calculus	5	5	25	75	100
	III	Elective-I (Choose any One)	AUEPH13A	Physics – I	4	3	25	75	100
			AUEMA13B1	Numerical Methods -I					
	IV	Skill Enhancement	AUSMA14	Mathematics For Competitive Examinations-I	2	2	25	75	100
	IV	Foundation Course	AUFMA15	Bridge Mathematics	2	2	25	75	100
<b>Semester Total</b>					<b>30</b>	<b>23</b>			
<b>SEMESTER - II</b>	I	Language	AULT20 / AULU 20	General Tamil -II / Urdu - II	6	3	25	75	100
	II	English	AULE20	English – II	6	3	25	75	100
	III	Core - 3	AUCMA21	Analytical Geometry (Two & Three Dimensions)	5	5	25	75	100
	III	Core – 4	AUCMA22	Integral Calculus	5	5	25	75	100
	III	Elective-II (Choose any One)	AUEPH23A	Physics – II	4	3	25	75	100
			AUEMA23B	Numerical Methods -II					
	IV	Skill Enhancement	AUSMA24	Office Automation	2	2	25	75	100
	IV	Skill Enhancement	AUSMA25	Mathematics For Competitive Examinations-II	2	2	25	75	100
	<b>Semester Total</b>					<b>30</b>	<b>23</b>		

Semester	Part	Category	Course Code	Course Title	Ins.Hrs/ Week	Credit	Maximum Marks		
							Internal	External	Total
<b>SEMESTER - III</b>	I	Language	AULT30 / AULU30	General Tamil - III / Urdu - III	5	3	25	75	100
	II	English	AULE30	English – III	6	3	25	75	100
	III	Core - 5	AUCMA31	Vector Calculus and Applications	5	5	25	75	100
	III	Core – 6	AUCMA32	Differential Equations and Applications	5	5	25	75	100
	III	Elective-III (Choose any One)	AUEMA33A1	Mathematical Statistics-I	4	3	25	75	100
			AUECH33B	Chemistry – I					
	IV	Skill Enhancement	AUSMA34	Entrepreneurial Skill	1	1	25	75	100
	IV	Skill Enhancement	AUSMA35	Geogebra	2	2	25	75	100
	IV	Compulsory	AUES30	Environmental Science	2	2	25	75	100
<b>Semester Total</b>					<b>30</b>	<b>24</b>			
<b>SEMESTER - IV</b>	I	Language	AULT40 / AULU 40	General Tamil -IV / Urdu - IV	6	3	25	75	100
	II	English	AULE40	English – IV	6	3	25	75	100
	III	Core - 7	AUCMA41	Optimization Techniques	5	5	25	75	100
	III	Core – 8	AUCMA42	Elements of Mathematical Analysis	5	5	25	75	100
	III	Elective-IV (Choose any One)	AUEMA43A1	Mathematical Statistics-II	4	3	25	75	100
			AUECH43B	Chemistry – II					
	IV	Skill Enhancement	AUSMA44	Maxima	2	2	25	75	100
	IV	Skill Enhancement	AUSMA45	R Language for Statistics	2	2	25	75	100
	<b>Semester Total</b>					<b>30</b>	<b>23</b>		

Semester	Part	Category	Course Code	Course Title	Ins.Hrs/ Week	Credit	Maximum Marks		
							Internal	External	Total
SEMESTER - V	III	Core – 9	AUCMA51	Abstract Algebra	5	4	25	75	100
	III	Core – 10	AUCMA52	Real Analysis	5	4	25	75	100
	III	Core – 11	AUCMA53	Mathematical Modelling	5	4	25	75	100
	III	Core – 12	AUPMA54	Project with Viva voce	5	4	25	75	100
	III	Elective-V (Choose any One)	AUEMA55A	Transformation Techniques	4	3	25	75	100
			AUEMA55B	Special Functions					
	III	Elective-VI (Choose any One)	AUEMA56A	Graph Theory	4	3	25	75	100
			AUEMA56B	Number Theory					
	IV	Compulsory	AUVE50	Value Education	2	2	25	75	100
IV	Compulsory	AUIMA57	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	-	2	100	-	100	
<b>Semester Total</b>					<b>30</b>	<b>26</b>			
SEMESTER - VI	III	Core – 13	AUCMA61	Linear Algebra	6	4	25	75	100
	III	Core – 14	AUCMA62	Complex Analysis	6	4	25	75	100
	III	Core – 15	AUCMA63	Mechanics	6	4	25	75	100
	III	Elective-VII (Choose any One)	AUEMA64A	Object Oriented Programming Concepts Using C++	5	3	25	75	100
			AUEMA64B	Financial Analytics					
	III	Elective-VIII (Choose any One)	AUEMA65A	Discrete mathematics	5	3	25	75	100
			AUEMA65B	Big Data Analytics					
	IV	Extension Activity	AUEA60	Extension Activity	-	1	100	-	100
	V	Professional Competency Skill	AUPCMA66	Professional Competency Skill	2	2	25	75	100
<b>Semester Total</b>					<b>30</b>	<b>21</b>			

**Consolidated Semester wise and Component wise Credit distribution**

<b>Parts</b>	<b>Semester-I</b>	<b>Semester-II</b>	<b>Semester-III</b>	<b>Semester-IV</b>	<b>Semester-V</b>	<b>Semester-VI</b>	<b>Total Credits</b>
<b>Part-I</b>	03	03	03	03	-	-	12
<b>Part-II</b>	03	03	03	03	-	-	12
<b>Part-III</b>	13	13	13	13	22	18	92
<b>Part-IV</b>	04	04	05	04	04	01	22
<b>Part-V</b>	-	-	-	-	-	02	2
<b>Total</b>	23	23	24	23	26	21	<b>140</b>

\*Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V has to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.

### COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>ALGEBRA &amp; TRIGONOMETRY</b>	<b>Hours/Week</b>	05
<b>Course Code</b>	AUCMA11	<b>Credits</b>	04
<b>Category</b>	CORE M1	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

#### Objectives of the course:

- Basic ideas on the Theory of Equations, Matrices and Number Theory.
- Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Reciprocal Equations-Standard form-Increasing or decreasing the roots of a given equation- Removal of terms-Approximate solutions of roots of polynomials by Horner's method – Related Problems.  <b>Chapter-6: Sections: 16, 16.1, 17, 19, 30</b>	CO1	K1 K2 K3
<b>UNIT-II</b>	Summation of Series: Binomial- Exponential –Logarithmic series (Theorems without proof) –Related Problems.  <b>Chapter-3: Sections: 10 Chapter -4: Sections 3 to 7</b>	CO2	K1 K2 K3
<b>UNIT-III</b>	Characteristic equation – Eigen values and Eigen Vectors- Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix-Inverse of a square matrix up to order 3– Diagonalization of square matrices –Related Problems.  <b>Chapter-2: Sections: 16, 16.1 to 16.4</b>	CO3	K1 K2 K3
<b>UNIT-IV</b>	. Expansions of $\sin n\theta$ , $\cos n\theta$ in powers of $\sin\theta$ , $\cos\theta$ - Expansion of $\tan n\theta$ in terms of $\tan \theta$ – Expansions of $\cos n\theta$ , $\sin n\theta$ , $\cos m\theta \sin n\theta$ – Expansions of $\tan(\theta_1 + \theta_2 + \dots + \theta_n)$ – Expansions of $\sin\theta$ , $\cos\theta$ and $\tan\theta$ in terms of $\theta$ –Related Problems. <b>Chapter 2 :Sections : 2.1, 2.1.1, 2.1.2</b> <b>Chapter 3: Sections: 3.1, 3.1.1, 3.2.1, 3.4, 3.4.1 to 3.4.3</b>	CO4	K1 K2 K3
<b>UNIT-V</b>	Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions.  <b>Chapter 4: Sections: 4.1 to 4.7</b>	CO5	K1 K2 K3

**Recommended Text Books**

1. Algebra, **Volume I** by T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2007, **Unit – 1** and **Unit – 2**
2. Algebra, **Volume II** by T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2008 **Unit -3**
3. Trigonometry by P.Duraipandian and Kayalal Pachaiyappa, Muhil publishers, **Unit – 4, Unit – 5**

**Reference Books**

1. W.S. Burnstine and A.W. Panton, Theory of equations
  2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007
  3. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005
  4. C.V.Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003
  5. J.Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012.
- Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9<sup>th</sup> Edition, 2010.

**Website and e-learning source**

<https://nptel.ac.in>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Classify and Solve reciprocal equations	K1,K2,K3
CO2	Find the sum of binomial, exponential and logarithmic series	K1,K2,K3
CO3	Find Eigen values, Eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix	K1,K2,K3
CO4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine	K1,K2,K3
CO5	Determine relationship between circular and hyperbolic functions	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	1	-	-	1	3	2	1
CO2	2	1	3	1	-	-	1	-	-	1	3	2	1
CO3	3	1	3	1	-	-	1	-	-	1	3	2	1
CO4	3	1	3	-	-	-	1	-	-	1	3	2	1
CO5	3	1	3	-	-	-	1	-	-	1	3	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>DIFFERENTIAL CALCULUS</b>	<b>Hours/Week</b>	05
<b>Course Code</b>	AUCMA12	<b>Credits</b>	04
<b>Category</b>	CORE M2	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- The basic skills of differentiation, successive differentiation, and their applications.
- Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Successive Differentiation:</b> Introduction (Review of basic concepts) – The nth derivative – Standard Results – Fractional Expressions – Trigonometric Transformation – Formation of Equations Involving Derivatives – Leibnitz Formula for nth Derivative of a Product (Without proof) <b>Chapter 3 Sections 1.1 – 1.6 and Section 2.1</b>	CO1	K1 K2 K3
<b>UNIT-II</b>	<b>Partial Differentiation:</b> Partial Derivatives – Successive Partial Derivatives – Function of a Function Rule – Total Differential Coefficient – A special case – Implicit Functions. <b>Chapter 8 Sections 1.1 – 1.5</b>	CO2	K1 K2 K3
<b>UNIT-III</b>	<b>Partial Differentiation (Continued):</b> Homogeneous Functions – Partial Derivatives of a Function of Two Variables – Maxima And Minima of Functions of Two Variables – Lagrange’s Method of Undetermined Multipliers. <b>Chapter 8: Sections 1.6, 1.7, Sections: 4 and 5</b>	CO3	K1 K2 K3
<b>UNIT-IV</b>	<b>Envelope:</b> Method of Finding Envelope – Another Definition of Envelope – Envelope of Family of Curves Which are Quadratic in the Parameter. <b>Chapter: 10 Sections: 1.1 – 1.4</b>	CO4	K1 K2 K3
<b>UNIT-V</b>	<b>Curvature:</b> Definition of a Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involute – Radius of Curvature in Polar Coordinates, p - r equations; pedal equation of a curve. <b>Chapter: 10 Sections: 2.1–2.7.</b>	CO5	K1 K2 K3

<b>Recommended Text Books</b> 1. Calculus Volume I -S. Narayanan and T.K. Manickavachagom Pillay, S. Viswanathan Publishers Pvt. Ltd. 2015
<b>Reference Books</b> 1. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York, Inc., 1989. 2. T. Apostol, Calculus, Volumes I and II. S. Goldberg, Calculus and mathematical analysis
<b>Website and e-learning source</b> <a href="https://nptel.ac.in">https://nptel.ac.in</a>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Find the nth derivative, form equations involving derivatives and apply Leibnitz formula	K1,K2,K3
CO2	Find the partial derivative and total derivative coefficient	K1,K2,K3
CO3	Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers	K1,K2,K3
CO4	Find the envelope of a given family of curves	K1,K2,K3
CO5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates	K1,K2,K3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	1	-	-	1	3	2	1
CO2	2	1	3	-	-	-	1	-	-	1	3	2	1
CO3	3	2	3	2	-	-	1	-	-	1	3	2	1
CO4	3	2	3	2	1	-	1	-	-	1	3	2	1
CO5	3	2	3	2	1	-	1	-	-	1	3	2	1



## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>Numerical Methods -I</b>	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA13B1	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- To know the methods of solving simultaneous linear equations.
- To acquire knowledge about forward differences and Backward differences and their relationship.
- Knowledge about central difference operators and problems based on various central differences formulae.
- To study Newton's divided difference formula and problems based on Lagrange's interpolation formula.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Solutions of Algebraic and Transcendental Equations: Bisection Method- Iteration Method- Regula-Falsi Method- Newton-Raphson Method. <b>Chapter -1 :Section 1.1 to 1.4</b>	CO1	K1 K2 K3
<b>UNIT-II</b>	Solutions of Simultaneous Linear Equations: Gauss-Elimination Method, Gauss-Jordan Method, Crout's Method. <b>Chapter 2 :Section 2.1 to 2.3</b>	CO2	K1 K2 K3
<b>UNIT-III</b>	Finite Differences: E Operators and Relation between them- Differences of Polynomial-Factorial Polynomials. <b>Chapter 3 :Section 3.1 to 3.4</b>	CO3	K1 K2 K3
<b>UNIT-IV</b>	Interpolation with Equal Intervals: Newton's Forward and Backward Interpolation formulae. Central Differences Formulae: Gauss-Forward and Backward Formulae. <b>Chapter 4 :Section 4.1 to 4.3 (omit 4.1a)</b> <b>Chapter 5 :Section 5.1 to 5.4</b>	CO4	K1 K2 K3
<b>UNIT-V</b>	Interpolation with Unequal Intervals: Divided Differences - Newton's Divided Differences Formula for Interpolation -Lagrange's Formula for Interpolation. <b>Chapter 6 :Section 6.1, 6.2, 6.5 &amp; 6.7</b>	CO5	K1 K2 K3

**Recommended Text Books**

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

**Reference Books**

1. B.D. Gupta. (2001) *Numerical Analysis*. Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.
3. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing, Palayamkottai.
4. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi

**Website and e-learning source**

<https://ocw.mit.edu/courses/22-15-essential-numerical-methods-fall-2014/pages/syllabus/>  
<https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	After studied unit -1, the student will be able to solve Iteration method- Regula-falsi method- Newton-Raphson method.	K1,K2,K3
CO2	After studied unit -2, the student will be able to calculate interpolation values by applying Gauss-Elimination method, Gauss-Jordan method.	K1,K2,K3
CO3	After studied unit -3, the student will be able to calculate Differences of a polynomial- Factorial polynomials	K1,K2,K3
CO4	After studied unit -4, the student will be able to estimate Central Differences Formulae.	K1,K2,K3
CO5	After studied unit -5, the student will be able to estimate the interpolation value for unequal intervals based on Lagrange's formula.	K1,K2,K3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	1	1	-	-	1	3	2	1
CO2	2	1	3	1	2	-	1	-	-	1	3	2	1
CO3	3	1	3	1	2	1	1	-	-	1	3	2	1
CO4	3	1	3	2	2	-	1	-	-	1	3	2	1
CO5	3	1	3	2	2	1	1	-	-	1	3	2	1

### COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>MATHEMATICS FOR COMPETITIVE EXAMINATIONS-I</b>	<b>Hours/Week</b>	02
<b>Course Code</b>	AUSMA14	<b>Credits</b>	02
<b>Category</b>	Skill Enhancement Course-I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

**Objectives of the course:**

- Remembering the meaning of HCF and LCM of numbers
- Understanding the concept of percentage on simple problems.
- Analyzing the concepts of ratio and proportion

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Numbers - H.C.F and L.C.M. of Numbers. (Chapter – 1 & 2 )	CO1	K1 K2 K3
<b>UNIT-II</b>	Decimal Fractions – Simplification. (Chapter – 3 & 4)	CO2	K1 K2 K3
<b>UNIT-III</b>	Square Roots and Cube Roots – Average. (Chapter – 5 & 6)	CO3	K1 K2 K3
<b>UNIT-IV</b>	Problems on Numbers - Problems on Ages. (Chapter – 7 & 8)	CO4	K1 K2 K3
<b>UNIT-V</b>	Percentage (Chapter – 10)	CO5	K1 K2 K3

**Recommended Text Books**

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand co Ltd., 152. Anna Salai, Chennai,2010

**Reference Books**

1. Quantitative Aptitude ‘by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005)

**Website and e-learning source**

<https://nptel.ac.in/>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Perform basic mathematics in Numbers.	K1,K2,K3
CO2	Understand Decimal Fractions and Simplification.	K1,K2,K3
CO3	Develop basic concept of Square Roots and Cube Roots and Average.	K1,K2,K3
CO4	Explain Problems on Numbers - Problems on Ages.	K1,K2,K3
CO5	Critique and evaluate quantitative arguments that utilize mathematics, statistical and quantitative informations.	K1,K2,K3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	1	-	-	1	3	2	1
CO2	2	1	3	1	-	-	1	-	-	1	3	2	1
CO3	3	1	3	1	-	-	1	-	-	1	3	2	1
CO4	3	1	3	-	-	-	1	-	-	1	3	2	1
CO5	3	1	3	-	-	-	1	-	-	1	3	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>Bridge Mathematics</b>	<b>Hours/Week</b>	02
<b>Course Code</b>	AUFMA15	<b>Credits</b>	02
<b>Category</b>	Foundation course	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- To bridge the gap and facilitate transition from higher secondary to tertiary education;
- To instill confidence among stakeholders and inculcate interest for Mathematics;

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Algebra: Binomial theorem, General term, middle term, problems based on these concepts.	CO1	K1 K2 K3
<b>UNIT-II</b>	Sequences Series (Progression). Fundamental Principle of counting. Factorial n	CO2	K1 K2 K3
<b>UNIT-III</b>	Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.	CO3	K1 K2 K3
<b>UNIT-IV</b>	Trigonometry: Introduction to trigonometric ratios, proof of $\sin(A+B)$ , $\cos(A+B)$ , $\tan(A+B)$ formulae, multiple and sub multiple angles, $\sin(2A)$ , $\cos(2A)$ , $\tan(2A)$ etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule	CO4	K1 K2 K3
<b>UNIT-V</b>	Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.	CO5	K1 K2 K3

**Recommended Text Books**

1.NCERT class XI and XII text books Any State Board Mathematics text books of class XI and XII

**Website and e-learning source**
<https://nptel.ac.in>
**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems	K1,K2,K3
CO2	Find the various sequences and series and solve the problems related to them. Explain the principle of counting.	K1,K2,K3
CO3	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations	K1,K2,K3
CO4	Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and sub multiple angles, etc. Also, they can solve the problems using the transformations.	K1,K2,K3
CO5	Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.	K1,K2,K3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	-	-	1	3	2	1
CO2	2	1	1	2	2	1	1	-	-	1	3	2	1
CO3	2	1	1	2	2	1	1	-	-	1	3	2	1
CO4	1	1	1	1	1	1	1	-	-	1	3	2	1
CO5	1	1	1	1	1	1	1	-	-	1	3	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>NUMERICAL METHODS-I</b> (For B.Sc., Computer Science)	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA13B	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

**Objectives of the course:**

- To Solve Practical Technical Problems using various Numerical Method Formulae
- To derive appropriate Numerical Methods to solve Algebraic, Transcendental Equations
- To know the Numerical Methods of Solving Simultaneous Linear Equations
- To Acquire Knowledge about Forward Difference and Backward Differences and their Relationship Knowledge about Central Difference Operators and Problems based on Various Central Difference Formulae

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Curve Fitting- Principle of Least square</b> Fitting of straight line $y = ax + b$ parabola $y = ax^2 + bx + c$ exponential curves of forms $y = ax^b$ , $y = e^{bx}$ , and $y = ab^x$ .	CO1	K1 K2 K3
<b>UNIT-II</b>	<b>The solution of numerical algebraic and transcendental Equations:</b> Bisection method – Iteration Method – Regula Falsi Method – Newton– Raphson method	CO2	K1 K2 K3
<b>UNIT-III</b>	<b>Solution of simultaneous linear algebraic equations:</b> Gauss elimination method – Gauss Jordan method – Method of Triangularization – Gauss Jacobi method – Gauss Seidel method.	CO3	K1 K2 K3
<b>UNIT-IV</b>	<b>Finite differences</b> Operators $\Delta$ , $\nabla$ and $E$ - relation between them — factorial polynomials. <b>Interpolation with equal intervals:</b> Gregory-Newton forward and backward- interpolation formulas.	CO4	K1 K2 K3
<b>UNIT-V</b>	<b>Central differences formulae</b> Operators $\Delta$ , $\nabla$ and $E$ relation with the other operators. Gauss forward and backward formulae, Stirling's formula and Bessel's formula.	CO5	K1 K2 K3

**Recommended Text Books**

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

**Reference Books**

1. B.D. Gupta.(2001) *Numerical Analysis*.Konark Pub. Ltd., Delhi
5. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.
6. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing,Palayamkottai.
7. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand& Co., Delhi

**Website and e-learning source**

<https://nptel.ac.in/courses/111107105>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Solve the problems of fitting of straight lines, parabolas and the different form of exponential curves	K1,K2,K3
CO2	Solve algebraic equations using various methods like Bisection method, Iteration method, Regula Falsi method and Newton – Raphson method	K1,K2,K3
CO3	Estimate the solution of simultaneous linear equations using different numerical methods	K1,K2,K3
CO4	Define basic concept of operators $\Delta$ , $\nabla$ and E, Solving interpolation with equal intervals problems using Gregory Newton's forward formula and Newton's backward formula	K1,K2,K3
CO5	Estimate the solution of central difference formula using the methods Gauss's forward, backward formula, Stirling's formula and Bessel,s formula	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	-	-	1	1	2	2
CO2	3	3	2	3	3	3	1	-	-	1	1	2	2
CO3	3	2	2	3	2	3	1	-	-	1	1	2	2
CO4	3	3	3	2	2	3	1	-	-	1	1	2	2
CO5	3	2	3	2	3	2	1	-	-	1	1	2	2



## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>DISCRETE MATHEMATICS-I</b> (For B.Sc., Computer Science)	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA13C	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

**Objectives of the course:**

- To make the students understand the Mathematical Logic and truth table.
- To know about how and when to use set theory.
- To understand the discrete structure, storage structure.
- To understand the methods of Relations and ordering.
- To understand the functions, classifications, and types.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	<b>Mathematical logic-:</b> Connectives, well formed formulas, Tautology, Equivalence of formulas, Tautological implications, Duality law, Normal forms.	CO1	K1 K2 K3
UNIT-II	<b>Set Theory:</b> Basic Concept of Set Theory – Operations on Sets – Venn Diagram	CO2	K1 K2 K3
UNIT-III	<b>Representation of Discrete Structure :</b> Data Structure – Storage Structure -Sequential Allocation – Pointers and Linked Allocation – An Application of Bit Represented Sets	CO3	K1 K2 K3
UNIT-IV	<b>Relations and Ordering:</b> Relations – Properties of Binary Relations in a set – Relation Matrix and the Graph of a Relation – Partition and Covering of a set – Equivalence Relations – Compatibility Relations – Composition of Binary Relations –Partial Ordering – Partially Ordered set.	CO4	K1 K2 K3
UNIT-V	<b>Functions</b> Definitions of functions and its Classification – Types – Examples – Composition of functions – Inverse functions – Binary and nary operations – Characteristic function of a set – Hashing functions –Recursive functions	CO5	K1 K2 K3

**Recommended Text Books**

1. Discrete Mathematical Structures with applications to computer Science J.P Tremblay and R.P Manohar (Mc.Graw Hill, 1997.)

**Reference Books**

1. P.R. Vittal, Mathematical Foundations– Margham Publication, Chennai.
2. Discrete Mathematics-Oscar Levin(3rd Edition)

**Website and e-learning source**

<https://nptel.ac.in/courses/106106094>  
<https://nptel.ac.in/courses/111107058>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Solve problems in Mathematical logic and truth table	K1,K2,K3
CO2	Know and understand about set theory.	K1,K2,K3
CO3	Know and understand about discrete structure, storage structure.	K1,K2,K3
CO4	Know and understand about Relations and Ordering	K1,K2,K3
CO5	Understand the functions, classification and types.	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	-	-	1	1	1	1
CO2	2	2	3	3	2	3	1	-	-	1	1	1	1
CO3	3	3	3	3	3	3	1	-	-	1	1	2	2
CO4	3	2	2	3	3	3	1	-	-	1	1	2	2
CO5	3	2	3	3	3	2	1	-	-	1	1	2	2

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>STATISTICAL METHODS AND ITS APPLICATIONS-I (For BCA)</b>	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA12A	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

**Objectives of the course:**

- Understand basic concepts of Statistical Methods
- Have a basic understanding of measures of location
- Have a basic understanding of measures of dispersion
- Understand about Measures of Skewness
- Understand about correlation

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data- Diagrammatic and Graphical representation of data – Graphical, determination of Quartiles ,Deciles and Percentiles	CO1	K1 K2 K3
UNIT-II	Measures of location: Arithmetic mean, median, mode, geometric mean and Harmonic mean and their properties.	CO2	K1 K2 K3
UNIT-III	Measures of dispersion: Range, Quartile deviation, mean deviation, Standard deviation, combined Standard deviation, and their relative measures	CO3	K1 K2 K3
UNIT-IV	Measures of Skewness: Karl Pearson's, Bowley's, and Kelly's and coefficient of Skewness and kurtosis based on moments.	CO4	K1 K2 K3
UNIT-V	Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods. Regression Analysis: Simple Regression Equations.	CO5	K1 K2 K3 K4

<p><b>Recommended Text Books</b></p> <ol style="list-style-type: none"> <li>1. Fundamental of Mathematical Statistics-S.C.Gupta &amp;V.K.Kapoor-Sultan Chand</li> <li>2. Statistical Methods-Snedecor G.W.&amp; Cochran W.G.oxford &amp;+DII</li> </ol>
<p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. Elements of Statistics -Mode. E.B.-Prentice Hall</li> <li>2. Statistical Methods-Dr.S.P.Gupta-Sultan Chand &amp;Sons</li> </ol>
<p><b>Website and e-learning source</b></p> <p><a href="https://www.simplilearn.com/what-is-statistical-analysis-article">https://www.simplilearn.com/what-is-statistical-analysis-article</a></p>

### Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Learn the basics of statistical methods	K1,K2,K3
CO2	Understanding of measures of location	K1,K2,K3
CO3	understanding of measures of dispersion	K1,K2,K3
CO4	Understand about Measures of skewness	K1,K2,K3
CO5	Understand about correlation	K1,K2,K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	1	1	-	-	1	2	1	3
CO2	2	1	3	1	2	-	1	-	-	1	2	1	2
CO3	3	1	3	1	2	1	1	-	-	1	2	1	3
CO4	3	1	3	2	2	-	1	-	-	1	2	1	2
CO5	3	1	3	2	2	1	1	-	-	1	2	1	2

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>NUMERICAL METHODS</b> (For BCA)	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA12B	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- To Solve Practical Technical Problems using various Numerical Method Formulae
- To derive appropriate Numerical Methods to solve Algebraic, Transcendental Equations
- To know the Numerical Methods of Solving Simultaneous Linear Equations
- To Acquire Knowledge about Forward Difference and Backward Differences and their Relationship Knowledge about Central Difference Operators and Problems based on Various Central Difference Formulae

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Curve Fitting- Principle of Least square</b> Fitting of straight line $y = ax + b$ parabola $y = ax^2 + bx + c$ exponential curves of forms $y = ax^b$ , $y = e^{bx}$ , and $y = ab^x$ .	CO1	K1 K2 K3
<b>UNIT-II</b>	<b>The solution of numerical algebraic and transcendental Equations:</b> Bisection method – Iteration Method – Regula Falsi Method – Newton– Raphson method	CO2	K1 K2 K3
<b>UNIT-III</b>	<b>Solution of simultaneous linear algebraic equations:</b> Gauss elimination method – Gauss Jordan method – Method of Triangularization – Gauss Jacobi method – Gauss Seidel method.	CO3	K1 K2 K3
<b>UNIT-IV</b>	<b>Finite differences</b> Operators $\Delta$ , $\nabla$ and $E$ - relation between them — factorial polynomials. <b>Interpolation with equal intervals:</b> Gregory-Newton forward and backward- interpolation formulas.	CO4	K1 K2 K3
<b>UNIT-V</b>	<b>Central differences formulae</b> Operators $\Delta$ , $\nabla$ and $E$ relation with the other operators. Gauss forward and backward formulae, Stirling's formula and Bessel's formula.	CO5	K1 K2 K3

**Recommended Text Books**

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

**Reference Books**

1. B.D. Gupta.(2001) *Numerical Analysis*.Konark Pub. Ltd., Delhi
8. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.
9. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing,Palayamkottai.
10. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand& Co., Delhi

**Website and e-learning source**

<https://nptel.ac.in/courses/111107105>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Solve the problems of fitting of straight lines, parabolas and the different form of exponential curves	K1,K2,K3
CO2	Solve algebraic equations using various methods like Bisection method, Iteration method, Regula Falsi method and Newton – Raphson method	K1,K2,K3
CO3	Estimate the solution of simultaneous linear equations using different numerical methods	K1,K2,K3
CO4	Define basic concept of operators $\Delta$ , $\nabla$ and E, Solving interpolation with equal intervals problems using Gregory Newton's forward formula and Newton's backward formula	K1,K2,K3
CO5	Estimate the solution of central difference formula using the methods Gauss's forward, backward formula, Stirling's formula and Bessel,s formula	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	-	-	1	2	1	3
CO2	3	3	2	3	3	3	1	-	-	1	2	1	2
CO3	3	2	2	3	2	3	1	-	-	1	2	1	3
CO4	3	3	3	2	2	3	1	-	-	1	2	1	2
CO5	3	2	3	2	3	2	1	-	-	1	2	1	2

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>STATISTICAL METHODS AND ITS APPLICATIONS (For AI)</b>	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA12A	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- Understand basic concepts of Statistical Methods
- Show an understanding of measures of location
- Show an understanding of measures of dispersion
- Show an Understand about Measures of Skewness
- Knowledge about correlation

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data- Diagrammatic and Graphical representation of data – Graphical, determination of Quartiles ,Deciles and Percentiles	CO1	K1 K2 K3
<b>UNIT-II</b>	Measures of location: Arithmetic mean, median, mode, geometric mean and Harmonic mean and their properties.	CO2	K1 K2 K3
<b>UNIT-III</b>	Measures of dispersion: Range, Quartile deviation, mean deviation, Standard deviation, combined Standard deviation, and their relative measures	CO3	K1 K2 K3
<b>UNIT-IV</b>	Measures of Skewness: Karl Pearson’s, Bowley’s, and kelly’s and coefficient of Skewness and kurtosis based on moments.	CO4	K1 K2 K3

<b>UNIT-V</b>	Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods. Regression Analysis: Simple Regression Equations.	CO5	K1 K2 K3 K4
<b>Recommended Text Books</b>			
3. Fundamental of Mathematical Statistics-S.C.Gupta & V.K.Kapoor-Sultan Chand			
4. Statistical Methods-Snedecor G.W.& Cochran W.G.oxford &+DII			
<b>Reference Books</b>			
1. Elements of Statistics -Mode. E.B.-Prentice Hall			
2. Statistical Methods-Dr.S.P.Gupta-Sultan Chand & Sons			
<b>Website and e-learning source</b>			
<a href="https://www.simplilearn.com/what-is-statistical-analysis-article">https://www.simplilearn.com/what-is-statistical-analysis-article</a>			

### Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Know the basics of statistical methods	K1,K2,K3
CO2	Understanding of measures of location	K1,K2,K3
CO3	Understanding of measures of dispersion	K1,K2,K3
CO4	Understand about Measures of skewness	K1,K2,K3
CO5	Understand about correlation, concurrent deviation method	K1,K2,K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	1	1	-	-	1	2	2	1
CO2	2	1	3	1	2	-	1	-	-	1	2	2	1
CO3	3	1	3	1	2	1	1	-	-	1	2	2	1
CO4	3	1	3	2	2	-	1	-	-	1	2	2	1
CO5	3	1	3	2	2	1	1	-	-	1	2	2	1



## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>RESOURCE MANAGEMENT TECHNIQUES (For AI)</b>	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA12C	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	Higher Secondary Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- To learn the basic concept of operation research theory which are frequently applied to business decision making
- To acquire the knowledge about linear programming problems
- Knowledge about simplex methods.
- To acquire knowledge about Mathematical formulation of transportation problem
- Knowledge about Mathematical formulation of transportation problem

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Development of OR -Definition of OR -Modelling in OR -general methods for solving OR models -Main characteristics and phases of OR study -tools, techniques and methods –scientific methods in OR – scope of OR.	CO1	K1 K2 K3
<b>UNIT-II</b>	Linear programming problems-Mathematical formulation of L.P.P.- slack and surplus variables -graphical solution of L.P.P.	CO2	K1 K2 K3
<b>UNIT-III</b>	Simplex methods- Computational procedure- Artificial variables Technique- two phase method-Duality in linear programming	CO3	K1 K2 K3
<b>UNIT-IV</b>	Mathematical formulation of assignment problem,-Method for solving The assignment problem.	CO4	K1 K2 K3
<b>UNIT-V</b>	Mathematical formulation of transportation problem-optimal solution of T.P.-Methods for obtaining initial feasible solution-optimal solution-Degeneracy in T.P.-Unbalanced T.P	CO5	K1 K2 K3 K4

<p><b>Recommended Text Books</b></p> <p>1. Operations Research-S.D.Sharma-KedarNath Ramnath&amp;Co-1997.Chapter1to6(all sections)</p>
<p><b>Reference Books</b></p> <p>1.OperationsResearchGupta,ManMohan,Gandhiswarup-Sulthand-ChandPublications                  2.Ackoff R.L. and Sasieni M. W," Fundamentals of Operations Research", John Wiley and sons New York 1968                  3.Chames A.CooperW.andHendersenA., "IntroductiontoLinearProgramming", WileyandSons New York                  4.Srinath L.S,"PERT and CPM principles and applications ",Affiliated East West Press Pvt.Ltd. New York.</p>
<p><b>Website and e-learning source</b></p> <p><a href="http://ebooks.iitd.ac.in/011erationsresearch/">http://ebooks.iitd.ac.in/011erationsresearch/</a>  <a href="http://ocw.mit.in/">http://ocw.mit.in/</a></p>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	To develop skills for decision making.	K1,K2,K3
CO2	To make use of Linear programming problems	K1,K2,K3
CO3	To make use of Simplex methods	K1,K2,K3
CO4	To make use of Mathematical formulation of assignment problem	K1,K2,K3
CO5	To utilize Mathematical formulation of transportation problem	K1,K2,K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	-	-	1	2	2	1
CO2	3	3	2	3	3	3	1	-	-	1	2	2	1
CO3	3	2	2	3	2	3	1	-	-	1	2	2	1
CO4	3	3	3	2	2	3	1	-	-	1	2	2	1
CO5	3	2	3	2	3	2	1	-	-	1	2	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>MATHEMATICAL STATISTICS-I</b> (For Data Science)	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA13A	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- Understand basic concepts of Statistical Methods
- Have a basic understanding of measures of location
- Have a basic understanding of measures of dispersion
- Understand about Measures of Skewness
- Understand about correlation

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data- Diagrammatic and Graphical representation of data – Graphical, determination of Quartiles ,Deciles and Percentiles	CO1	K1 K2 K3
UNIT-II	Measures of location: Arithmetic mean, median, mode, geometric mean and Harmonic mean and their properties.	CO2	K1 K2 K3
UNIT-III	Measures of dispersion: Range, Quartile deviation, mean deviation, Standard deviation, combined Standard deviation, and their relative measures	CO3	K1 K2 K3
UNIT-IV	Measures of Skewness: Karl Pearson's, Bowley's, and Kelly's and coefficient of Skewness and kurtosis based on moments.	CO4	K1 K2 K3
UNIT-V	Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods. Regression Analysis: Simple Regression Equations.	CO5	K1 K2 K3 K4

#### Recommended Text Books

5. Fundamental of Mathematical Statistics-S.C.Gupta &V.K.Kapoor-Sultan Chand

**Reference Books**

1. Elements of Statistics -Mode. E.B.-Prentice Hall
2. Statistical Methods-Dr.S.P.Gupta-Sultan Chand & Sons

**Website and e-learning source**

<https://www.simplilearn.com/what-is-statistical-analysis-article>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Know the basics of statistical methods	K1,K2,K3
CO2	Understanding of measures of location	K1,K2,K3
CO3	Understanding of measures of dispersion	K1,K2,K3
CO4	Understand about Measures of skewness	K1,K2,K3
CO5	Understand about correlation, concurrent deviation method	K1,K2,K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	1	1	-	-	1	3	2	1
CO2	2	1	3	1	2	-	1	-	-	1	3	2	1
CO3	3	1	3	1	2	1	1	-	-	1	3	2	1
CO4	3	1	3	2	2	-	1	-	-	1	3	2	1
CO5	3	1	3	2	2	1	1	-	-	1	3	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>NUMERICAL METHODS-I</b> (For Data Science)	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA13B	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- To Solve Practical Technical Problems using various Numerical Method Formulae
- To derive appropriate Numerical Methods to solve Algebraic, Transcendental Equations
- To know the Numerical Methods of Solving Simultaneous Linear Equations
- To Acquire Knowledge about Forward Difference and Backward Differences and their Relationship Knowledge about Central Difference Operators and Problems based on Various Central Difference Formulae

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Curve Fitting- Principle of Least square</b> Fitting of straight line $y = ax + b$ parabolay = $ax^2 + bx + c$ exponential curves of forms $y = ax^b$ , $y = e^{bx}$ , and $y = ab^x$ .	CO1	K1 K2 K3
<b>UNIT-II</b>	<b>The solution of numerical algebraic and transcendental Equations:</b> Bisection method – Iteration Method – Regula Falsi Method – Newton– Raphson method	CO2	K1 K2 K3
<b>UNIT-III</b>	<b>Solution of simultaneous linear algebraic equations:</b> Gauss elimination method – Gauss Jordan method – Method of Triangularization – Gauss Jacobi method – Gauss Seidel method.	CO3	K1 K2 K3
<b>UNIT-IV</b>	<b>Finite differences</b> Operators $\Delta$ , $\nabla$ and E - relation between them — factorial polynomials. <b>Interpolation with equal intervals:</b> Gregory-Newton forward and backward- interpolation formulas.	CO4	K1 K2 K3
<b>UNIT-V</b>	<b>Central differences formulae</b> Operators $\mu$ , $\delta$ and relation with the other operators, Gauss forward and backward formulae, Stirling's formula and Bessel's formula.	CO5	K1 K2 K3

**Recommended Text Books**

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

**Reference Books**

1. B.D. Gupta.(2001) *Numerical Analysis*.Konark Pub. Ltd., Delhi
11. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.
12. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing, Palayamkottai.
13. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi

**Website and e-learning source**

<https://nptel.ac.in/courses/111107105>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Solve the problems of fitting of straight lines, parabolas and the different form of exponential curves	K1,K2,K3
CO2	Solve algebraic equations using various methods like Bisection method, Iteration method, Regula Falsi method and Newton – Raphson method	K1,K2,K3
CO3	Estimate the solution of simultaneous linear equations using different numerical methods	K1,K2,K3
CO4	Define basic concept of operators $\Delta$ , $\nabla$ and E, Solving interpolation with equal intervals problems using Gregory Newton's forward formula and Newton's backward formula	K1,K2,K3
CO5	Estimate the solution of central difference formula using the methods Gauss's forward, backward formula, Stirling's formula and Bessel's formula	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	-	-	1	3	2	1
CO2	3	3	2	3	3	3	1	-	-	1	3	1	1
CO3	3	2	2	3	2	3	1	-	-	1	3	1	1
CO4	3	3	3	2	2	3	1	-	-	1	3	2	1
CO5	3	2	3	2	3	2	1	-	-	1	3	1	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>MATHEMATICS–I (For Chemistry)</b>	<b>Hours/Week</b>	04
<b>Course Code</b>	AUEMA 13	<b>Credits</b>	03
<b>Category</b>	ELECTIVE COURSE -I	<b>Year &amp; Semester</b>	I & I
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the course:

- To discuss and analyze the concept of Binomial series-Exponential series- Logarithmic series.
- To be familiar with Computation of inverse of matrix using Cayley-Hamilton theorem.
- To solve the Newton’s forward and back ward interpolation formulae.
- To solve the Successive differentiation ,nth derivatives ,Leibnitz theorem

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Summation of series:</b> Binomial series-Exponential series-Logarithmic series-Simple Problems.  <b>Chapter2: Sections: 2.1.3, 2.2, 2.2.1, 2.3, 2.3.3.</b>	CO1	K1 K2 K3
<b>UNIT-II</b>	<b>Matrices:</b> Symmetric–Skew-Symmetric–Hermitian–Skew –Hermitian–Orthogonal and Unitary matrices–Cayley- Hamilton theorem (with out proof) – Verification- Computation of inverse of matrix using Cayley-Hamilton theorem. <b>Chapter4: Sections: 4.1.1–4.1.6,4.5.2and4.5.3.</b>	CO2	K1 K2 K3
<b>UNIT-III</b>	<b>Numerical Methods:</b> Newton’s method to find a root approximately. <b>Finite Differences :</b> Interpolation :Operators $\Delta, \nabla, E, E^{-1}$ differencetables.Interpolation formulae:Newton’s forward and back ward interpolation formulae for equal intervals, Lagrange’s interpolation formula.  <b>Chapter3:Sections3.4.1.Chapter5:Sections:5.1and5.2.</b>	CO3	K1 K2 K3
<b>UNIT-IV</b>	<b>Trigonometry:</b> Expansions of $\sin^n\theta, \cos^n\theta$ , in a series of powers of $\sin\theta$ and $\cos\theta$ - Expansions of $\sin(n\theta)$ and $\cos(n\theta)$ in a series sines and cosines of multiples of “ $\theta$ ”-Expansions of $\sin\theta, \cos\theta$ and $\tan\theta$ in a series of powers of “ $\theta$ ”– Hyperbolic and inverse hyperbolic functions  <b>Chapter6:Section6.1–6.3</b>	CO4	K1 K2 K3

<b>UNIT-V</b>	<b>Differential Calculus:</b> Successive differentiation, nth derivatives, Leibnitz theorem (with out proof) and applications, Jacobians, maxima and minima of functions of two variables-Simple problems <b>Chapter1, Section1.1to1.3.1.</b>	CO5	K1 K2 K3
---------------	--	-----	----------------

**Recommended Text Books**

1.Allied Mathematics, Volume I and Volume II by P. Duraipandian and S.Udayabaskaran, S. Chand Publications  
 Volume-I:UnitI–IV, Volume-II–Unit-V

**Reference Books**

- Ancillary Mathematics by S .Narayanan and T.K.Manickavachagom Pillay,S.ViswanathanPinters,1986,Chennai
- Allied Mathematics by A.Singaravel
- Allied Mathematics by P.R.Vittal

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Understand the concepts of Summation of Series.	K1,K2,K3
CO2	Understand the concepts of Cayley Hamilton Theorem and inverse matrices.	K1,K2,K3
CO3	Understand the concepts of finite differences.	K1,K2,K3
CO4	Understand the knowledge about expansions, hyperbolic and inverse hyperbolic functions	K1,K2,K3
CO5	Understand the concept of Leibnitz theorem and functions of two variables	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
<b>CO1</b>	2	3	1	3	1	1	1	-	-	1	2	2	1
<b>CO2</b>	3	2	1	3	1	1	1	-	-	1	2	2	1
<b>CO3</b>	3	2	1	3	1	1	1	-	-	1	2	2	1
<b>CO4</b>	3	3	1	3	1	1	1	-	-	1	2	2	1
<b>CO5</b>	3	2	1	3	1	1	1	-	-	1	2	2	1



## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>ANALYTICAL GEOMETRY (Two &amp; Three Dimensions)</b>	<b>Hours/Week</b>	05
<b>Course Code</b>	<b>AUCMA21</b>	<b>Credits</b>	05
<b>Category</b>	Core - 3	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- To understand and apply the concept of homogeneous equations of second degree to represent straight lines in different forms.
- To derive polar equations for straight lines, circles, and conic sections, and analyze their geometric properties.
- To formulate general equations of planes, calculate angles between two planes, and determine perpendicular distances.
- To calculate the angle between a line and a plane, determine the length of perpendiculars, and analyze coplanar and skew lines.
- To originate equations of spheres, determine lengths of tangents, and analyze sections of spheres.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Pair of Straight lines</b> Introduction – Homogeneous equation of second degree – Angle between the lines – Equation for the bisector of the angle between the lines – Condition for a second degree equation to represent a pair of straight lines. <b>(Chapter 3: Sections 3.1 - 3.5 Pages: 89 - 129).</b>	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	<b>Polar Coordinates</b> Introduction – Definition of polar coordinates – Relation between Cartesian coordinates and Polar coordinates – polar equation of a straight line – circle – Polar equation of a conic. <b>(Chapter 9: Sections: 9.1 – 9.7.1 Pages: 480 - 500).</b>	CO2	K1 K2 K3 K4,K5
<b>UNIT-III</b>	<b>Plane</b> Introduction – General equations of plane – Angle between two planes - Perpendicular distance – Plane passing through: Three given points, Intersection of two given planes – Condition for a second degree equation to represent a pair of planes. <b>(Chapter 12: Sections: 12.1 – 12.12 Pages 585 - 629).</b>	CO3	K1 K2 K3 K4,K5
<b>UNIT-IV</b>	<b>Straight Lines</b> Introduction – Equations of straight Lines – Angle between a line and plane – Length of the perpendicular – Coplanar lines – Skew lines – Intersection of three planes. <b>(Chapter 13: Sections: 13.1 – 13.12 Pages: 630 – 647, 648 - 686).</b>	CO4	K1 K2 K3 K4,K5

<b>UNIT-V</b>	<b>Sphere</b>	CO5	K1
	Equations of sphere – Length of the tangent – Section of a sphere		K2
	– Equation of circle – Intersection of two spheres – Condition for the orthogonality – Radical planes.		K3
	<b>(Chapter 14: Sections: 14.1 – 14.11 Pages: 687 – 695, 699 - 727).</b>		K4
			K5

**Recommended Text Books**

1.P.R.Vittal, Analytical Geometry 2D and 3D, Pearson Publications,Chennai.

**Reference Books**

1. P.Duraipandian and Laxmi Duraipandian, Analytical Geometry Two dimensions, Emerald Publication.
2. Shanti Narayan and P.K.Mittal, Analytical Solid Geometry of 3D, S. Chand Publication
3. Manicavasagam Pillay & Natarajan, Analytical Geometry of Two dimensions, S. Viswanathan (printers & publication) Pvt Ltd.
4. Manicavasagam Pillay & Natarajan, Analytical Geometry of Three dimensions, S. Viswanathan (printers & publication) Pvt Ltd.

**Website and e-learning source**

<https://mathworld.wolfram.com/>  
<http://www.univie.ac.at/future.media/moe/galerie.html/>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Apply the concept of homogeneous equations of second degree to represent straight lines in different forms.	K1,K2,K3,K4
CO2	Derive polar equations for straight lines, circles, and conic sections, and analyze their geometric properties.	K1,K2,K3,K4,K5
CO3	Formulate general equations of planes, calculate angles between two planes, and determine perpendicular distances.	K1,K2,K3,K4,K5
CO4	Calculate the angle between a line and a plane, determine the length of perpendiculars, and analyze coplanar and skew lines.	K1,K2,K3,K4,K5
CO5	Formulate equations of spheres, determine lengths of tangents, and analyze sections of spheres.	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	3	2	2	1	1	-	-	1	3	2	2
<b>CO2</b>	3	2	3	2	2	-	1	-	-	1	3	2	2
<b>CO3</b>	3	2	3	2	2	1	1	-	-	1	3	2	2
<b>CO4</b>	3	2	3	2	2	-	1	-	-	1	3	2	2
<b>CO5</b>	3	2	3	2	2	1	1	-	-	1	3	2	2

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>INTEGRAL CALCULUS</b>	<b>Hours/Week</b>	05
<b>Course Code</b>	<b>AUCMA22</b>	<b>Credits</b>	05
<b>Category</b>	Core - 4	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals.
- Knowledge about Beta and Gamma functions and their applications.
- Skills to Determine Fourier series expansions.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula. <b>Chapter 1 : Sections : 13, 13.1 to 13.10, 14, 15.1</b>	CO1	K1 K2 K3 K4,K5
<b>UNIT-II</b>	Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Change of order of integration. <b>Chapter 5 : Sections : 1, 2.1, 2.2, 3.1</b>	CO2	K1 K2 K3 K4,K5
<b>UNIT-III</b>	Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces–change of variables – Jacobian <b>Chapter 5 : Sections : 4, 5.1 to 5.3,6.1,6.2</b> <b>Chapter 6 : Sections : 1.1,1.2,2.1 to 2.3</b>	CO3	K1 K2 K3 K4,K5
<b>UNIT-IV</b>	Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions - Applications. <b>Chapter 7: Sections 1.1 to 1.4, 2.1, 2.3 , 3 to 6</b>	CO4	K1 K2 K3 K4,K5
<b>UNIT-V</b>	<b>Geometric Applications of Integrations</b> Areas in polar co-ordinate, Trapezoidal Rule, Simpson's Rule, Length of a curve–Cartesian co-ordinate–Polar co-ordinate–Area of surface of revolution. <b>Chapter2:Sections :1.4,2.1,2.2,4,4.1,4.2&amp;5</b>	CO5	K1 K2 K3 K4,K5

**Recommended Text Books**

1. Calculus, Volume II, by S. Narayanan and T.K Manicavachagom Pillay.–S.Viswanathan, Publishers-2016

**Reference Books**

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons,Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
3. D.Chatterjee, Integral Calculus and Differential Equations, Tata- McGraw Hill Publishing Company Ltd.
4. P. Dyke, An Introduction to Laplace Transforms and Fourier Series, Springer Undergraduate Mathematics Series,2001(second edition).

**Website and e-learning source**

<https://nptel.ac.in>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae	K1,K2,K3,K4,K5
CO2	Evaluate double and triple integrals and problems using change of order of integration	K1,K2,K3,K4,K5
CO3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution	K1,K2,K3,K4,K5
CO4	Explain beta and gamma functions and to use them in solving problems of integration	K1,K2,K3,K4,K5
CO5	Explain Geometric and Physical applications of integral calculus	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	-	-	-	1	-	-	1	3	2	2
CO2	2	2	3	-	-	-	1	-	-	1	3	2	2
CO3	3	2	3	2	-	-	1	-	-	1	3	2	2
CO4	3	2	3	2	2	-	1	-	-	1	3	2	2
CO5	3	2	3	2	2	-	1	-	-	1	3	2	2

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>NUMERICAL METHODS –II</b> (For B.Sc., Mathematics, B.Sc., Computer Science and B.Sc., Data Science)	<b>Hours/Week</b>	04
<b>Course Code</b>	<b>AUEMA23B</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- To evaluate derivatives using Newton's forward and backward differences formulae
- To acquire the knowledge about evaluation of numerical integration.
- To evaluate the solution of linear homogeneous difference equations with constant coefficients.
- To obtain numerical solutions to the ordinary differential equations.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Numerical Differentiation:</b> Derivatives using Newton's Forward and Backward Difference Formulae Derivatives using Stirling's Formula- Derivatives using Divided Difference Formula- Maxima and Minima using the above Formulae. <b>(Chapter 7 :Section 7.1 to 7.4 &amp; 7.6)</b>	CO1	K1 K2 K3 K4,K5
<b>UNIT-II</b>	<b>Numerical Integration:</b> Trapezoidal Rule-Simpson's One-Third Rule - Simpson's Three-Eighth Rule- Weddle's Rule. <b>(Chapter 7 :Section 7.9 &amp; 7.13 to 7.15)</b>	CO2	K1 K2 K3 K4,K5
<b>UNIT-III</b>	<b>Difference Equations:</b> Linear Homogenous and Non Homogenous Difference Equation with constant coefficients- particular integrals for $a^x$ , $x^m$ , $\sin kx$ , $\cos kx$ $a^x F(x)$ . <b>(Chapter 8 :Section 8.1 to 8.4 &amp; 8.6)</b>	CO3	K1 K2 K3 K4,K5
<b>UNIT-IV</b>	<b>Numerical solution of Ordinary Differential Equations (I order only):</b> Taylor's series method- Picard's method. <b>(Chapter 9: Section 9.5 ,9.6)</b>	CO4	K1, K2, K3 K4,K5
<b>UNIT-V</b>	<b>Numerical solution of Ordinary Differential Equations (I order only):</b> Euler's Method- Modified Euler's Method-Runge-Kutta Method (Fourth Order only). <b>(Chapter 9 : Section 9.7,9.9 to 9.11)</b>	CO5	K1 K2 K3 K4,K5

**Recommended Text Book:**

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

**Reference Books:**

1. Dr.P.Kandasamy, Dr.K.Thilagavathy Dr.Gunavathi –Numerical Methods, S. Chand Publications(2023)
2. B.D. Gupta.(2001) *Numerical Analysis*.Konark Pub. Ltd., Delhi
3. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National PublishinCompany, Chennai.
4. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing,Palayamkottai.
5. H.C. Saxena. (1991) *Finite differences and Numerical analysis*S.Chand& Co., Delhi

**Website and e-learning source**

- <https://ocw.mit.edu/courses/22-15-essential-numerical-methods-fall-2014/pages/syllabus/>  
<https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Evaluate derivatives by applying Newton’s forward and backward differences formulae.	K1,K2,K3,K4,K5
CO2	Evaluate integrations by applying the trapezoidal rule, Simpson’s rules, and Weddle’s rule.	K1,K2,K3,K4,K5
CO3	Find a complete solution to lineardifference equations.	K1,K2,K3,K4,K5
CO4	Estimate approximate numerical solutions of ordinary differential equations by Euler, Picard and Taylor.	K1,K2,K3,K4,K5
CO5	Estimate approximate numerical solutions of ordinary differential equations by Runge-Kutta methods.	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	1	1	-	-	1	3	2	1
CO2	2	1	3	1	2	-	1	-	-	1	3	2	1
CO3	3	1	3	1	2	1	1	-	-	1	3	2	1
CO4	3	1	3	2	2	-	1	-	-	1	3	2	1
CO5	3	1	3	2	2	1	1	-	-	1	3	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>OFFICE AUTOMATION</b>	<b>Hours/Week</b>	02
<b>Course Code</b>	<b>AUSMA24</b>	<b>Credits</b>	02
<b>Category</b>	Skill Enhancement Course	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point. Applying the concept of time and distance.
- The course is highly practice oriented rather than regular class room teaching.
- To acquire knowledge on editor, spread sheet and presentation software.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Introductory concepts: Hardware and Software - Memory unit – CPU- Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems.	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	Word Processing: File menu operations - Editing text – tools, formatting, bullets and numbering - Document formatting – Paragraph alignment, headers and footers, printing – Preview, options, merge.	CO2	K1 K2 K3 K4
<b>UNIT-III</b>	Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying	CO3	K1 K2 K3 K4
<b>UNIT-IV</b>	Charts – creating, formatting and printing, analysis tables, preparation of financial statements.	CO4	K1 K2 K3 K4
<b>UNIT-V</b>	Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects.	CO5	K1 K2 K3 K4,K6

**Recommended Text Book:**

1. Peter Norton, “Introduction to Computers” –Tata McGraw-Hill.

**Reference Books:**

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw- Hill

**Website and e-learning source**

Web content from NDL / SWAYAM or open source web resources

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Understand the basics of computer systems and its components.	K1,K2,K3,K4
CO2	Understand and apply the basic concepts of a word processing package	K1,K2,K3,K4
CO3	Understand and apply the basic concepts of electronic spreadsheet software	K1,K2,K3,K4
CO4	Understand and apply the basic concepts of database management system	K1,K2,K3,K4
CO5	Understand and create a presentation using PowerPoint tool	K1,K2,K3,K4,K6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	1	-	-	1	-	-	1	3	2	1
CO2	3	1	3	1	-	-	1	-	-	1	3	2	1
CO3	3	1	3	1	-	-	1	-	-	1	3	2	1
CO4	3	1	3	1	-	-	1	-	-	1	3	2	1
CO5	3	1	3	1	-	-	1	-	-	1	3	2	1



## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>MATHEMATICS FOR COMPETITIVE EXAMINATIONS-II</b>	<b>Hours/Week</b>	02
<b>Course Code</b>	<b>AUSMA25</b>	<b>Credits</b>	02
<b>Category</b>	Skill Enhancement Course	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- After taking the course, to prepare the students for competitive examinations.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Time and work – Time and distance – Problems on Trains. <b>(Book-1: Chapters-15,17,18)</b>	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	Simple interest, Compound Interest–Bar graphs. <b>(Book-1: Chapters-21, 22, 37)</b>	CO2	K1 K2 K3 K4
<b>UNIT-III</b>	Logical Sequence of Words–Arithmetical Reasoning– Inserting the Missing Character. <b>(Book-2, Section: 1, Chapters 13–15)</b>	CO3	K1 K2 K3 K4
<b>UNIT-IV</b>	Data Sufficiency–Decision Making– Verification of Truth of the Statement. <b>(Book-2, Section: 1, Chapters-16, 17, 20)</b>	CO4	K1 K2 K3 K4, K5
<b>UNIT-V</b>	Non-Verbal Reasoning–Analytical Reasoning– Grouping of Identical Figures. <b>(Book-2, Section: 3, Chapter-3,4,13)</b>	CO5	K1 K2 K3 K4, K5

**Recommended Text Books:**

1. R.S.Aggarwal, *Quantitative Aptitude for Competitive Examinations*, Revised Edition, S.Chand and Company Ltd., Ram Nagar, NewDelhi, Reprint 2022.
- 2.R.S.Agarwal, *A Modern Approach To Verbal And Nonverbal Reasoning*, S..Chand, 2018.

**Reference Books:**

- 1.V.V.K.Subbiraj, *Test of Reasoning–Verbal/Non-Verbal & General Intelligence for Competitive Examinations*, Sura Books,2007

**Website and e-learning source:**

- [www.tcyonline.com/tests/mathematics-competitive-exam](http://www.tcyonline.com/tests/mathematics-competitive-exam)  
<http://www.indiabix.com/online-test/non-verbal-reasoning-test>  
<http://books.tamilcube.com/career/aptitude-test/non-verbal-reasoning/non-verbal-reasoning-questions-001.aspx>  
<http://www.kent.ac.uk/careers/tests/spatialtest.htm>  
<http://www.careerbliss.com/aptitude/qa/home.php>  
[http://www.careerride.com/online- aptitude-test.aspx](http://www.careerride.com/online-aptitude-test.aspx)

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Make critique of quantitative information using Proportional reasoning	K1,K2,K3,K4
CO2	Interpret and compare weighted averages, indices, ranking.	K1,K2,K3,K4
CO3	Identify uses and misuses of percentages related to a proper Understanding of the bases.	K1,K2,K3,K4
CO4	Examining and estimating percentages a s ratesper100	K1,K2,K3,K4,K5
CO5	Solve for an unknown quantity in proportional situation	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	1	-	-	1	3	2	1
CO2	2	1	3	1	-	-	1	-	-	1	3	2	1
CO3	3	1	3	1	-	-	1	-	-	1	3	2	1
CO4	3	1	3	-	-	-	1	-	-	1	3	2	1
CO5	3	1	3	-	-	-	1	-	-	1	3	2	1

### COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>DISCRETE MATHEMATICS-II</b> (For B.Sc., Computer Science)	<b>Hours/Week</b>	04
<b>Course Code</b>	<b>AUEMA23C</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

**Objectives of the Course:**

- This course aims to develop mathematical maturity and ability to deal with abstraction.
- To develop construction and verification of Formal logical manipulation.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>RECURRENCE RELATIONS AND GENERATING FUNCTIONS</b> Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite Order Homogeneous [linear] Relations - Solutions of Non-homogeneous Relations. (Chapter -V. Sections:1 to 5 )	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	<b>MATHEMATICAL LOGIC</b> TF Statements - Connectives - Atomic and Compound Statements - Well-formed [Statement Formulae]- Truth Table of a Formula- Tautology-Tautological Implications and Equivalence of Formulae. (Chapter -IX . Sections:1 to 8 )	CO2	K1 K2 K3 K4
<b>UNIT-III</b>	<b>MATHEMATICAL LOGIC [CONTD..]</b> Replacement process - Functionally complete sets of connectives and Duality law – Normal Forms-Principal Normal Forms. (Chapter -IX . Sections:9 to 12 )	CO3	K1 K2 K3 K4
<b>UNIT-IV</b>	<b>LATTICES</b> Lattices [omit example 15 PpNo.10.6]- Some properties of Lattices - New Lattices (omit remark Pp 10.14)-Modular and Distributive Lattices (omit theorem 10 and 17,Example 4-Pp10.23, Example 11-Pp10.24) (Chapter - X . Sections:1 to 4 )	CO4	K1 K2 K3 K4
<b>UNIT-V</b>	<b>BOOLEAN ALGEBRA</b> Boolean Algebra (omit theorem 25) - Boolean Polynomials- Karnaugh Maps (omit K- map for 5 and 6 variables) (Chapter - X . Sections:5 to 7)	CO5	K1 K2 K3 K4,K5

**Recommended Text Book:**

1. M.K.Venkataraman, N.Sridharan and N.Chandrasekaran, [2003] Discrete Mathematics, The National Publishing company, chennai

**Reference Books:**

1. Oscar Levin, Discrete Mathematics, 3rd Edition,2016.
2. B. A. Davey & H. A. Priestley (2002). *Introduction to Lattices and Order* (2<sup>nd</sup>edition). Cambridge University Press.
3. Edgar G. Goodaire& Michael M. Parmenter (2018). *Discrete Mathematics with Graph Theory* (3rd edition). Pearson Education.
4. Rudolf Lidl& Günter Pilz (1998). *Applied Abstract Algebra* (2nd edition). Springer.
5. Kenneth H. Rosen (2012). *Discrete Mathematics and its Applications: WithCombinatorics and Graph Theory* (7th edition). McGraw-Hill.
- 6.C. L. Liu (1985). *Elements of Discrete Mathematics* (2nd edition).McGraw-Hill.

**Website and e-learning source**

<https://nptel.ac.in>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Analyze and perceive various graph theoretic concepts and familiarize with their applications.	K1,K2,K3,K4
CO2	Describe about partially ordered sets, Boolean algebra, lattices and their types.	K1,K2,K3,K4
CO3	Apply Karnaugh map for simplifying the Boolean expression	K1,K2,K3,K4
CO4	Demonstrate the skill to construct simple mathematical proofs and to validate.	K1,K2,K3,K4
CO5	Achieve greater accuracy, clarity of thought and language.	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	1	1	-	-	1	1	1	1
CO2	2	2	3	3	2	-	1	-	-	1	1	1	1
CO3	3	3	3	3	2	1	1	-	-	1	1	2	1
CO4	3	2	3	3	2	-	1	-	-	1	1	2	1
CO5	3	2	3	3	2	1	1	-	-	1	1	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>STATISTICAL METHODS AND ITS APPLICATIONS-II</b> (For BCA)	<b>Hours/Week</b>	04
<b>Course Code</b>	<b>AUEMA22A</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- To increase the span of attention of concepts
- . To link concepts related to one unit with other units
- Give clarity on the intended learning outcomes of the unit.
- To acquire knowledge about Test of Significance-and Analysis of variance.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Probability</b> Sample Space-events-probability-Addition and Multiplication Theorem-conditional probability - Baye's Theorem and simple problems	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	<b>Probability Distribution</b> Binomial, Poisson, Normal distribution and fitting distribution	CO2	K1 K2 K3 K4
<b>UNIT-III</b>	<b>Index Number</b> Weighted and UN weighted Index Numbers – Cost of Living Index Number – Average of Relative Price Indices-Quality Index Number-Teston index Numbers- Time reversal test, Factors reversal test.	CO3	K1 K2 K3 K4
<b>UNIT-IV</b>	<b>Test of Significance (Small Samples Tests)</b> Small sample tests with regard to Mean, Difference between Means and Paired _t- test , F-test - Definition of Chi-square test – Assumptions – Characteristics– Chi-square tests for Goodness of fit and Independence of attributes – Simple Problems.	CO4	K1 K2 K3 K4
<b>UNIT-V</b>	Analysis of variance –One and Two way classifications-Basic principle of design of Experiments Randomization, L.S.D.	CO5	K1 K2 K3 K4

**Recommended Text Book:**

1. Fundamental of Mathematical Statistics-S.C. Gupta&V.K. Kapoor-SultanChand

**Reference Books:**

1. Fundamental of Applied Statistics-S.C.Gupta& V.K.Kapoor–Sultan Chand
2. Statistical Methods-Snedeco rG.W.& Cochran W.G. oxford &+DII

**Website and e-learning source**

<https://nptel.ac.in/courses/111107105>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Increase the span of attention of concepts	K1,K2,K3,K4
CO2	Understand Probability Distribution	K1,K2,K3,K4
CO3	Understand about Index Number	K1,K2,K3,K4
CO4	Acquire knowledge about Test of Significance.	K1,K2,K3,K4
CO5	Knowledge about Analysis of variance.	K1,K2,K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	1	1	-	-	1	2	1	3
CO2	2	1	3	1	2	-	1	-	-	1	2	1	2
CO3	3	1	3	1	2	1	1	-	-	1	2	1	3
CO4	3	1	3	2	2	-	1	-	-	1	2	1	2
CO5	3	1	3	2	2	1	1	-	-	1	2	1	2

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>RESOURCE MANAGEMENT TECHNIQUES</b> (For BCA)	<b>Hours/Week</b>	04
<b>Course Code</b>	<b>AUEMA22C</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- To learn the basic concept of operation research theory which are frequently applied to business decision making
- To acquire the knowledge about linear programming problems
- Knowledge about simplex methods.
- To acquire knowledge about Mathematical formulation of transportation problem.
- Knowledge about Mathematical formulation of transportation problem

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Introduction to Operation Research - Scope - LPP - Graphical Method -Simplex Method of solving Linear Programming Problems (Simple problems only)	CO1	K1 K2 K3 K4,K5
<b>UNIT-II</b>	Transportation Model - Basic Feasible Solution –Northwest corner- leastcost method – VAM- balanced & unbalanced TP.	CO2	K1 K2 K3 K4,K5
<b>UNIT-III</b>	Assignment Model and Assignment Algorithm –Unbalanced Maximization & minimization - Restricted Assignment problems.	CO3	K1 K2 K3 K4,K5
<b>UNIT-IV</b>	Project Management - Network Analysis – CPM - Network Construction- Critical Path and Duration - PERT - Time Estimates for PERT –projectlength - distinction Between PERT and CPM.	CO4	K1 K2 K3 K4,K5

<b>UNIT-V</b>	Game Theory - Meaning - Rules of Game - Saddle Point - Pure strategies- value of the game – Dominance Property - Different Methods of Solving Game Theory problems (No LPP Method).	CO5	K1
			K2
			K3
			K4,K5

**Recommended Text Book:**

1. P.R. Vittal & V. Malini Operation Research, Margham publications, Chennai 2018.
2. V.K Kapoor, Operation Research Techniques for Management, Sultan Chand & sons, New Delhi 2017.

**Reference Books:**

1. M.Sathya Narayana & Lalitha Raman, Operations Research, Himalaya publishing house, Mumbai, 2001
2. Dr.P.K Gupta & DR. Manmohan, problems in Operations Research, Sultan Chand & sons New Delhi 2018.

**Website and e-learning source**

<http://ebooks.iitlud.ac.in/01/operationsresearch/>

<https://www.onlinemathlearning.com/linear-programming-example>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Apply quantitative techniques to formulate business problems into linear programming problems for optimization of results.	K1,K2,K3,K4,K5
CO2	Utilize transportation model to maximize profit and minimize cost in business	K1,K2,K3,K4,K5
CO3	Utilize Assignment model to maximize profit and minimize cost in business	K1,K2,K3,K4,K5
CO4	Use CPM and PERT to plan, schedule and control project activities.	K1,K2,K3,K4,K5
CO5	Propose the best strategy and predict how firms behave in a specific strategic situation	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	3	3	3	3	1	-	-	1	2	2	1
<b>CO2</b>	2	3	2	3	3	3	1	-	-	1	2	2	1
<b>CO3</b>	3	2	2	3	2	3	1	-	-	1	2	2	1
<b>CO4</b>	3	3	3	2	2	3	1	-	-	1	2	2	1
<b>CO5</b>	3	2	3	2	3	2	1	-	-	1	2	2	1



## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>NUMERICAL METHODS</b> (For B.Sc., Artificial Intelligence)	<b>Hours/Week</b>	04
<b>Course Code</b>	<b>AUEMA22B</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- To Solve Practical Technical Problems using various Numerical Method Formulae
- To derive appropriate Numerical Methods to solve Algebraic, Transcendental Equation. To link concepts related to one unit with other units
- To know the Numerical Methods of Solving Simultaneous Linear Equations
- To Acquire Knowledge about Forward Difference and Backward Differences and their Relationship Knowledge about Central Difference Operators and Problems based on Various Central Difference Formula.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Curve Fitting- Principle of Least square:</b> Fitting of straight line $y = ax + b$ parabola $y = ax^2 + bx + c$ exponential curves of forms $y = ax^b$ , $y = e^{bx}$ , and $y = ab^x$ .	CO1	K1 K2 K3 K4,K5
<b>UNIT-II</b>	<b>The solution of numerical algebraic and transcendental Equations:</b> Bisection method – Iteration Method – Regula Falsi Method – Newton–Raphson method.	CO2	K1 K2 K3 K4,K5
<b>UNIT-III</b>	<b>Solution of simultaneous linear algebraic equations:</b> Gauss elimination method – Gauss Jordan method – Method of Triangularization – Gauss Jacobi method – Gauss Seidel method.	CO3	K1 K2 K3 K4,K5
<b>UNIT-IV</b>	<b>Finite differences:</b> Operators $\Delta$ , $\nabla$ and $E$ - relation between them — factorial polynomials. <b>Interpolation with equal intervals:</b> Gregory-Newton forward and backward- interpolation formulas.	CO4	K1 K2 K3 K4,K5
<b>UNIT-V</b>	<b>Central differences formulae</b> Operators $\mu$ , $\delta$ and relation with the other operators, Gauss forward and backward formulae, Stirling's formula and Bessel's formula.	CO5	K1 K2 K3 K4,K5

**Recommended Text Book:**

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

**Reference Books:**

1. Dr.P.Kandasamy, Dr.K.Thilagavathy Dr.Gunavathi – Numerical Methods, S. Chand publications(2023)
2. B.D. Gupta. (2001) Numerical Analysis. Konark Pub. Ltd., Delhi
3. M.K. Venkataraman. (1992) Numerical methods for Science and Engineering National Publishing Company, Chennai.
4. S. Arumugam. (2003) Numerical Methods, New Gamma Publishing ,Palayamkottai.
5. H.C. Saxena. (1991) Finite differences and Numerical analysis S.Chand & Co., Delhi Website and e-learning source

**Website and e-learning source**

<https://nptel.ac.in/courses/111107105>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Solve the problems of fitting of straight lines, parabolas and the different form of exponential curves.	K1,K2,K3,K4,K5
CO2	Solve algebraic equations using various methods like Bisection method, Iteration method, Regula Falsi method and Newton – Raphson method.	K1,K2,K3,K4,K5
CO3	Estimate the solution of simultaneous linear equations using different numerical methods.	K1,K2,K3,K4,K5
CO4	Define basic concept of operators $\Delta$ , $\nabla$ and E, Solving interpolation with equal intervals problems using Gregory Newton’s forward formula and Newton’s backward formula.	K1,K2,K3,K4,K5
CO5	Estimate the solution of central difference formula using the methods Gauss’s forward, backward formula, Stirling’s formula and Bessel’s formula.	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	1	-	-	1	3	2	1
CO2	3	3	2	3	3	3	1	-	-	1	3	1	1
CO3	3	2	2	3	2	3	1	-	-	1	3	1	1
CO4	3	3	3	2	2	3	1	-	-	1	3	2	1
CO5	3	2	3	2	3	2	1	-	-	1	3	1	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>DISCRETE MATHEMATICS</b> (For B.Sc., Artificial Intelligence)	<b>Hours/Week</b>	04
<b>Course Code</b>	<b>AUEMA22D</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- This course aims to develop mathematical maturity and ability to deal with abstraction.
- To develop construction and verification of Formal logical manipulation.

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>RECURRENCE RELATIONS AND GENERATING FUNCTIONS</b> Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite Order Homogeneous [linear] Relations - Solutions of Non-homogeneous Relations. (Chapter -V. Sections:1 to 5)	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	<b>MATHEMATICAL LOGIC</b> TF Statements - Connectives - Atomic and Compound Statements - Well-formed [Statement Formulae]- Truth Table of a Formula-Tautology-Tautological Implications and Equivalence of Formulae. (Chapter -IX . Sections:1 to 8)	CO2	K1 K2 K3 K4,K5
<b>UNIT-III</b>	<b>MATHEMATICAL LOGIC [CONTD..]</b> Replacement process - Functionally complete sets of connectives and Duality law – Normal Forms-Principal Normal Forms. (Chapter -IX . Sections:9 to 12)	CO3	K1 K2 K3 K4
<b>UNIT-IV</b>	<b>LATTICES</b> Lattices [omit example 15 PpNo.10.6]- Some properties of Lattices - New Lattices (omit remark Pp 10.14)-Modular and Distributive Lattices (omit theorem 10 and 17,Example 4-Pp10.23, Example 11-Pp10.24) (Chapter - X . Sections:1 to 4)	CO4	K1 K2 K3 K4,K5
<b>UNIT-V</b>	<b>BOOLEAN ALGEBRA</b> Boolean Algebra (omit theorem 25) - Boolean Polynomials-Karnaugh Maps (omit K- map for 5 and 6 variables) (Chapter - X . Sections:5 to 7)	CO5	K1 K2 K3 K4,K5

**Recommended Text Book:**

1. M.K.Venkataraman, N.Sridharan and N.Chandrasekaran, [2003] Discrete Mathematics, The National Publishing company, chennai

**Reference Books:**

1. Oscar Levin, Discrete Mathematics, 3rd Edition,2016.
2. B. A. Davey & H. A. Priestley (2002). *Introduction to Lattices and Order* (2<sup>nd</sup>edition). Cambridge University Press.
3. Edgar G. Goodaire& Michael M. Parmenter (2018). *Discrete Mathematics with Graph Theory* (3rd edition). Pearson Education.
4. Rudolf Lidl& Günter Pilz (1998). *Applied Abstract Algebra* (2nd edition). Springer.
5. Kenneth H. Rosen (2012). *Discrete Mathematics and its Applications: WithCombinatorics and Graph Theory* (7th edition). McGraw-Hill.
- 6.C. L. Liu (1985). *Elements of Discrete Mathematics* (2nd edition).McGraw-Hill.

**Website and e-learning source**

<https://nptel.ac.in>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Analyze and perceive various graph theoretic concepts and familiarize with their applications.	K1,K2,K3,K4
CO2	Describe about partially ordered sets, Boolean algebra, lattices and their types.	K1,K2,K3,K4,K5
CO3	Apply Karnaugh map for simplifying the Boolean expression	K1,K2,K3,K4
CO4	Demonstrate the skill to construct simple mathematical proofs and to validate.	K1,K2,K3,K4,K5
CO5	Achieve greater accuracy, clarity of thought and language.	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	1	1	-	-	1	1	1	1
CO2	2	2	3	3	2	-	1	-	-	1	1	1	1
CO3	3	3	3	3	2	1	1	-	-	1	1	2	1
CO4	3	2	3	3	2	-	1	-	-	1	1	2	1
CO5	3	2	3	3	2	1	1	-	-	1	1	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>MATHEMATICAL STATISTICS-II</b> (For B.Sc., Data Science)	<b>Hours/Week</b>	04
<b>Course Code</b>	<b>AUEMA23A</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

### Objectives of the Course:

- To test the significance of sampling
- Finding the Goodness of Fit
- To derive the various measures of t and F distributions
- To Analyze the correlation coefficient and Regression lines

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	Introduction-Types of Sampling-Parameter and Statistic- Tests of significance-Procedure for testing of hypothesis - Test of significance for large samples - Sampling of attributes-Sampling of variables. <b>(Chapter -14)</b>	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	Introduction - Student's t - distribution - Applications of t-distribution. <b>(Chapter -16 Section-16.1 to 16.3.3)</b>	CO2	K1 K2 K3 K4,K5
<b>UNIT-III</b>	F-distribution- Applications of F-distribution. <b>(Chapter -16 Section-16.5 to 16.6.5)</b>	CO3	K1 K2 K3 K4,K5
<b>UNIT-IV</b>	Meaning of Correlation –Scatter Diagram – Karl Pearsons's Coefficient of Correlation – Rank Correlation. <b>(Chapter -10 Section-10.1 to 10.4,10.7.1)</b>	CO4	K1 K2 K3 K4
<b>UNIT-V</b>	Introduction - Linear regression. <b>(Chapter -11` Section-11.1 to 11.2.5)</b>	CO5	K1 K2 K3 K4

**Recommended Text Book:**

1 S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Co, New Delhi, Reprint 2019.

**Reference Books:**

1. Vittal, P.R. (2004). *Mathematical statistics*. Margham Publications.
2. Kapur, J. N & Saxena, H. C. (2010). *Mathematical statistics* (20<sup>th</sup>ed.). S. Chand & Company Ltd..

**Website and e-learning source**

<https://nptel.ac.in>

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Recognize the parameters and statistics to test the significance of sampling	K1,K2,K3,K4
CO2	Finding the Goodness of Fit	K1,K2,K3,K4,K5
CO3	Derive the various measures of Chi-square, t and F distributions	K1,K2,K3,K4,K5
CO4	Correlation coefficients between Observed and Estimated values	K1,K2,K3,K4
CO5	Analyze the Regression lines	K1,K2,K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	1	1	-	-	1	3	2	1
CO2	2	1	3	1	2	-	1	-	-	1	3	2	1
CO3	3	1	3	1	2	1	1	-	-	1	3	2	1
CO4	3	1	3	2	2	-	1	-	-	1	3	2	1
CO5	3	1	3	2	2	1	1	-	-	1	3	2	1

## COURSE DESCRIPTORS

<b>Title of the Course</b>	<b>MATHEMATICS-II</b> (For B.Sc., Chemistry)	<b>Hours/Week</b>	05
<b>Course Code</b>	<b>AUEMA23</b>	<b>Credits</b>	03
<b>Category</b>	Elective Course -II	<b>Year &amp; Semester</b>	I & II
<b>Prerequisites</b>	12 <sup>th</sup> Standard Mathematics	<b>Regulation</b>	2024

**Objectives of the Course:**

- To discuss and analyze the concept of gradient, divergence and curl and its properties.
- To be familiar with Green's, Gauss and Stoke's theorem in vector integrals.
- To find the solution of first order linear partial differential equations.
- To solve the ordinary differential equations by using Laplace and Inverse Laplace Transform

UNITS	Contents	COs	Cognitive Levels
<b>UNIT-I</b>	<b>Differentiation of Vectors</b> Differentiation of vectors – Differential operators – Solenoidal – Irrotational – Directional derivative – Gradient – Divergence and curl – Formula involving operator . (Chapter 8: Pages: 329 - 363)	CO1	K1 K2 K3 K4
<b>UNIT-II</b>	<b>Integration of Vectors</b> Line integrals – Surface integrals – Volume integrals – Statements of Gauss divergence, Green's, Stoke's theorems and its applications – verifications. (Chapter 8: Pages: 364 - 390, 395 - 418 excluding Green's theorem in space- problems)	CO2	K1 K2 K3 K4
<b>UNIT-III</b>	<b>Partial Differential Equations</b> Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of first order equations: $f(p, q) = 0$ , $f(x, p) = g(y, q)$ , $f(x, p, q) = 0$ , $f(y, p, q) = 0$ , $f(z, p, q) = 0$ : $z = px + qy + f(p, q)$ (Chapter 6: Pages: 252 - 269)	CO3	K1 K2 K3 K4, K5
<b>UNIT-IV</b>	<b>Laplace Transforms</b> Definition – Laplace transforms of $e^{at}$ , $\cos at$ , $\sin at$ , $\cosh at$ , $\sinh at$ , $t^n e^{at}f(t)$ , $t^n f(t)$ , $f'(t)$ , $f''(t)$ . (Chapter 7: Pages: 289 - 298)	CO4	K1 K2 K3 K4, K5

<b>UNIT-V</b>	<p><b>Inverse Laplace transforms</b> Solving differential equations of second order with constant coefficients using Laplace transform. <b>(Chapter 7: Pages: 299 - 317 excluding simultaneous equations -problems)</b></p>	CO5	K1, K2, K3, K4, K5
---------------	---	-----	-----------------------

**Recommended Text Book:**  
1 .S. Narayanan, P. Kandhasamy, R. Hanumantha Rao and T.K. Manickavasagam Pillai, Ancillary Mathematics, Volume II, S.Viswanathan Printers, Chennai 2010.

**Reference Books:**

1. P. Balasubramaniam, K. G. Subramanian, Ancillary Mathematics, Volume – I, Tata McGraw – Hill publishing company limited, New Delhi, 1996.
2. P. DuraiPandian, S. UdayaBaskaran, Allied Mathematics, Volume – I, Muhil publishers, 1<sup>st</sup> Edition, Chennai, 1997.
3. P. Kandsamy and K. Thilagavathy, Allied Mathematics volume – I, Volume – II, S. Chand & Company, New Delhi, 2004.
4. Shanti Narayan, P.K. Mittal, Differential Calculus, S. Chand & Co, New Delhi, 2005.
5. A. Singaravelu, Allied Mathematics, Meenakshi Agency, Chennai, 2001.
6. P.R.Vittal, Allied Mathematics, Margham Publications, Chennai, 1999.

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Discuss and analyze the concept of gradient, divergence and curl and its properties.	K1,K2,K3,K4
CO2	Recognize the importance of Green’s, Gauss and Stoke’s theorem in vector integrals.	K1,K2,K3,K4
CO3	Find solution of first order linear partial differential equations using Lagrange’s method.	K1,K2,K3,K4,K5
CO4	Solve the ordinary differential equations by using Laplace Transform.	K1,K2,K3,K4,K5
CO5	Develop Fourier series of the periodic functions.	K1,K2,K3,K4,K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	1	3	1	1	1	-	-	1	2	2	1
<b>CO2</b>	3	2	1	3	1	1	1	-	-	1	2	2	1
<b>CO3</b>	3	2	1	3	1	1	1	-	-	1	2	2	1
<b>CO4</b>	3	3	1	3	1	1	1	-	-	1	2	2	1
<b>CO5</b>	3	2	1	3	1	1	1	-	-	1	2	2	1