BACHELOR OF SCIENCE (MATHEMATICS)

VISION

To be a global centre of excellence in Mathematics for the growth of Science and Technology.

MISSION

- To provide quality education and research in Mathematics through updated curriculum and effective teaching learning process.
- To inculcate innovative skills, team work and ethical practices among students so as to meet societal expectations.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1: To provide a degree course, suitable for students of high ability by combining and relating Mathematics, Statistics and the Social Sciences.

PEO 2: To prepare students for further study or for professional and managerial careers, particularly in areas requiring the applications of quantitative skills.

PEO 3: To develop their positive attitude, skills which will enable them to become a multi facet personality shining in any chosen field.

PROGRAMME OUTCOMES (PO)

After completion of the programme, the graduates will be able to

PO 1: Think in a critical manner and recognize when there is a need for information and use that information for solving problems effectively.

PO 2: Formulate and develop Mathematical arguments in a logical manner.

PO 3: Attain good knowledge and understanding in advanced areas of Mathematics and Statistics, chosen by the students from the given courses and acquires the ability to think independently paving way for life long learning.

PO 4: Understand and formulate and use quantitative models arising in social science, business and other contexts.

PO 5: Apply the concepts to design a Mathematical model and to solve the real life problems involving the concepts studied in Applied Mathematics.

PROGRAMME SPECIFIC OUTCOMES (PSO)

After completion of the programme, the graduates will be able to

PSO 1: Acquire the knowledge and sound understanding on fundamentals of mathematical concepts including quantity, structure, space and change.

PSO 2: Analyze the basic concepts of advanced Mathematics.

PSO 3: Comprehend a range of general skills, to solve problems, to evaluate information using computers to develop software programming and to communicate with society effectively and learn independently.

PSO 4: Possess the effective skills to analyze problems in diverse fields such as Science and Engineering, Education, Banking, Public services, Business etc.

PSO 5: Develop the Analytical, Numerical and Mathematical skills to create Mathematical Models and improve the problem solving skills to find the solution to the real life problems.

REGULATIONS

ELIGIBILITY

Candidates seeking the admission to the first year of the Bachelor of Science (Mathematics) full-time degree programme shall be required to possess a Bachelor's Degree of any Recognized University.

DURATION OF THE COURSE

The programme shall extend a three academic years consisting of six semesters. Each academic year will be divided into two semesters.

MAXIMUM DURATION FOR THE COMPLETION OF THE PROGRAMME

The maximum duration for completion of the UG Programme shall not exceed 12 semesters.

B.Sc., Mathematics (Students admitted from 2018 – 2019 Onwards)

SCHEME OF EXAMINATION

Subject Code	Subject	Hours of Instruction	Exam Duration	Max. Marks			Credit Points
				CA	CE	Total	
First Semester							
Part I							
18UTALA101/ 18UHILA101/ 18UFRLA101	Tamil I/ Hindi I/ French I	5	3	25	75	100	3
Part II							
18UENLA101	Foundation English - I	5	3	25	75	100	3
Part III							
18UMAM101	Core I : Classical Algebra	6	3	25	75	100	4
18UMAM102	Core II : Differential Calculus	5	3	25	75	100	4
18UPHMAA101	Allied I : Physics I	4	3	25	75	100	2
18UPHMAAP101	Allied Practical I : Physics I	3	3	40	60	100	2
Part IV							
18UVE101	Value Education I : Yoga	2	3	25	75	100	2
Total		**30**				**700**	**20**
Second Semester							
Part I							
18UTALA201/ 18UHILA201/ 18UFRLA201	Tamil II/ Hindi II/ French II	5	3	25	75	100	3
Part II							
18UENLA201	Foundation English - II	5	3	25	75	100	3
Part III							
18UMAM201	Core III: Integral Calculus	6	3	25	75	100	4
18UMAM202	Core IV: Differential Equations and Laplace Transforms	5	3	25	75	100	4
18UPHMAA201	Allied II: Physics II	4	3	25	75	100	2
18UPHMAAP201	Allied Practical II: Physics II	3	3	40	60	100	2
Part IV							
18UVE201	Value Education II : Environmental Studies	2	3	25	75	100	2
Total		**30**				**700**	**20**

Third Semester							
Part I							
18UTALA301/ 18UHILA301 / 18UFRLA301	Tamil III/ Hindi III/ French III	5	3	25	75	100	3
Part II							
18UENLA301	Foundation English- III	5	3	25	75	100	3
Part III							
18UMAM301	Core V: Analytical Geometry of 2D and 3D	5	3	25	75	100	4
18UMAM302	Core VI: Statics and Dynamics	5	3	25	75	100	4
18UMAA301	Allied III : Mathematical Statistics I	3	3	25	75	100	2
18UMAAP301	Allied Practical III: Statistical Package (Ms-Excel)	2	3	40	60	100	2
Part IV							
18UMASB301	SBC I: Quantitative Aptitude – 100% Internal Evaluation	2	3	100	-	100	2
18UMANM301	NMEC I	2	3	25	75	100	2
Non Credit							
18ULS301	Career Competency Skills I	1	-	-	-	-	-
	Add-on Course *	-	-	-	-	-	-
Total		**30**				**800**	**22**
Fourth Semester							
Part I							
18UTALA401/ 18UHILA401 / 18UFRLA401	Tamil IV/ Hindi IV/ French IV	5	3	25	75	100	3
Part II							
18UENLA401	Foundation English -IV	5	3	25	75	100	3
Part III							
18UMAM401	Core VII: Applications of integration and Vector Calculus	5	3	25	75	100	4
18UMAM402	Core VIII: Sequences and Series	5	3	25	75	100	4
18UMAA401	Allied IV: Mathematical Statistics II	3	3	25	75	100	2
18UMAAP401	Allied Practical IV: Statistical Software (SPSS)	2	3	40	60	100	2
Part IV							
18UMASB401	SBC II : Statistics for Competitive Exams – 100% Internal Evaluation	2	3	100	-	100	2
18UMANM401	NMEC II	2	3	25	75	100	2
Non Credit							
18ULS401	Career Competency Skills II	1	-	-	-	-	-
	Add-on Course *	-	-	-	-	-	-
Total		**30**				**800**	**22**

Fifth Semester							
Part III							
18UMAM501	Core IX: Abstract Algebra	6	3	25	75	100	5
18UMAM502	Core X: Real Analysis I	6	3	25	75	100	5
18UMAM503	Core XI: Operations Research	6	3	25	75	100	5
18UMAM504	Core XII: Programming in C	3	3	25	75	100	3
	Elective I	4	3	25	75	100	4
18UMAMP501	Core Practical I: Programming in C	2	3	40	60	100	2
Part IV							
18UMASB501	SBC III: Mathematics for Competitive Exams– I (100% Internal Evaluation)	2	3	100	-	100	2
Part V							
18UMAE501	Extension Activity	-					2
Non Credit							
18ULS501	Career Competency Skills III	1	-	-	-	-	-
	Total	**30**				**700**	**28**
Sixth Semester							
Part III							
18UMAM601	Core XIII: Linear Algebra (Fifth Unit as Self-Study)	5	3	25	75	100	5
18UMAM602	Core XIV: Real Analysis II	6	3	25	75	100	5
18UMAM603	Core XV: Complex Analysis	5	3	25	75	100	5
18UMAM604	Core XVI: Numerical Methods	5	3	25	75	100	5
	Elective II	4	3	25	75	100	4
18UMAMP601	Core Practical II: Sci Lab	2	3	40	60	100	2
Part IV							
18UMASB601	SBC IV: Mathematics for Competitive Exams– II (100% Internal Evaluation)	2	3	-	100	100	2
Non Credit							
18ULS601	Career Competency Skills IV	1	-	-	-	-	-
		30				**700**	**28**
					Grand Total	**4400**	**140**

ELECTIVE –I

(Student shall select any one of the following subject as Elective in fifth semester)

S.No	Subject Code	Name of the Subject
1.	18UMAEL501	Discrete Mathematics
2.	18UMAEL502	Graph Theory

ELECTIVE - II

(Student shall select any one of the following subject as Elective in sixth semester)

S.No	Subject Code	Name of the Subject
1.	18UMAEL601	Number Theory
2.	18UMAEL602	Optimization Techniques

NON MAJOR ELECTIVE COURSE

The department offering the following Non Major Elective Course for other than Mathematics students.

S.No	Subject Code	Name of the Subject
1	18UMANM301	Quantitative Aptitude.
2	18UMANM401	Basic Statistics.

ADD-ON COURSE

If Students want to get a Degree with additional skills, they can do Add-on Courses offered by the Department. The Add-on Courses offered by the Department are listed below.

S.No	Subject Code	Name of the Subject
1	18UMAAC301	Data Analysis Using R-Software.
2	18UMAAC401	Numerical Computations Using MatLab.

ADVANCED LEARNERS COURSE (ALC)

ALC to be introduced in the 4th and 5th semester.

If Students want to get a Degree with additional credits, they can do Advanced Learners Courses offered by the Department. The available advanced learners courses are listed below.

S.No	Subject Code	Name of the Subject
1	18UMAAL401	Index Numbers & Time Series Analysis.
2	18UMAAL402	Theory of Numbers & Inequalities.
3	18UMAAL501	Astronomy
4	18UMAAL502	Mathematical Modeling

TOTAL CREDIT DISTRIBUTION

Subjects	Total	Credits
Part – I Tamil	4 X 100 = 400	12
Part – II English	4 X 100 = 400	12
Part – III Core	16 X 100 = 1600	70
Part – III Elective	2X100 = 200	08
Part – III Core Practical	2 X 100 = 200	04
Part – III Allied	4 X 100 = 400	08
Part – III Allied Practical	4 X 100 = 400	08
Part - IV NMEC	2X100 = 200	04
Part - IV SBC	4X100 = 400	08
Part – IV Other Courses (YOGA, EVS)	1 X 100 = 100 1 X 100 = 100	02 02
Part – V Extension Activity		02
Total	**4400**	**140**

FOR COURSE COMPLETION

Student shall complete:

- Language papers (Tamil/Hindi/French and English) in I, II, III and IV semesters.
- Value Education Yoga and Environmental Studies in I and II Semester.
- Non Major Elective Course in III and IV semesters.
- Skill Based Course in III, IV, V and VI semesters.
- Extension activity in V semester.

18UTALA101	TAMIL – I: கவிதைகளும் கதைகளும்	பருவம் - I

இப்பாடத்திட்டத்தின் நோக்கங்களாவன:

- தற்காலத்தமிழ் இலக்கியவகைகளைமாணவர்களுக்குக் கற்பித்தல்.
- காலந்தோறும் தமிழ்க் கவிதைவளர்ச்சிநிலைகளைஅறிமுகப்படுத்துதல்.
- அடிப்படைத் தமிழ் இலக்கணத்தைக் கற்பித்துஅரசுப்போட்டித் தேர்வுகளுக்கு
- ஆயத்தப்படுத்துதல்.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**மரபுக் கவிதைகள்** அ .பாரதியார் - பாரததேசம் ஆ .பாரதிதாசன் - தமிழின் இனிமை இ. நாமக்கல் கவிஞர் - கவிதைஎன்றால் என்ன? ஈ. முடியரசன் - நல்லஉலகமடா!	10	**CO1**
II	**புதுக்கவிதைகள்** ஆ .வைரமுத்து - ரத்ததானம் - தண்ணீர் பிச்சை ஆ. வெ.இறையன்பு - பூபாளத்திற்கொருபுல்லாங்குழல் - பனித்துளியில் பாற்கடல் இ. தீபா - மழைக்குஒருமடல் - பாரதியார்,வறுமை ஈ. சிற்பி - ஒருகிராமத்துநதி–ஒருகிராமத்துநதி	10	**CO2**
III	**சிறுகதைகள்** அ. அறிஞர் அண்ணா - செவ்வாழை ஆ. கிருத்திகா - உழவுமாடுகள் இ. வள்ளி.வ. - தணல் துண்டாய்...சிலதருணங்கள் ஈ. தி.ஜானகிராமன் - முள்முடி	10	**CO3**
IV	**இலக்கியவரலாறு** அ. மரபுக்கவிதையின் தோற்றமும் வளர்ச்சியும் ஆ. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் இ. சிறுகதையின் தோற்றமும் வளர்ச்சியும் ஈ. நாடகத்தின் தோற்றமும் வளர்ச்சியும்	10	**CO4**
V	**அடிப்படை இலக்கணம்** அ. முதலெழுத்துகள் மற்றும் சார்பெழுத்துகள் (நன்னூல் விதிப்படிவிளக்கம்) ஆ. வல்லினம் மிகும் மிகா இடங்கள். இ. மரபுப் பெயர்கள் - இளமைப் பெயர்கள்	10	**CO5**

TEXT BOOK	
1.	தமிழ்த்துறைவெளியீடு, கே.எஸ்.ரங்கசாமிகலைஅறிவியல் கல்லூரி(தன்னாட்சி), திருச்செங்கோடு.

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாகமாணவர்கள் பெறும் பயன்களாவன:

CO1	மரபுக்கவிதைகளின் வடிவங்களைஅறிதல்.
CO2	புதுக்கவிதைகளின் வடிவங்கள் மற்றும் பாடுபொருள் தன்மையையறிதல்.
CO3	சிறுகதைகளின் உருவம்,உள்ளடக்கங்களைஅறிதல்.
CO4	காலந்தோறும் மாறும் இலக்கியவளர்ச்சியையறிதல்.
CO5	எழுத்துகளின் வகைகளைஅறிதல்.

18UENLA101	FOUNDATION ENGLISH – I	SEMESTER – I

COURSE OBJECTIVES

The course aims

- To enable the students to develop their comprehensive skill.
- To introduce the students to know about English poetry.
- To introduce the students to know about English short stories.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I & II	**POETRY** William Wordsworth - The Solitary Reaper. Margaret Atwood - This Is a Photograph of Me. **SHORT STORY** A. J. Cronin - Two Gentlemen of Verona. **GRAMMAR** Parts Of Speech. Articles. **COMPOSITION** Letter Writing – Formal. **COMMUNICATION SKILLS** Greeting and Introducing. Inviting a Person.	20	CO1 & CO2
III & IV	**POETRY** Robert Frost - The Road Not Taken. **SHORT STORIES** Pearl S. Buck - The Refugees. C. Rajagopalachary– Tree Speaks. **GRAMMAR** Kinds of Sentences. **COMPOSITION** Dialogue Writing. **COMMUNICATION SKILLS** Seeking Permission. Offering a Suggestion and Giving an Advice.	20	CO3 & CO4
V	**SHORT STORY** R. K. Narayan - The Axe. **GRAMMAR** Question Tag. **COMPOSITION** Reading Comprehension. **COMMUNICATION SKILLS** Persuading.	10	CO5

TEXT BOOKS	
1.	*G.Damodar, D.Venkateshwarlu,M.Narendra,M.SaratBabu,G.M.Sundaravalli.* 2009. **English For Empowerment**. Published by Orient Blackswan Private Limited. Hyderabad.
2.	*M.M.Lukose.* 2010. **Images, A handbook of Stories.**Macmillan Publishers Indian Limited. Chennai.
3.	*Dr.A.Shanmugakani,* M.A., Ph.d, **Prose for Communication**. Manimekala Publishing House, Madurai.
4.	*SasiKumar V and SyamalaV*. 2006. **Form and Function A Communicative Grammar for Colleges.** Emerald Publishers. Chennai.
5.	*T.M.Farhathullah.*2006.**Communication Skills For Undergraduates**. Publishers-RBA Publications. Chennai.
REFERENCE BOOK	
1.	*Thomas, A.J and Martinet, A.V.* 1994.**A Practical English Grammar.** Oxford University Press. Delhi.

COURSE OUTCOMES (CO)

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

CO1	Know the different parts of genres in English.
CO2	Trace the famous authors of English.
CO3	Enrich grammar knowledge.
CO4	Stimulate their writing skills.
CO5	Deserve appreciation for their communication.

18UMAM101	CORE I: CLASSICAL ALGEBRA	SEMESTER I

COURSE OBJECTIVES

The course aims

- To learn about advanced properties of matrices.
- To learn various methods of solving algebraic equations and manipulation of roots.
- To study Transformation of equation.

Credit : 04 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	Matrices: Rank of a matrix - Rank using Elementary Transformations – System of non-homogeneous linear equations. **Volume II : Chapter 2 (Section 11 ,13, 15.2)** Eigen values and Eigen vectors - Diagonalization of Matrix - Cayley - Hamilton theorem (statement only) and its problems. **Volume II : Chapter 2(Section 16 , 16.3)**	12	CO1
II	Binomial Theorem: Binomial theorem – General term - Some important particular cases of the binomial expansion – Expansion of rational fractions into partial fractions - Application of the binomial theorem to summation of series. **Vol. - I: Chapter 3 (sections: 1, 6, 9, 10) (exclude 1.1, 1.2, 1.3)**	12	CO2
III	Exponential series - Exponential theorem - Application to summation - Logarithmic series - theorem – Sum of certain series by using logarithmic series - Series which can be summed up by the logarithmic series. **Vol. - I: Chapter 4 (Sections: 2, 3, 5, 7, 9)**	12	CO3
IV	Theory of equations: Polynomial equation - Remainder theorem – In an equation with real coefficients, imaginary roots occur in pairs - In an equation with rational coefficients irrational roots occur in pairs - Relation between roots and coefficients of the equation. Symmetric function of the roots- Newton's Theorem on the sum of the powers of the roots. **Volume I : Chapter 6(Section 1, 2, 9-12,14)**	12	CO4
V	Transformations of equations – Roots with signs changed - Roots multiplied by a given number – Reciprocal roots - Reciprocal equation. **Volume I : Chapter 6 (Section 15, 16)** To increasing and decreasing the roots of an equation by a given quantity - Removing the terms – Descarte's rule of signs - Newton's method. **Volume I : Chapter 6 (Section 17 , 19 , 24, 29.4)**	12	CO5

TEXT BOOKS	
1.	*Manicavachagom Pillay,T.K., Natarajan,T. and Ganapathy, K.S*. 2010. **Algebra - Volume II.**S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For unit I only).
2.	*ManicavachagomPillay,T.K. ,Natarajan,T. and Ganapathy, K.S*. 2007. **Algebra - VolumeI.**S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For units II, III, IV and V).
REFERENCE BOOK	
1.	*Vittal, P.R.* 2000. **Algebra Calculus and Trigonometry.** [Fifth Edition]. Margham Publications, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Learn Eigen values and Eigen vectors and to know how to solve the simultaneous linear equation.
CO2	Understand the concept of Binomial series and its application.
CO3	Understand the concept of Exponential series and Logarithmic series.
CO4	Understand the concepts of Polynomial equation and relation between roots and coefficients.
CO5	Learn how to transform the roots of the equation, understand the concepts of reciprocal equations.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM102	CORE II: DIFFERENTIAL CALCULUS	SEMESTER I

COURSE OBJECTIVES

The course aims

- To learn basic concepts of differentiation which are instrumental in constructing many of Mathematical concepts.
- To learn how to apply differential Calculus and Trigonometry in all sciences and social science.
- To study Trigonometric expansions, Hyperbolic functions and Logarithmic functions of complex numbers.

Credits : 04 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	Review of basics (limit, continuity, differentiability) - Successive differentiation - The n^{th} derivative - Standard results-Leibnitz formula for the n^{th} derivative and its problems –Maxima-Minima. **Volume I : Chapter 3(Sections 1.1 to 2.2) Chapter 5(Sections 1.5)**	**12**	**CO1**
II	Curvature: Circle, Radius and Centre of curvature - The co-ordinates of centre of curvature in Cartesian co-ordinates only. Radius of curvature when the curve is given in polar co-ordinates – p-r equation: Pedal equation of a curve. **Volume I : Chapter 10(Sections 2.1 to 2.4) Volume I : Chapter 10(Sections 2.6 to 2.7)**	**12**	**CO2**
III	Partial Differentiation: Successive partial derivatives – Function of function rule – Total differential coefficient – A special case – Implicit functions – Homogeneous functions – Partial derivatives of function of two functions. **Volume I : Chapter 8 (Sections 1.1 to 1.7)**	**12**	**CO3**
IV	Expansion of $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$- Expansion of - Expansion of $\sin\theta$, $\cos\theta$ in terms of θ-Hyperbolic and inverse hyperbolic functions-properties. **Chapter – 3 (Sections 1 to 5) Chapter – 4(Sections 1 and 2)**	**12**	**CO4**
V	Logarithm of complex quantities – General Principal Values – Summation of Trigonometrical Series: Method of Difference – Sum of Series of n Angles in A.P. **Chapter – 5 (Section 5) Chapter – 6 (Sections 1 to 2)**	**12**	**CO5**

TEXT BOOKS

1. *Narayanan, S. and Manicavachagom Pillay, T.K.* 2009. **Calculus Vol. I (Differential Calculus).**S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For Units I, II & III)
2. *Manicavachagom Pillay, T.K.* and *Narayanan, S.* 2007. **Trigonometry.**S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For units IV & V).

REFERENCE BOOKS	
1.	*Vittal, P.R*. 2002. **Differential Calculus.** Margham Publication, Chennai.
2.	*Bali, N.P.* 1994. **Trigonometry.** Krishna Prakasammandir, Meerut (UP).
3.	*Vittal, P.R.* 2000. **Algebra, Calculus and Trigonometry.** Margham publications, Chennai.
4.	*Maurice D.* Weir, Joel Hass **Thomas Calculus.** 13 Edition Pearson publications, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Learn successive differentiation and Leibnitz rule for nth derivative.
CO2	Understand the concept of Curvature and Radius of curvature.
CO3	Learn partial derivatives, successive partial derivatives and Euler's formula for homogeneous equation.
CO4	Understand the concept of expansion of trigonometric ratios, Hyperbolic functions and inverse hyperbolic functions.
CO5	Learn Logarithm of complex number, general and principal values and summation of trigonometric series.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UPHMAA101	ALLIED I: PHYSICS I	SEMESTER – I

COURSE OBJECTIVES

The course aims

- To impart knowledge on the basic principles of Mechanics and Properties of matter.

Credits: 2 **Total Hours: 40**

UNIT	CONTENTS	Hrs.	CO
I	**Mechanics:** Projectile - Range up and down an inclined plane - Maximum range - Impulse and impact - Laws of impact - Coefficient of restitution - Direct impact between two spheres - Compound pendulum – Theory – Determination of acceleration due to gravity.	8	CO1
II	**Properties of Matter:** Newton's law of gravitation – Determination of gravitational constant – Boy's method – Bending of beams – Expressions for bending moment – Theory of uniform and nonuniform bending - Torsion expression for couple per unit twist - Torsion pendulum – Theory - Surface tension and interfacial surface tension by drop weight method.	8	CO2
III	**Heat:** Postulates of kinetic theory of gases – Vander Waal's equation - Derivation of critical constants in terms of Vander Waal's constants – Expressions for Vander Waal's constants - Thermal conductivity of a bad conductor - Lee's disc method – Joule-Thomson effect - Porous plug experiment - Theory - Liquefaction of Helium by K. Onnes method - Properties of Helium I and Helium II.	8	CO3
IV	**Optics:** Interference - Air wedge - Thickness of a wire - Jamin's Interferometer - Rayleigh's Interferometer - Polarization - Nicol prism as a polarizer and analyzer - Specific rotary power and its determination – Diffraction – Principle – Bragg's law - Fresnel's and Fraunhofer diffraction. **Sound:** Laws of transverse vibration of strings - Sonometer - Musical sound and noise - Characteristic of musical sound.	8	CO4
V	**Electricity and Magnetism:** Potentiometer - Low range voltmeter and ammeter calibration - Theory of moving coil ballistic galvanometer – Determination of current and voltage sensitivities - Comparison of capacitances – Magnetic susceptibility - magnetic permeability - Properties of dia, para, ferro magnetic materials.	8	CO5

TEXT BOOKS	
1.	*Murugesan, R. 2007.***AlliedPhysics-I.** S. Chand & Company. New Delhi.
2.	*Kamalakannan,D.*and*Rangarajan.C.*1992.**AlliedPhysicsPart-I.**[FirstEdition] S. Viswanathan Printersand Publishers Pvt. Ltd., Chennai.
REFERENCE BOOKS	
1.	*Brijlal* and *Subramanian.*2004. **Optics.** S. Chand & Company. New Delhi.
2.	*Mathur,D.S.*1991.**Heat and Thermodynamics.**[Fifth Edition] Sultan Chand & Sons. NewDelhi.
3.	*Murugesan.R.* 2005. **Mechanics and Mathematical Method.** Second Edition] S. Chand & Company, New Delhi.
4.	*Murugeshan. R.* 1995. **Electricity and Magnetism.** [FirstEdition]. S.Chand & Co,NewDelhi
WEB REFERENCES	
1.	http://www.nptel.ac.in
2.	https://ocw.mit.edu/courses/physics/

COURSE OUTCOMES (CO)

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

CO1	Comprehend the motion of objects in various range and collision between them with suitable law.
CO2	Apply knowledge of the properties of matter to understand the natural physical processes and related technological advances.
CO3	Explain the basic concepts of heat like temperature measurement and specific heat measurement.
CO4	Acquire the knowledge on light and sound.
CO5	Describe the fundamentals of electricity and magnetism.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	M	H	M	M	L
CO3	M	L	H	H	M
CO4	M	H	M	L	H
CO5	L	M	H	H	H

H-High; M-Medium; L-Low

18UPHMAAP101	ALLIED PRACTICAL I: PHYSICS I	SEMESTER – I

COURSE OBJECTIVES

The course aims

- To provide basic skills in measurements using microscope, telescope, spectrometer, potentiometer etc.
- To impart knowledge in properties of matter, light and electricity.

Credits: 2 **Total Hours: 30**

Ex.No.	LIST OF EXPERIMENTS	Hrs.	CO
1.	Young's modulus-Non -uniform bending– Scale and telescope.	**3**	**CO1**
2.	Torsion pendulum–Rigidity modulus – without masses.	**3**	
3.	Compound pendulum – Gravity and radius of gyration.	**3**	
4.	Surface tension and interfacial surface tension– Drop weight method.	**3**	
5.	Potentiometer –Calibration of low range voltmeter.	**3**	
6.	Figure of merit of a galvanometer (Table galvanometer).	**3**	
7.	Thermal Conductivity – Lee's disc method	**3**	
8.	Spectrometer-Dispersive power of a prism (Angle of prism is given).	**3**	
9.	Sonometer-Frequency of a fork.	**3**	
10.	Airwedge– Thickness of a wire.	**3**	

TEXT BOOK

1. *Srinivasan,M.N, Balasubramanian,S* and *Ranganathan,R*.2004. **A Book for Study of Practical Physics**.S. Chand &Co. NewDelhi.

REFERENCE BOOKS

1. *UshaRani, Subbarayan, A*and*Somasundaram.* 2007.**PracticalPhysics**. APSARA Publication,Trichy.
2. B.Sc., Physics Laboratory Manual of the year 2018 – 2019.

COURSE OUTCOMES (CO)

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

CO1	Analyze the various physical parameters such as length and thickness, stress, strain and elastic limit needed to achieve a given amount of deformation in the given material using vernier scale, micrometer screw gauge and the travelling microscope, pin & microscope method and scale & telescope method.

18UVE101	VALUE EDUCATION I: YOGA	SEMESTER - I

COURSE OBJECTIVES

The course aims

- To understand physical body and Health concepts.
- To have the basic Knowledge on Simplified Physical Exercises and Asanas and Meditation.
- To Introspect and improve the behaviors.
- To inculcate cultural behavioral patterns.

Credits: 2 **Total Hours: 30**

UNIT	CONTENTS	Hrs	CO
I	**Yoga and Physical Health:** Health - Meaning and Definition - Physical Structure - Three bodies - Five limitations - Simplified Physical Exercises - Hand, Leg, Breathing, Eye exercises - Kapalabathi, Makarasana 1, 2 , Massage, Acu pressure, Relaxation exercises - Yogasanas – Surya namaskar - Padmasana - Vajrasana - ArdhakattiChakrasana - Viruchasana - Yogamudra - Patchimothasana - Ustrasana - Vakkarasana – Salabasana.	6	CO1
II	**Greatness of Life Force and Mind: Maintaining** youthfulness - Postponing the ageing process - Sex and spirituality - Significance of sexual vital fluid - Married life - Chastity - Development of mind in stages - Mental Frequencies - Methods for Concentration - Meditation and its Benefits.	6	CO2
III	**Personality Development – Sublimation :**Purpose and Philosophy of Life - Introspection - Analysis of Thought - Moralization of Desire - Analysis and practice - Neutralization of Anger - Strengthening of will-power.	6	CO3
IV	**Human Resources Development:** Eradication of Worries - Analysis and Eradication practice - Benefits of Blessings – Effect of good vibrations - Greatness of Friendship - Guidance for good Friendship – Individual Peace and world peace - Good cultural behavioral patterns.	6	CO4
V	**Law of Nature:** Unified force - Cause and effect system - Purity of thought deed and Genetic Centre – Love and Compassion - Gratitude - Cultural Education - Fivefold culture.	6	CO5

TEXT BOOK

1.	Value Education - World Community Service centre, Vethathiri Publications, Erode.

REFERENCE BOOKS	
1.	*Vethathiri Maharishi*, 2011, Journey of Consciousness, Erode, Vethathiri Publications.
2.	*Vethathiri Maharishi*, 2014, Simplified Physical Exercises, Erode, Vethathiri Publications.
3.	*Vethathiri Maharishi*, 2004, Unified force, Erode, Vethathiri Publications.
4.	Yoga for Modern age - ThathuvagnaniVethathiri Maharishi.
5.	Sound Health through yoga – Dr. K. Chandrasekaran, November 1999 Prem Kalyan Publications, Madurai.
6	Light on yoga - BKS.lyenger.
7	ThathuvagnaniVethathiri Maharishi – Kayakalpa yoga – First Edition 2009 –Vethathiri Publications, Erode.
8	Environmental Studies - Bharathidasan University Publication Division.

COURSE OUTCOMES (CO)

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

CO1	Understand the physical structure and simplified physical exercises.
CO2	Nurture the life force and mind.
CO3	Introspect and improve the moral values.
CO4	Realize the importance of human resources development.
CO5	Enhance purity of thought and deed.

18UTALA201	Tamil – II: சமய இலக்கியங்கள்	பருவம் - II

இப்பாடத்திட்டத்தின் நோக்கங்களாவன:

- சமய இலக்கியங்களைஅறிமுகம் செய்தல்.
- சமயச் சான்றோர் நிலைப்பாட்டைஉணர்த்துதல்.
- 3. சமயங்கள் வளர்த்ததமிழைஅறியச் செய்தல்.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**சைவ,வைணவ இலக்கியங்கள்** அ. சம்பந்தர் தேவாரம் - திருக்கொடிமாடச்செங்குன்றூர்- (**முதல் ஐந்து பாடல்கள்**). ஆ. மாணிக்கவாசகர் - திருவம்மானை - **(முதல் ஐந்துபாடல்கள்**). இ. பெரியாழ்வார் - திருப்பல்லாண்டு (**முதல் ஐந்துபாடல்கள்).** ஈ. ஆண்டாள் - திருமணக் கனவு **(முதல் ஐந்துபாடல்கள்**).	**10**	**CO1**
II	**கிறித்துவ, இசுலாமிய இலக்கியங்கள்** அ. இரட்சணியயாத்திரிகம் - சிலுவைப்பாடு **(முதல் பத்துப்பாடல்கள்).** ஆ. நாயகம் ஒருகாவியம்–பாம்பின் நேசமும் தோழரின் பாசமும் **(முதல் பத்துப்பாடல்கள்).**	**10**	**CO2**
III	**சமயச் சான்றோர் வரலாறு** அ. **சைவசமயச் சான்றோர்கள்.** 1. திருஞானசம்பந்தர், 2. திருநாவுக்கரசர், 3. சுந்தரர், 4. மாணிக்கவாசகர் 5. சேக்கிழார். ஆ. **வைணவசமயச் சான்றோர்கள்** 1. முதலாழ்வார்கள் 2. திருமங்கையாழ்வார் 3.ஆண்டாள் 4. நாதமுனிகள்.	**12**	**CO3**
IV	**சமய இலக்கியவரலாறு** அ. பன்னிருதிருமுறைகள். ஆ. பதினெண்சித்தர்கள். இ. நாலாயிரதிவ்யபிரபந்தம். ஈ. சைவசித்தாந்தசாத்திரங்கள்.	**08**	**CO4**
V	**இலக்கணமும் மொழித்திறனும்** அ. ஆகுபெயர். ஆ. தொகைச்சொற்கள். இ. மயங்கொலிச்சொற்கள் (ர,ற வேறுபாடுகள்). ஈ. நேர்காணல்.	**10**	**CO5**

TEXT BOOK

1	தமிழ்த்துறை. வெளியீடு : கே.எஸ்.ரங்கசாமிகலைஅறிவியல் கல்லூரி(தன்னாட்சி),திருச்செங்கோடு– 637 215.

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாக மாணவர்கள் பெறும் பயன்களாவன:

CO1	தேவார,திவ்யபிரபந்தச் சிறப்பினைஉணர்தல்.
CO2	கிறித்துவ, இசுலாமிய காவியங்களின் சிறப்பினை உணர்தல்.
CO3	சைவசமய, வைணவசமயச் சான்றோர் சிறப்புக்களை உணர்தல்.
CO4	சமயவளர்ச்சி, இலக்கியவளர்ச்சி ஆகியவற்றை உணர்தல்.
CO5	ஆகுபெயர் வகைகளை உணர்தல், மொழித்திறன் பெறுதல்.

18UENLA201	FOUNDATION ENGLISH – II	SEMESTER – II

COURSE OBJECTIVES

The course aims

- To enable the students to develop their comprehensive skill.
- To introduce the students to know about English poetry and short stories.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I & II	**POETRY** Langston Hughes - I, Too. **SHORT STORIES** Vsevolod M. Garshin - The Signal. W. Somerset Maugham - The Man with the Scar. **GRAMMAR** Tenses (Present, Past & Future). **COMPOSITION** E-mail. SMS. **COMMUNICATION SKILLS** Asking Questions.	**20**	**CO1 & CO2**
III & IV	**POETRY** Chinua Achebe - Refugee Mother and Child. Nissim Ezekiel - Goodbye Party for Miss Pushpa T. S. **SHORT STORY** H. G. Wells - The Stolen Bacillus. **GRAMMAR** Voices (Active and Passive). **COMPOSITION** Note Making, Note Taking. **COMMUNICATION SKILLS** Praising and Complimenting. Complaining and Apologizing.	**20**	**CO3 & CO4**
V	**POETRY** Tripuraneni Srinivas - I Will Embrace only the Sun. **SHORT STORY** O. Henry - One Thousand Dollars. **COMPOSITION** Discourse Pattern. **COMMUNICATION SKILLS** Expressing Sympathy. Phoning.	**10**	**CO5**

TEXT BOOKS	
1.	*G.Damodar, DVenkateshwarlu, M.Narendra, M.SaratBabu, G.M.Sundaravalli.* 2009. **English For Empowerment**. Published by Orient Blackswan Private Limited. Hyderabad –500 029.
2.	*M.M.Lukose*. 2010. **Images, A hand book of Stories.** Macmillan Publishers Indian Limited. Chennai–600 041.
3.	*SasiKumarV and SyamalaV*. 2006. **Form and Function A Communicative Grammar for Colleges.** Emerald Publishers. Chennai–600 008.
4.	*T.M.Farhathullah.* 2006. **Communication Skills For Undergraduates**. Publishers-RBA Publications. Chennai–600 015.
REFERENCE BOOKS	
1.	*Thomas, A.J and Martinet, A.V.* 1994. **A Practical English Grammar.** Oxford University Press. Delhi.
2.	*Martin Hewings.* 1999. **Advanced English Grammar.** Cambridge University Press. New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Know the different parts of genres in English
CO2	Identify the famous authors of English
CO3	Enrich their grammar knowledge
CO4	Stimulate their writing skills
CO5	Deserve appreciation for their communication

18UMAM201	CORE III: INTEGRAL CALCULUS	SEMESTER II

COURSE OBJECTIVES

The course aims

- To learn basic concepts of integration and properties of definite integrals.
- To learn advanced topic in integration like multiple integrals, improper integral and beta gamma functions.

Credit: 04 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	Integration – Review of basics- Integration by partial fractions – Integration of Irrational functions - Integration by parts. **Chapter 1 (Sections 7.4 - 8, 12)**	12	CO1
II	Properties of definite integral - Reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n x dx$, $\int_0^{\frac{\pi}{2}} \cos^n x dx$, $\int_0^{\frac{\pi}{2}} \tan^n x dx$, $\int \sec^n x dx$, $\int \cot^n x dx$, $\int_0^{\frac{\pi}{2}} \sin^m x.\cos^n x.dx$, $\int x^n e^{ax} xdx$ and $\int x^m (\log x)^n dx$ - Bernoulli's formula. **Chapter 1(Sections 11, 13, 15, 15.1)**	12	CO2
III	Multiple Integral: Definition of Double Integral - Evaluation of double integral – Changing the order of integration – Double integral in polar co-ordinates – Triple integral. **Chapter 5 (Sections 2.1 to 4)**	12	CO3
IV	Improper Integrals: Definition and its problem - Beta Gamma Functions: Definition and convergence of gamma n. **Chapter 7 (Sections 1 to 2.2)**	12	CO4
V	Recurrence formula of Gamma functions - Properties of Beta functions - Relation between Beta and Gamma functions. **Chapter 7 (Sections 2.3 to 5)**	12	CO5

TEXT BOOK

1.	*Narayanan, S. and Manicavachagom Pillay, T.K.* 1997**. Calculus Vol II.**S.Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For units I to IV).

REFERENCE BOOK

1.	*Vittal, P.R.* 2000. **Calculus.** Margham Publishers, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Learn Integration, types of integration and Integration by parts.
CO2	Learn definite integral and its properties and understand the concepts of reduction formula.
CO3	Learn multiple integral and understand the concept of order of change of integration.
CO4	Learn Beta & Gamma functions, Properties of Beta and Gamma functions
CO5	Understand the relationship between Beta and Gamma functions.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM202	CORE IV: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORM	SEMESTER II

COURSE OBJECTIVES

The course aims

- To provide a knowledge of Ordinary differential equations, Partial differential equations and their solutions.
- To introduce Laplace Transforms and its applications.

Credits : 04 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	Equations of the first order and of the first degree: Exact differential equations – Equations of the first order but of higher degree: Equations solvable for p, x and y – Clairaut's form. **Chapter II (Sections 1 – 6.1) Chapter IV (Sections 1 – 3)**	**12**	**CO1**
II	Linear equation with constant coefficients: Particular integral of the type, cosax or sinax, x^n, $e^{ax}v$ where v is any function of sinax or cosax or x or x^2 or xsinax and xcosax– Linear equations with variable coefficients . **Chapter V (Sections 1 – 5)**	**12**	**CO2**
III	Partial differential equations of the first order: Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions - Definitions – Complete, particular, singular and general integrals – Solutions of standard types: $F(p,q) = 0$, $F(x,p,q) = 0$, $F(y,p,q) = 0$, $F(z,p,q) = 0$ and $f_1(x,p) = f_2(y,q)$ – Clairaut's form – Lagrange's equation $Pp + Qq = R$ **Chapter XII (Sections 1 – 5.4)**	**12**	**CO3**
IV	Laplace transforms – Standard formula – Elementary theorems - Laplace transform of periodic functions – Problems - Inverse Laplace transforms – Standard formula. **Chapter IX (Sections 1 – 7)**	**12**	**CO4**
V	Partial fractions- Applications of Laplace transform: To solve ordinary differential equations with constant co-efficients – To solve system of differential equations. **Chapter IX (Sections 8 – 9)**	**12**	**CO5**

TEXT BOOK

1. *Manickavasagom Pillay, T.K. and Narayanan, S.* 2006. **Differential Equations and Its Applications.**S.Viswanathan and Co., Chennai.

REFERENCE BOOKS

1. *Vittal, P.R. 2002.* **Differential Equations and Laplace Transforms.**Margham Publications, Chennai.

2.	*Singaravelu, A. 2002*. **Differential Equations and Laplace Transforms.**Meenakshi Publications, Chennai.
3.	*Sankarappan, S and Kalavathi, S. 2004*. **Differential Equations and Laplace Transforms.** Vijay Nicole Imprints Pvt. Ltd., Chennai.
4.	*William E.Boyce, Richard C. DiPrima***Elementary Differential Equations and Boundary Value Problems** 9 Edition, Wiley Student edition, Delhi.

COURSE OUTCOMES (CO)

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

CO1	Learn Exact differential equations and first order higher degree differential equations.
CO2	Learn Linear DE with constant coefficients and Linear DE with variable coefficients.
CO3	Learn Partial Differential Equations and Understand the concept standard types of PDEs.
CO4	Learn Laplace Transforms, Inverse Laplace Transforms and their properties.
CO5	Understand the concept of Inverse Laplace transforms using partial fractions and applications of Laplace Transforms.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UPHMAA201	**ALLIED II: PHYSICS II**	**SEMESTER – II**

COURSE OBJECTIVES

The course aims

- To impart knowledge on the basic principles of Atomic Physics, Nuclear Physics, Basic Electronics and Digital Electronics.

Credits: 2 **Total Hours: 40**

UNIT	CONTENTS	Hrs.	CO
I	**Atomic Physics:** Bohr Atom model - Spectral series of hydrogen - Vector atom model - Spatial quantization - Spinning electron - Quantum numbers associated with vector atom model - Coupling schemes – LS coupling - JJ Coupling – Pauli's exclusion principle - Example of electron configuration - Photoelectric effect - Laws - Einstein's equation.	**8**	**CO 1**
II	**Nuclear Physics:** Radioactivity - Properties of α, B, γ rays – Laws of radioactivity - Half-life and Mean-life - Nuclear models –Liquid drop model - Semi-empirical mass formula - Merits and demerits - Shell model – Evidences - Nuclear radiation detectors – Ionization chamber – G.M counter - Particle accelerator - Cyclotron – Synchrocyclotron.	**8**	**CO 2**
III	**LASER Physics:** LASER - Characteristics of laser – Theory of laser – Population inversion – Optical pumping – Construction and working of: Ruby laser – He-Ne laser – Semiconductor laser – Application of laser. **Spectroscopy:** Types of spectra - Emission and absorption spectra - Raman Effect – Quantum theory of Raman Effect – Experimental study of Raman Effect – Application of Raman effect.	**8**	**CO 3**
IV	**Basic Electronics:** Junction diode - Zener diode – Characteristics – Half & Full wave rectifiers - Construction and characteristics of transistors (common emitter only) - Oscillators - Hartley oscillator - Astable multivibrator - Construction and characteristics of FET.	**8**	**CO 4**
V	**Digital Electronics:** Binary, Octal, Hexadecimal numbers and their conversion – Basic logic gates, their truth tables - Laws of Boolean algebra – De'Morgan's theorem - NAND/NOR as universal blocks.	**8**	**CO 5**

TEXT BOOK

1. *Murugesan. R*. 2007. **Allied Physics - II**. S. Chand & Company. New Delhi**.**

REFERENCE BOOKS

1. *Murugesan, R*. 2007. **Modern Physics**. S. Chand & Company Limited, New

	Delhi.
2	*Metha, V.K.* 2002. **Principles of Electronics**. [Eleventh Edition] S. Chand & Company Limited, New Delhi.
3	*Avadhanula, M.N*. 2001. **An Introduction to Laser Theory and Application**. S. Chand & Company, New Delhi.
4	*Brijlal and Subramanian*. 2005. **Atomic and Nuclear Physics**. S. Chand & Company Limited, New Delhi.
WEB REFERENCES	
1.	http://www.nptel.ac.in
2.	https://ocw.mit.edu/courses/physics/

COURSE OUTCOMES (CO)

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

CO1	Know the basic principles of atomic structure of atom, photo electricity and atom models.
CO2	Acquire knowledge in nuclear physics related various theoretical models.
CO3	Assess the properties of new laser systems based on knowledge of their design and spectroscopy applications.
CO4	Know the unique vocabulary associated with electronics and explain the basic concepts of semiconductor devices.
CO5	Comprehend the concepts of number systems, logic gates and Boolean algebraic functions.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	H	H	H
CO3	M	L	M	H	M
CO4	M	H	M	L	H
CO5	L	M	H	H	H

H-High; M-Medium; L-Low

18UPHMAAP201	ALLIED PRACTICAL II: PHYSICS II	SEMESTER – III

COURSE OBJECTIVES

The course aims

- To provide basic skills in physical properties of the materials using microscope, telescope, spectrometer, potentiometer etc.
- To impart knowledge in properties of matter, light and electricity.

Credits: 02 **Total Hours: 30**

S.No	EXPERIMENT	Hrs.	CO
01.	Torsion pendulum – Rigidity modulus – with masses.	3	CO1
02.	Young's modulus – Uniform bending – Scale and telescope.	3	CO1
03.	Potentiometer –Calibration of high range Ammeter.	3	CO1
04.	Spectrometer – Grating – wavelength of Mercury spectrum.	3	CO1
05.	Newton's ring –Radius of curvature.	3	CO1
06.	Zener diode – VI–Characteristics, Breakdown voltage and voltage regulator.	3	CO2
07.	Bridge rectifier with voltage regulator.	3	CO2
08.	Characteristics of FET.	3	CO3
09.	Basic logic gates – Verification of truth tables.	3	CO3
10.	NAND and NOR as universal gates.	3	CO3

TEXT BOOK

1. *Srinivasan, M.N, Balasubramanian, S* and *Ranganathan, R.* 2004. **A Book for Study of Practical Physics**. S. Chand & Co. New Delhi.

REFERENCE BOOKS

1. *Usha Rani, Subbarayan, A* and *Somasundaram.* 2007. **Practical Physics**. APSARA Publication, Trichy.
2. *Arora, C.L.* 1995**. B.Sc., Practical Physics.** S. Chand & Co. New Delhi.
3. *Ouseph.C.C, Rao.U.J, Vijayendran, S.* 2009. **Practical Physics and Electronics.** Viswanathan, S., Printers & Publishers Pvt Ltd, Chennai.
4. B.Sc., Physics Laboratory Manual of the year 2018 – 2019.

COURSE OUTCOMES (CO)

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

CO1	Analyze the various physical properties of the various materials.
CO2	Analyze the basic characterization of semiconductor devices.
CO3	Examine the arithmetic and logical operations through the digital circuits.

18UVE201	VALUE EDUCATION II: ENVIRONMENTAL STUDIES	SEMESTER – II

COURSE OBJECTIVES

The course aims

- To enable the students acquire knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.
- To implicate awareness among young minds for safeguarding environment from manmade disasters.

Credits: 2 **Total Hours: 30**

UNIT	CONTENTS	Hrs	CO
I	Environment– Definition– Scope– Structure and function of ecosystems- producers, consumers and decomposers- Energy flow in the ecosystem- Ecological succession– food chain, food webs and ecological pyramids– Concept of sustainabledevelopment.	06	CO1
II	Natural resources: Renewable- air, water, soil, land and wildlife resources. Non–renewable – Mineral coal, oil and gas. Environmental problems related to the extraction and use of natural resources.	06	CO2
III	Biodiversity– Definition– Values– Consumption use, productive social, ethical, aesthetic and option values threats to bio diversity – hotspots of bio diversity– conservation of bio- diversity: in– situ Ex– situ. Bio– wealth – National and Global level.	06	CO3
IV	Environmental Pollution :Definition– causes, effects and mitigation measures– Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution– Nuclear hazards – Solid wastes acid rain–Climate change and global warming environmental laws and regulations in India– Earth summit.	06	CO4
V	Population and environment – Population explosion – Environment and human health – HIV/AIDS – Women and Child welfare – Disaster Management – Resettlement and Rehabilitation of people, Role of information technology in environmental health – Environmental awareness.	06	CO5

TEXT BOOK

1.	Department of Biochemistry. Environmental Studies (Study Material). Published by K.S.Rangasamy College of Arts & Science (Autonomous). Tiruchengode.

REFERENCE BOOK	
1.	*Erach Bharucha*. 2005. **Textbook of Environmental studies**. Universities press. PVT. Ltd.

COURSE OUTCOMES (CO)

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

CO1	Describe the types of ecosystem and concepts in sustainable development.
CO2	Explain the importance of natural resources and environmental problems.
CO3	Recite about the biodiversity, hot spots of biodiversity and its conservation.
CO4	Be conscious on the effects of pollution and population explosion.
CO5	Implement the preventive measures for environmental issues.

18UTALA301	TAMIL – III: காப்பியம் - சிற்றிலக்கியம்	பருவம் - III

இப்பாடத்திட்டத்தின் நோக்கங்களாவன:

- தமிழ்க் காப்பியங்கள் தோற்றத்தையும்,காப்பிய இலக்கணத்தையும் காப்பியவகைகளையும் அறிமுகம் செய்தல்.
- சிற்றிலக்கியங்கள் தோற்றம்,வளர்ச்சிநிலைகளையும்,சிற்றிலக்கியங்களையும் அறிமுகம் செய்தல்.
- பகுபதஉறுப்புக்களைக் கற்பித்தல்.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	காப்பியங்கள் - சிலப்பதிகாரம் - வழக்குரைகாதை. மணிமேகலை - மலர்வனம் புக்ககாதை.	**10**	**CO1**
II	பிறகாப்பியங்கள் - கம்பராமாயணம் - குகப் படலம். பெரியபுராணம் - இளையான்குடிமாறநாயனார் புராணம்.	**10**	**CO2**
III	சிற்றிலக்கியங்கள் - குற்றாலக் குறவஞ்சி– வசந்தவல்லியின் காதல். **(1-10 பாடல்)** கலிங்கத்துப் பரணி - பேய்களைப் பாடியது.	**10**	**CO3**
IV	இலக்கியவரலாறு - காப்பியங்கள் - ஐம்பெருங்காப்பியங்கள் - ஐஞ்சிறுகாப்பியங்கள் -புராணங்கள் - சிற்றிலக்கியங்கள்.	**10**	**CO4**
V	இலக்கணமும் மொழிப்பயிற்சியும் - பகுபதஉறுப்பிலக்கணம் - சீர் வகைகள் - வழூஉச் சொற்கள் - கடிதம் எழுதுதல்.	**10**	**CO5**

TEXT BOOK

1	தமிழ்த்துறை வெளியீடு ,கே .எஸ். ரங்கசாமி கலை அறிவியல் கல்லூரி (தன்னாட்சி), திருச்செங்கோடு-637 215.

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாக மாணவர்கள் பெறும் பயன்களாவன:

CO1	இரட்டைக் காப்பியங்களின் மேன்மைநிலையை உணர்தல்.
CO2	காப்பியக்காலகுடிகளின் நிலையை,உரிமையைஉணர்தல்.
CO3	சிற்றிலக்கியங்களின் சிறப்பை உணர்தல்.
CO4	காப்பிய,சிற்றிலக்கியங்களின் வரலாறு குறித்த செய்திகளைஅறிதல்.
CO5	இலக்கணம் மற்றும் மொழிப்பயிற்சியின் அமைப்பை உணர்தல்.

18UENLA301	FOUNDATION ENGLISH – III	SEMESTER – III

COURSE OBJECTIVES

The course aims

- To enable the students to develop their comprehensive skill.
- To promote language skills through literature.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I & II	**ONE ACT PLAY** A. Ball - The Seven Slaves. **PROSE** Somerset Maugham - Mr. Know –All. **GRAMMAR** Degrees of Comparison. **COMPOSITION –** Advertisement. **COMMUNICATION SKILLS** Speaking About Oneself. The Media.	**20**	**CO1 & CO2**
III & IV	**ONE ACT PLAY** R.H. Wood - Post Early for Christmas. **PROSE** Satyajit Ray - Film Making. **GRAMMAR** Determiners **COMPOSITION** Resume Writing. **COMMUNICATION SKILLS** Imagining. Context specific expression - Master of Ceremonies.	**20**	**CO3 & CO4**
V	**PROSE** Isai Tobolsky - Not Just Oranges. **GRAMMAR** Reported Speech. **COMPOSITION** Precise Writing. **COMMUNICATION SKILLS** Inviting Personalities.	**10**	**CO5**

TEXT BOOKS

1 *G.Damodar, D.Venkateshwarlu, M.Narendra, M.SaratBabu, G.M.Sundaravalli.* 2009. **English For Empowerment**. Published by Orient Blackswan Private Limited. Hyderabad –500 029.

2 *Ramamurthy.K.S. 1984.* **Seven-Act Plays**. Published in India by Oxford University. New Delhi–110 001.

3 *Sasi Kumar V and Syamala V*. 2006. **Form and Function - A Communicative Grammar for Colleges.** Emerald Publishers. Chennai–600 008.

4 *T.M.Farhathullah.* 2006. **Communication Skills For Undergraduates**.

	Publishers-RBA Publications. Chennai–600 015.
REFERENCE BOOKS	
1.	*Raymond Murphy*. 1994. **Intermediate English Grammar.** Cambridge University India Pvt. Ltd, Delhi.

COURSE OUTCOMES (CO)

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

CO1	Know the different parts of genres in English
CO2	Trace the famous authors of English
CO3	Enrich their grammar knowledge
CO4	Stimulate their writing skills
CO5	Deserve appreciation for their communication

18UMAM301	CORE V: ANALYTICAL GEOMETRY OF 2 D AND 3 D	SEMESTER III

COURSE OBJECTIVES

The course aims

- To study in detail about the structures Parabola, Ellipse and Hyperbola.
- To study in detail about multiple integrals and applications of multiple integrals.

Credits: 04 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	Analytical Geometry of 2 Dimensions: Parabola: Conic Sections – Equation of a Parabola – the equation of the pair of tangents to the parabola – Coordinates of any points on the parabola - properties of a Parabola. **Part I : Chapter 6 (Sections 1, 2, 7 , 8, 9)**	**12**	**CO1**
II	Ellipse:Equation of an Ellipse – The point of intersection of the line and ellipse -The equation tangent to the ellipse – The chord of contact of tangents - The equation of the normal to the ellipse at the point (x_1,y_1) - Properties of an Ellipse . **Part I : Chapter 7 (Sections 1, 3, 5, 6, 10 , 11)**	**12**	**CO2**
III	Hyperbola: Equation of the hyperbola – Coordinates of a point on the hyperbola in terms of single parameter – Asymptotes of the hyperbola- Rectangular hyperbola - Parametric representation of $xy=c^2$. **Part I : Chapter 8 (Sections 1, 3, 8, 10, 11)**	**12**	**CO3**
IV	Analytical Geometry of 3 Dimensions: Plane: General Equation – Different forms of equations of a plane – The equation of the plane passing through the points – Angle between the planes. The Straight Line: Symmetric form of the equations of the line – Equation of a straight line passing through two given points. **Part II** : **Chapter 2(Sections 1 to 7); Chapter 3 (Sections 1 to 4)**	**12**	**CO4**
V	Sphere: Equation of a sphere – The plane section of a sphere is a circle – Equation of a circle on a sphere – Intersection of two spheres is a circle. Cone: Right circular cone. **Part II** :**Chapter 4 (Sections 1 to 7); Chapter 5 (Section 2)**	**12**	**CO5**

TEXT BOOKS

1. *Manicavachagom Pillay, T.K. and Natarajan, T.* 2000.**A Text book of Analytical Geometry Part I - Two Dimensions**. S.Viswanathan Publications, Chennai.(For Units I, II and III)
2. *Manicavachagom Pillay, T.K. and Natarajan, T.* 2001.**A Text book of Analytical Geometry Part II - Three Dimensions**. S.Viswanathan Publications, Chennai.(For Units IV and V)

REFERENCE BOOKS	
1.	*Duraipandian, P., Laxmi Duraipandian and Muhilan*, D. 1997. **Analytical Geometry 3 Dimension.** Emerald Publishers.
2.	*Shanti Narayanan and Mittal, P.K* . 2009. **Analytical Solid Geometry.** S.Chand and Company Ltd., New Delhi.
3.	*Duraipandian, S. and Laxmi Duraipandian.* **1997**. **Analytical Geometry 2 Dimension**. Emerald Publishers, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of conic section parabola and its properties.
CO2	Describe ellipse and find the equation normal to the ellipse.
CO3	Find the equation of the hyperbola and rectangular hyperbola.
CO4	Find the equation of the plane and symmetric form of straight lines.
CO5	Compute equation of sphere and circle on a sphere.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM302	CORE VI: STATICS & DYNAMICS	SEMESTER III

COURSE OBJECTIVES

The course aims

- To provide the knowledge about the nature of forces acting on a surface, friction and centre of gravity.
- To enable the students to realize the resultant forces acting at a point.
- To learn about virtual work.

Credits: 04 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	Definition – parallelogram law of forces – resultant of two forces – triangle law of forces – perpendicular triangle of forces – lami's theorem. (Example problems only). **Chapter1 (Sections 1 - 6), Chapter 2(Sections 1 - 9)**	12	CO1
II	Introduction – experimental results – statistical , dynamical and limiting friction – laws of friction – coefficient of friction – angle of friction – cone of friction – equilibrium of a particle on a rough inclined plane- equilibrium of a body on a rough inclined plane under the force parallel to plane, under any force – problem on friction. (Example problems only). **Chapter7 (Sections 1 – 4, 6 - 8, 10 - 13)**	12	CO2
III	Definition-two fundamental principles-path of a projectile is a parabola – characteristic of the motion of a projectile – maximum horizontal range – range on the inclined plane – motion on the surface of smooth inclined plane. (Example problems only). **Chapter6 (Sections 6.1 – 6.5 , 6.7, 6.12 , 6.16)**	12	CO3
IV	Definition – fundamental laws of impact – Newton's experimental law – principle of conservation of momentum – impact of sphere on a fixed smooth plane – direct and oblique impact of two spheres – loss of kinetic energy. (Example problems only). **Chapter8 (Sections 8.1 – 8.8)**	12	CO4
V	Simple harmonic motion in a straight line – general solution simple harmonic motion equation–composition of two simple harmonic motion - loss or gain in the number of oscillation. Velocity and acceleration in polar co-ordinates – differential equation of central orbits – perpendicular from the pole with tangent - pedal equation of central orbit. (Example problems only). **Chapter10 (Sections 10.1 – 10.3, 10.6 – 10.7, 10.16)** **Chapter 11(Sections 11.2, 11.6 – 11.8)**	12	CO5

TEXT BOOKS	
1.	*Venkatraman, M.K.* **Statics.** [Eleventh Edition]. Agasthiar Publication, Trichy.
2.	*Venkatraman, M.K.* **Dynamics.**[Twelfth Edition].Agasthiar Publication, Trichy.
REFERENCE BOOKS	
1.	*Narayanan, S.* 1986.**Statics.** Sultan Chand and Co., Chennai.
2.	*Duraipandian, P. and Lakshmi Duraipandian.* 1984. **Mechanics.** Emerald Publishers, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of forces and know the resultant of any number of forces acting on a particle.
CO2	Compute the experimental results of statistical, dynamical and limiting frictions.
CO3	Solve problems involving the concepts projectile.
CO4	Understand the concepts of fundamental laws of impact and kinetic energy.
CO5	Apply the concepts of simple harmonic motion, velocity and acceleration to solve problems in real life situation.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAA301	ALLIED III: MATHEMATICAL STATISTICS I	SEMESTER III

COURSE OBJECTIVES

The course aims

- Introduction to the concepts of random variables and distribution of random
- variables.
- This course provides a sound knowledge about some standard distributions.
- To give a good grip on concepts in analyzing the data using Correlation and
- regression lines.

Credits: 02 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	Random variables – Distribution functions - Discrete and continuous random variables – One dimensional and two dimensional random variables - Probability mass function and probability density function – Joint probability function and Marginal probability functions and conditional distributions – Problems. **Chapter 5(Sections 5.1 – 5.5)**	**10**	**CO1**
II	Mathematical expectation –Properties- Variance – Properties – Covariance - Moment generating function – Properties - Characteristic function – Properties – Problems - Chebechev's Inequality(Excluding Problems). **Chapter 6 (Sections 6.1 – 6.6)** **Chapter 7 (Sections 7.1, 7.3, 7.5)**	**10**	**CO2**
III	Theoretical Discrete distributions: Binomial, Poisson, Geometric distributions– Derivations, Properties and applications. **Chapter 8 (Sections 8.4, 8.5, 8.7)**	**10**	**CO3**
IV	Theoretical Continuous distributions: Normal distribution, Uniform distribution and Exponential Derivations, Properties and applications. **Chapter 9 (Sections 9.2, 9.3, 9.8)**	**10**	**CO4**
V	Correlation and Regression: Correlation co-efficient and rank correlation co-efficient – Regression lines and regression co-efficients – Properties – Multiple and Partial correlation co-efficient (Three variables only). **Chapter (Sections 10.1 – 10.4) Chapter (Sections 11.1 – 11.2)** **Chapter (Sections 12.7 – 12.8)**	**10**	**CO5**

TEXT BOOKS

1. *Gupta, S.C. and Kapoor, V.K.* 1994. **Fundamentals of Mathematical Statistics**. [Ninth Edition]. Sulthan Chand and Sons, New Delhi.

REFERENCE BOOKS	
1.	*Gupta,S.C. and Kapoor,V.K. 2001.* **Elements of Mathematical Statistics.** [Third Edition]. Sulthan Chand and Sons, New Delhi.
2.	*Vittal, P.R.* 2009. **Mathematical Statistics**. Margham Publications, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Define Random variables, Probability mass function and probability density function, Distribution functions and Find Joint probability function and Marginal probability functions and conditional distributions.
CO2	Compute expectation, covariance and MGF and show Chebechev's inequality.
CO3	Solve problems involving the concepts of theoretical discrete distributions.
CO4	Solve problems involving the concepts of theoretical continuous distributions.
CO5	Apply the concepts of correlation and regressions to solve problems in real life situation.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAAP301	ALLIED PRACTICAL III: STATISTICAL PACKAGE (Ms - EXCEL)	SEMESTER III

COURSE OBJECTIVES

The course aims

- To give a good grip on concepts in analyzing the data using Excel.
- To provide a sound knowledge about diagrams, graphs and measures.

Credits: 02 **Total Hours:24**

S.No	EXPERIMENT	Hrs.	CO
01.	Simple Bar diagram.	**1**	**CO1**
02.	Multiple Bar diagram.	**1**	**CO1**
03.	Simple line diagram.	**1**	**CO1**
04.	Multiple line diagram.	**1**	**CO1**
05.	Pie diagram.	**1**	**CO1**
06.	Histogram.	**1**	**CO1**
07.	Mean.	**2**	**CO2**
08.	Median.	**2**	**CO2**
09.	Mode.	**2**	**CO2**
10.	Geometric Mean.	**1**	**CO3**
11.	Harmonic Mean.	**1**	**CO3**
12.	Standard Deviation.	**1**	**CO4**
13.	Coefficient of Variation.	**1**	**CO4**
14.	Karl Pearson's Coefficient of Skewness.	**2**	**CO5**
15.	Bowley's Coefficient of Skewness.	**2**	**CO5**
16.	Karl Pearsons's correlation coefficient.	**2**	**CO6**
17.	Spearman's rank correlation coefficient.	**2**	**CO6**

TEXT BOOK

1. *Sharma, K.V.S.* 2002**. Statistics made simple**. Prentice Hall of India Private Limited, New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of diagrammatic representation for statistical data.
CO2	Acquire the knowledge about some standard distribution.
CO3	Solve problems involving the concepts Geometric and Harmonic mean.
CO4	Find standard deviation and coefficient of variation.
CO5	Measure the coefficient of skewness.
CO6	Compute Correlation co-efficient.

18UMASB301	**SBC I : QUANTITATIVE APTITUDE I**	**SEMESTER III**

COURSE OBJECTIVES

The course aims

- To develop and improve the problem solving skill.

Credits: 02 **Total Hours: 25**

UNIT	**CONTENTS**	**Hrs**	**CO**
I	Simplification and Average. **Chapters 4 and 6**	**05**	**CO1**
II	Square roots and cube roots, Surds and indices. **Chapter s 5 and 9**	**05**	**CO2**
III	Ratio and proportion, Chain rule. **Chapters 12 and 14**	**05**	**CO3**
IV	Profit and loss, partnership. **Chapters 11 and 13**	**05**	**CO4**
V	Problem on ages and percentage. **Chapters 8 and 10**	**05**	**CO5**

TEXT BOOK

1.	*Agarwal*, *R.S.* 2014. **Quantitative Aptitude.** S. Chand & Company Ltd, New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Solve problems involving the concepts of Simplification and Average.
CO2	Solve problems involving the concepts of Surds and indices.
CO3	Solve problems involving the concepts of Ratio and proportion.
CO4	Solve problems involving the concepts of Profit and loss, Partnership.
CO5	Solve problems involving the concepts of age and percentage.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18ULS301	CAREER COMPETENCY SKILLS I	SEMESTER III

COURSE OBJECTIVES

The course aims

- To understand the basic needs of Communication.
- To utilize the communication skills for achieving at the time of Interview.

Credits: 02 **Total Hours: 25**

UNIT	CONTENTS	Hrs	CO
I	Basic Grammar – Usage of English – Listening and Speaking (Level-1). Tenses and Voices (Present, Past and Future).	3	CO1
II	Sentence Correction – Sentence Pattern – Reading. Comprehension (Level -1).	3	CO2
III	Expansion of Proverbs – Closet Test (Level -1).	3	CO3
IV	Sentence Improvement (Essay Writing, Now- a –Days Vocabulary), Story Writing.	3	CO4
V	E-Mail Building (Sending call letters), Letters (Formal and Informal).	3	CO5

TEXT BOOKS

1. *Anne Seaton, Mew Y. H.* **Basic English Grammar for English-Book 1.** Learners Saddle point Publishers.
2. *Mark Newson.* **Basic English Syntax with Exercises.** (E-Copy).

REFERENCE BOOK

1. *Chand S, Agarwal R. S.* **Objective General English.** Arihant Publications (India) Limited.

COURSE OUTCOMES (CO)

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

CO1	Recall the basic grammar in English.
CO2	Concentrate on Sentence Correction.
CO3	Understand Paragraph Writing.
CO4	Improve the ability of Sentence Construction and Story Writing.
CO5	Format Web Writing and Formal Writing of letters.

18UTALA401	TAMIL – IV: சங்க இலக்கியம் - நீதி இலக்கியம்	பருவம் - IV

இப்பாடத்திட்டத்தின் நோக்கங்களாவன :

- சங்க இலக்கியம், அற இலக்கியங்களின் சிறப்பைஉணர்த்துதல்.
- இலக்கண நூல்களைகாலவரிசைப்படிஅறியச் செய்தல்.
- அணி இலக்கணத்தின் சிறப்பைஉணரச் செய்தல்.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**எட்டுத்தொகை** அ.நற்றிணை–அன்னாய் வாழிப்பத்து (பாடல் எண். 208, 209, 210). ஆ. குறுந்தொகை–யாயும் ஞாயும் (பாடல் எண்.40). இ. கலித்தொகை–ஆற்றுதல் என்பதொன். (பாடல் எண்.103). ஈ. புறநானூறு –பல்சான்றீரேபல்சான்றீரே (பாடல் எண்.195).	10	CO1
II	**பத்துப் பாட்டு** அ. குறிஞ்சிப்பாட்டு (1 முதல் 106 அடிகள் வரை) -கபிலர்.	12	CO2
III	**அற இலக்கியங்கள்** அ. நாலடியார் -பாடல் எண் (35,59,94,141,333). ஆ. நான்மணிக்கடிகை - பாடல் எண் (04,09,59,69,80). இ. பழமொழி-பாடல் எண் (05,21,120,149,361). ஈ. சிறுபஞ்சமூலம் - பாடல் எண் (05,17,48,83,99).	10	CO3
IV	**இலக்கியவரலாறு** அ. சங்க இலக்கிய நூல்கள் அறிமுகம். ஆ. முச்சங்கவரலாறு. இ. தமிழ் இலக்கண நூல்கள் அறிமுகம். ஈ. அற இலக்கியங்கள் அறிமுகம்.	10	CO4
V	**இலக்கணம்** அ. அணி இலக்கணம். 1. உவமைஅணி 2. உருவகஅணி 3. வேற்றுமைஅணி. 4. வஞ்சப்புகழ்ச்சிஅணி. ஆ. அகத்திணைகள்,புறத்திணைகள் - விளக்கம்.	08	CO5

TEXT BOOK

1.	தமிழ்த்துறை வெளியீடு, கே. எஸ். ரங்கசாமி கலை அறிவியல் கல்லூரி (தன்னாட்சி), திருச்செங்கோடு– 637 215.

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாக மாணவர்கள் பெறும் பயன்களாவன:

CO1	எட்டுத்தொகை நூல்களின் சிறப்பை அறிதல்.
CO2	பத்துப்பாட்டு நூல்களின் சுவை அறிதல்.
CO3	அற இலக்கியங்கள் பற்றிஅறிதல்.
CO4	இலக்கியங்கள் தோற்றமுறையை அறிதல்.
CO5	அணி இலக்கணத்தின் பயன் பற்றிஅறிதல்.

<table>
<tr><td colspan="2">18UENLA401</td><td>FOUNDATION ENGLISH - IV</td><td colspan="2">SEMESTER – IV</td></tr>
<tr><td colspan="5">COURSE OBJECTIVES
The course aims
• To promote communication skills through literature.
• To enhance the language learning through activities.</td></tr>
<tr><td colspan="3">Credits: 3</td><td colspan="2">Total Hours: 50</td></tr>
<tr><td>UNIT</td><td colspan="2">CONTENTS</td><td>Hrs</td><td>CO</td></tr>
<tr><td>I & II</td><td colspan="2">ONE ACT PLAY
Monica Thorne - The King Who Limped.
PROSE
A.G.Gardiner - On Shaking Hands.
GRAMMAR
Punctuation.
COMPOSITION
Hints Development.
COMMUNICATION SKILLS
Breaking the Law.
Honoring the Person.</td><td>20</td><td>CO1 & CO2</td></tr>
<tr><td>III & IV</td><td colspan="2">ONE ACT PLAY
Ella Adkins – The Unexpected.
PROSE
Minoo Masani - No Man is an Island.
GRAMMAR
Conditional Clause.
COMPOSITION
Report Writing.
COMMUNICATION SKILLS
Brain Storming.</td><td>20</td><td>CO3 & CO4</td></tr>
<tr><td>V</td><td colspan="2">PROSE
Arnold Toynbee - India’s Contribution to World Unity.
GRAMMAR
Simple, Compound and Complex Sentences.
COMPOSITION
Jumbled Sentences.
COMMUNICATION SKILLS
Role-Play</td><td>10</td><td>CO5</td></tr>
<tr><td colspan="5">TEXT BOOKS</td></tr>
<tr><td>1.</td><td colspan="4">Ramamurthy.K.S. 1984. Seven-Act Plays. Published in India by Oxford University. New Delhi–110 001.</td></tr>
<tr><td>2.</td><td colspan="4">Damodar.G, D.Venkateshwarlu, M.Narendra, M.SaratBabu, G.M.Sundaravalli. 2009. English For Empowerment. Published by Orient Blackswan Private Limited. Hyderabad –500 029.</td></tr>
<tr><td>3.</td><td colspan="4">SasiKumarV and SyamalaV. 2006. Form and Function - A Communicative Grammar for Colleges. Emerald Publishers. Chennai–600 008.</td></tr>
<tr><td>4.</td><td colspan="4"></td></tr>
</table>

	Farhathullah.T.M. 2006. **Communication Skills for Undergraduates**. RBA Publications. Chennai–600 015.
REFERENCE BOOK	
1.	Raymond Murphy. 1994. **Intermediate English Grammar.** Cambridge University India Pvt. New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Understand the text on the basis of close reading analytically and critical views.
CO2	Ability to construct a sustained sophisticated and original argument on a specific topic.
CO3	Acquire language skills through composition.
CO4	Acquire both composition and communication skills.
CO5	Apply basic communication skills.

18UMAM401	CORE VII : APPLICATIONS OF INTEGRATION AND VECTOR CALCULUS	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To provide a fundamental knowledge of vector differentiation and integration and integral theorems.
- To learn about the applications of vector calculus.

Credits : 4 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	Area under plane curves – Area of the closed curves - Area in polar co-ordinates - Volume of the solid revolution - Length of a curve - Cartesian co-ordinates - Polar co-ordinates - Area of surface of revolution. **Part II : Chapter2 (Sections 1.1, 1.2, 1.4, 2.2, 4 and 5)**	**12**	**CO1**
II	Fourier series: Obtain Fourier series for a given periodic function with period 2π - Odd and Even functions – Half range series. **Volume II (1995): Chapter 13 (Sections 1 to 5)**	**12**	**CO2**
III	Vector Differentiation: Gradient – Directional derivative – Unit vector normal to the Surface - Divergence – Curl – Solenoidal – Irrotational – Vector Identities (Statement Only), Solved Problems. **Part II : Chapter 2 (Sections 6 to 11)**	**12**	**CO3**
IV	Vector Integration: Line integral – Surface integral – Volume Integral. **Vector Calculus : Chapter 3 (Section 2-11)**	**12**	**CO4**
V	Stoke's Theorem – Gauss divergence theorem – Green's theorem – problems. **Vector Calculus : Chapter 3 (Sections 5 to 9)**	**12**	**CO5**

TEXT BOOKS

1.	*Narayanan, S. and Manicavachagom Pillay, T.K.* 2010**. Calculus Vol II.** S.Viswanathan Publications, Chennai. (For Units I , II and III)
2.	*Sharma, J.N., and Vashista, A.R.* **Vector Calculus.** Krishna Prakasam Mandir,Meerut. (For units IV and V)

REFERENCE BOOK

1.	*Vittal, P.R.* 2000. **Calculus.** Margham publications, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Find area under plane curve, closed curve , length of the curve and find volume of the solid revolution.
CO2	Obtain the Fourier series for periodic function, odd and even functions, Half range series.
CO3	Understand the concepts of Gradient, Directional derivative, Divergence, Curl, Solenoidal and Irrotational. Show the Vector Identities.
CO4	Compute Line integral – Surface integral – Volume Integral.
CO5	Apply the concepts of Stoke's Theorem – Gauss divergence theorem – Green's theorem to solve problems in vector integration.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM402	**CORE VIII: SEQUENCES AND SERIES**	**SEMESTER IV**

COURSE OBJECTIVES

The course aims

- To understand the functions of Bounded variations.
- To know the application of Power series (Problems only).

Credits: 04 **Total Hours:60**

UNIT	CONTENTS	Hrs	CO
I	Sequences: Introduction - Convergence sequences – Oscillatory sequences - Bounded sequences -- Divergent sequences – Some important limit theorems – Cauchy sequences. **Chapter 5 (Sections 5.1 , 5.2, 5.4 , 5.6, 5.7 – 5.9)**	**12**	**CO1**
II	Cluster points of a sequence -Monotonic sequences – Subsequences - Limit superior and limit inferior of a sequence. **Chapter 5 (Sections 5.3, 5.11 – 5.13)**	**12**	**CO2**
III	Infinite series : Introduction – Sequences of partial sums of a series –A necessary condition for the convergence - Convergent series - Cauchy's general principle of convergence for series–Series of positive term. **Chapter 6 (Sections 6.1 – 6.4)**	**12**	**CO3**
IV	Comparison tests – An important comparison series - Cauchy's n^{th} root test - D'Alembert's ratio test - Raabe's test - Cauchy's condensation test. **Chapter 6 (Sections 6.6 – 6.9,6.11-6.13,6.20)**	**12**	**CO4**
V	Logarithmic test - Bertrand and de Morgan's test –Kummer's test- Gauss's test – Absolute convergence - conditional convergence – Alternative series. **Chapter 6 (Sections 6.14 – 6.15,6.17-6.18) Chapter 7 (Sections 7.2-7.3)**	**12**	**CO5**

NOTE: Definition, Theorem Statement (Excluding Proof) & Problems Only.

TEXT BOOK

1.	*Shanti Narayan and Raisinghania, M.D*. 2007. **Elements of Real Analysis**. S. Chand and Company Ltd., New Delhi.

REFERENCE BOOK

1.	*Singal, M.K. and Asha Rani Singal*. 2003. **A First Course in Real Analysis.** R. Chand and Company Ltd., New Delhi. (For units I, III, IV & V)

COURSE OUTCOMES (CO)

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

CO1	Define sequence, convergent sequence, divergent sequence and bounded sequence.
CO2	Understand the concepts of Monotone sequence, limit superior and limit inferior.
CO3	Identify whether the given infinite series is either convergent or divergent.
CO4	Apply various test to find the convergence and divergence of the series.
CO5	Show that the given series is either convergent or divergent with the help various test and applying the concepts of absolute convergent and conditional convergent.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAA401	ALLIED IV: MATHEMATICAL STATISTICS II	SEMESTER IV

COURSE OBJECTIVES

The course aims

- This course provides a sound knowledge about estimation theory.
- To give a good grip on concepts in analyzing the data using Test of Significance.

Credits: 02 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	Population and Sample – Sampling Methods - Parameter and Statistic - Point Estimation – Unbiasedness, Consistency, Efficiency– Sufficiency - Cramer Rao Inequality - Rao Blackwel Theorem. **Chapter 14 (Sections 14.2, 14.3) Chapter 17 (Sections 17.2.1 – 17.2.4, 17.3, 17.5)**	**10**	**CO1**
II	Methods of Estimation – Maximum Likelihood Estimation– Method of Moments – Properties of these estimators – Interval estimation (Concept only). **Chapter 17 (Sections 17.6.1, 17.6.3, 17.7)**	**10**	**CO2**
III	Testing of Hypothesis – Concept of Statistical Hypothesis – Simple and Composite hypothesis – Critical Region – Type I and Type II Errors – Power of the test – Neymann Pearson Lemma (Excluding Problems). **Chapter 18 (Sections 18.2, 18.5)**	**10**	**CO3**
IV	Standard Error - Test of Significance - Large sample test with regard to Mean, Variance, Difference of Mean, Proportions and Difference of Proportions – Problems. **Chapter 14 (Sections 14.3.2, 14.4,14.6)**	**10**	**CO4**
V	Test of Significance – Exact tests based on t and F distributions with regard to Mean, Variance and Correlation co-efficient – Test based on Chi-Square distribution. **Chapter 16 (Sections 16.3)**	**10**	**CO5**

TEXT BOOK

1. *Gupta, S.C. and Kapoor, V.K.* 1994. **Fundamentals of Mathematical Statistics**. [Eleventh Edition]. Sultan Chand and Sons, New Delhi.

REFERENCE BOOKS

1. *Gupta, S.C. and Kapoor,V.K. 2001.* **Elements of Mathematical Statistics.** [Third Edition]. Sultan Chand and Sons, New Delhi.

2. *Vittal, P.R.* 2009. **Mathematical Statistics**. Margham Publications, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Define sampling and point estimation. Understand the concepts of Cramer Rao Inequality, Sufficiency and Rao Blackwel Theorem.
CO2	Understand the concepts of Estimation theory.
CO3	Apply the testing of hypothesis and compute type I and type II error.
CO4	Apply the large sample tests.
CO5	Solve problems using t-test, F-test and chi-square test.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAAP401	ALLIED PRACTICAL IV: STATISTICAL SOFTWARE (SPSS)	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To give a good grip on concepts in analyzing the data using SPSS Software.
- This course provides a sound knowledge about test of Significance, Correlation, Regression and Non-parametric test.

	Credits: 02		**Total Hours: 24**
S.No	**EXPERIMENT**	**Hrs**	**CO**
01.	Simple Bar diagram.	**1**	**CO1**
02.	Multiple Bar diagram.	**1**	**CO1**
03.	Simple line diagram.	**1**	**CO1**
04.	Multiple line diagram.	**1**	**CO1**
05.	Pie diagram.	**1**	**CO1**
06.	Histogram.	**1**	**CO1**
07.	Mean, Median, Mode.	**2**	**CO2**
08.	Standard Deviation, Coefficient of Variation, Skewness and Kurtosis.	**2**	**CO3**
09.	Karl Pearsons's correlation coefficient.	**1**	**CO4**
10.	Spearman's rank correlation coefficient.	**1**	**CO4**
11.	Regression lines.	**1**	**CO5**
12.	t-test for single mean.	**1**	**CO6**
13.	t-test difference of mean.	**1**	**CO6**
14.	t-test for paired data.	**1**	**CO6**
15.	chi-square test for independent of attributes.	**2**	**CO7**
16.	f-test.	**1**	**CO8**
17.	Run test.	**1**	**CO8**
18.	Mann Whitney U test.	**1**	**CO8**
19.	Wilcoxon Signed rank test.	**1**	**CO8**
20.	Krushkal Walis H test.	**2**	**CO8**

TEXT BOOK

1. *Sheridan J Coakes, Lyndall Steed and Peta Dzidic*. **SPSS 13.0 Version for Windows Analysis without Anguish**. John Wiley & Sons, Australia.

REFERENCE BOOKS

1. *Andy Field*. 2006. **Discovering Statistics Using SPSS**. [Second Edition]. SAGE Publications.

2.	*Robert H. Carver, and Jane Gradwohl Nash*. 2007. **Doing Data Analysis with SPSS Version -14**. Thomson Brooks cole.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of diagrammatic representation for statistical data.
CO2	Acquire the knowledge about some standard distribution.
CO3	Compute standard deviation, coefficient of variation, skewness and kurtosis.
CO4	Acquire the concepts in analyzing the data using Correlation co-efficient.
CO5	Understand the concept of regression.
CO6	Apply t-test.
CO7	Apply chi-square test for independent of attributes.
CO8	Acquire the knowledge different kinds of test.

18UMASB401	SBC II : STATISTICS FOR COMPETITIVE EXAMS (100 % Internal Evaluation)	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To strengthen our students skills to get success in Competitive exams.
- To provide Problem solving skills.

Credits:02 **Total Hours:25**

UNIT	CONTENTS	Hrs	CO
I	Uses, Scope and limitation of Statistics, Collection Classification and tabulation of data, Diagrammatic and Graphical representation.	**05**	**CO1**
II	Simple random sample - stratified, systematic, Cluster (Single stage) - Sampling and Non-Sampling errors.	**05**	**CO2**
III	Time series - Different Components - Trend and Seasonal Variations - Determination and elimination.	**05**	**CO3**
IV	Index Numbers - Construction and uses - Different kinds of simple and weighted index numbers - Reversal tests - construction and use of cost of living index numbers.	**05**	**CO4**
V	Vital Statistics - Birth and death rates - Crude and standard death rates, Fertility rates - Life table construction and uses.	**05**	**CO5**

TEXT BOOK

1. *Agarwal, B.S.* **Programmed Statistics.** (Second Edition). New Age International(P) Limited, Publishers, New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Classify, tabulate and analyse the collected data.
CO2	Understand the concepts of random sample and compute the sampling and non-sampling errors.
CO3	Apply time series analysis to compute trend and seasonal variations.
CO4	Solve problems involving the concepts of index numbers.
CO5	Compute birth rates, death rates, fertility rates and construct life table.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18ULS401	CAREER COMPETENCY SKILLS II	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To impart knowledge on the aptitude skills.
- To enhance employability skills and to develop career competency.

Credits: 02 **Total Hours: 15**

UNIT	CONTENTS	Hrs	CO
I	Aptitude: Speed Maths - Multiplication of Numbers - Simplification - Squaring of numbers - Square roots and cube roots – HCF & LCM –Decimals - Averages, Powers and Roots.	**3**	**CO1**
II	Aptitude: Problems on Numbers – Problems on Ages – Surds & Indices – Percentage – Profit & Loss – Ratio & Proportion – Partnership – Chain Rule.	**3**	**CO2**
III	Aptitude: Simple & Compound Interest – Alligation or Mixture - Permutation and Combination.	**3**	**CO3**
IV	Aptitude: Probability – Missing Number series – Wrong Number Series – Races & Games of Skill.	**3**	**CO4**
V	Aptitude: Time & Work – Pipes & Cistern – Time & Distance – Problems on Trains – Boats and Streams.	**3**	**CO5**

TEXT BOOK

1.	*R.S. Aggarwal.* 2017. **Quantitative Aptitude**, *S Chand and Company Limited, New Delhi.*

REFERENCE BOOKS

1.	*Abhijith Guha.* 2015. **Quantitative Aptitude for Competitive Examinations**, *5th Edition, Tata McGraw Hill, New Delhi.*

COURSE OUTCOMES (CO)

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

CO1	Carry out mathematical calculations using shortcuts.
CO2	Calculate problems on age, surds and indices with shortcuts.
CO3	Understand the core concepts of SI and CI, Permutation and Combination.
CO4	Obtain knowledge on shortcuts to calculate number series.
CO5	Perform new methods for aptitude calculations.

18UMANM301	NMEC I: QUANTITATIVE APTITUDE	SEMESTER – III

COURSE OBJECTIVE

The course aims

- To create and improve the problem solving skills.

Credits: 2 **Total Hours: 25**

UNIT	CONTENTS	Hrs.	CO
I	Problems on Time and Work. **Chapter: 15**	05	CO 1
II	Problems on Trains. **Chapter: 18**	05	CO 2
III	Simplification – Logarithm based problems. **Chapters: 4 and 23**	05	CO 3
IV	Problems on Areas. **Chapter: 24**	05	CO 4
V	Problems on Volumes, Surface Areas. **Chapter: 25**	05	CO 5

TEXT BOOK

1.	*Aggarwal, R.S.* 2008. **Quantitative Aptitude.** S.Chand and Company Ltd., New Delhi.

COURSE OUTCOMES (CO)

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

CO 1	Solve problems involved in Time and Work.
CO 2	Gain knowledge on Problems on Trains.
CO 3	Simplify the given problem and find solution for the Logarithms.
CO 4	Find the area value for the different regions.
CO 5	Calculate volumes and Surface areas.

18UMANM401	**NMEC II : BASIC STATISTICS**	**SEMESTER – IV**

COURSE OBJECTIVES

The course aims

- To create and improve the problem solving skills.

Credits: 2 **Total Hours: 25**

UNIT	CONTENTS	Hrs	CO
I	Statistics – Definition – Classification and Tabulation – Formation of Frequency Distribution.	**5**	**CO1**
II	Measures of Central Tendency: Arithmetic Mean, Median and Mode.	**5**	**CO2**
III	Measures of Dispersion: Range, Standard Deviation and Coefficient of Variation.	**5**	**CO3**
IV	Correlation – Definition – Properties – Karl Pearson Coefficient of Correlation – Spearman's Rank Correlation	**5**	**CO4**
V	Regression Lines- Properties of Regression Coefficients – Difference between Correlation and Regression .	**5**	**CO5**

TEXT BOOK

1. *Agarwal, R.S.* 2008. **Quantitative Aptitude.** S.Chand and Company Ltd., New Delhi.

COURSE OUTCOMES (CO)

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

CO 1	Learn the importance of statistics
CO 2	Understand the concepts of measures of central tendency
CO 3	Know the concepts of measures of dispersion
CO 4	Gain knowledge on correlation
CO 5	Discuss the regression analysis

18UMAAC301	ADD ON COURSE I: DATA ANALYSIS USING R – SOFTWARE	SEMESTER III

COURSE OBJECTIVES

The course aims

- To give a good grip on Concepts in analyzing the data using R – Programming
- This course Provides a Knowledge of R –Data types, Operators, Function, Chart & etc.

Credits: 02 **Total Hours: 25**

UNIT	CONTENTS	Hrs	CO
I	**Introduction to R Programming** – Evolution of R -Features of R- **R-EnvironmentSetup:** Try to Option Online-Local Environment Setup - **R-Basic Syntax:** R Command Prompt – R Script File – Comments – **R –Data Types:**Vectors ,Lists ,Matrices , Arrays , Factors & Data Frames.	05	CO1
II	**R- Variables:** Variable Assignment - Data type of a Variable – Finding Variables – Deleting Variables – **R – Operators:** Types of Operators , Arithmetic operators , Relational operators , Logical operators , Assignment operators & Miscellaneous operators – **R- Decision Making :** if Statement – if ...Else Statement – The if...else if...else Statement – Switch Statement.	05	CO2
III	**R- Loops**: Reapeat Loop – While Loop – For Loop – Loop Control Statements – Break Statement – Next Statement- **R-Function:** Function Definition – Function Components – Built-in Function – User - Defined Function – Calling a Function – Lazy Evaluation of Function-**R-Strings:** Rules Applied in String Construction – String Manipulation.	05	CO3
IV	**R –Vectors:**Vector Creation – Accessing Vector Elements – Vector Manipulation – **R–Lists:** Creating a list – Naming List Elements – Accessing List Elements – Manipulating List Elements – Merging Lists – Converting List of Vectors – **R-Matrices:** Accessing Elements of a Matrix – Matrix Computations – **R – Arrays:** Naming Columns & Rows – Accessing Array Elements – Manipulating Array Elements – Calculations Across Array Elements.	05	CO4
V	**R – Pie Charts:** Pie Chart Title & Colors – Slice Percentages & Chart Legend – 3D Pie Chart – **R – Bar Charts:** Bar Chart Labels,Title & Colors – Group Bar Chart & Stacked Bar Chart – **R- BoxPlots:** Creating the Boxplot – Boxplot with Notch – **R-Histograms:** Range of x & y values – **R- Line**	05	CO5

	Graphs: Line chart title, color & Labels – Multiple Lines in a Line Chart – **R –** Mean , Median & Mode.		
TEXT BOOK			
1.	*Sandip Rakshit,* **R for Beginners**. McGraw Hill Education, New Delhi.		

COURSE OUTCOMES (CO):

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

CO1	Know R-environment, R-Basic syntax and R- data types.
CO2	Understand the concepts of R- variables, R- operators and R- decision making.
CO3	Write program using R-loops, R-strings and R- functions.
CO4	Apply the concepts of R-vectors and R-matrices to create program in R-environment.
CO5	Create R- pie chart, R-bar chart. R-box plot, R- histogram and compute mean, median and mode.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAAC401	ADD ON COURSE II: NUMERICAL COMPUTATIONS USING MATLAB	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To give a good grip on Concepts in Programming using MATLAB
- This course Provides a Knowledge Data types, Operators, Function, Matrix Computation & etc.

Credits: 02 **Total Hours:25**

UNIT	CONTENTS	Hrs	CO
I	**MATLAB Environment:** Student edition of MATLAB - MATLAB windows – Variables - Working with matrices - Number display - Saving variables - Script M-files **Chapter-2 Section 2.1 to 2.3.**	05	CO1
II	**Predefined MATLAB functions:** Using the Help feature - Elementary Math Functions -Trigonometric functions - Data analysis functions - Random numbers - Defining matrices - Using the colon operator - Computational limitations - Special values and functions. **Chapter- 3 sections: 3.1 to 3.4**	05	CO2
III	**Programming in MATLAB:** Introduction - Problems with 2 variables - User defined input - Output options - Syntax-local variables - Naming function M-files - Rules for witting and using function M-files - Relational end Logical operators - Selection structures - Loops. **Chapter- 5 Sections 5.0 to 5.4**	05	CO3
IV	**Matrix Computations:** Transpose - Dot product - Matrix multiplication - Matrix powers - Matrix inverse – Determinants - Solution using the Matrix inverse - Solution using the Matrix left division - Matrix of zeros - Matrix of ones - Identity matrix - Diagonal matrices – Magic matrices. **Chapter 6 Section 6.1 to 6.3**	05	CO4
V	**Symbolic Mathematics**: Symbolic algebra - Equation solving – Differentiation and Integration. **Numerical Techniques:** Interpolation - Curve fitting: Linear and polynomial regression – Using the interactive fitting tools – Numerical integration – Numerical differentiation. **Chapter 7 Section 7.1 to 7.3 and Chapter-8 Section 8.1 to 8.5.**	05	CO5

TEXT BOOK

1. *Sandip Rakshit,* **R for Beginners**. McGraw Hill Education, New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of MatLab variables and Script M-files.
CO2	Apply MatLab predefined functions to compute maximum, minimum, average of given list of numbers. Do matrix operations in MatLab.
CO3	Write MatLab program using conditional statements and looping statements.
CO4	Know the handling of matrices in MatLab.
CO5	Solve differential equations and compute numerical integration.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAAL401	**ADVANCED LEARNERS COURSE I: INDEX NUMBER & TIME SERIES ANALYSIS**	**SEMESTER IV**

COURSE OBJECTIVES

The course aims

- To learn about Index Numbers.
- To learn Analysis of Time Series and Methods.
- To learn various methods of solving.

Credits:02 **Total Hours:25**

UNIT	**CONTENTS**	**Hrs**	**CO**
I	Index Numbers: Definition-Uses-Types-Problems of construction of index numbers-Method-Simple aggregate-Weighted aggregate. **Chapter – 14**	**05**	**CO1**
II	Index Numbers: Test of consistency of index numbers-time reversal test-Factor Reversal Test-Unit Test Circular Test-Chain Base-Base shifting- Spliting -Deflating Consumer Price index-family budget-Limitation of index Numbers-Formula-Theoretical Questions, Practical Problems. **Chapter – 14**	**05**	**CO2**
III	Analysis of Time Series: Meaning-Definition-User-Time Series models, Secular Trend-seasonal variation-Cyclical variation-Irregular Variation. **Chapter – 15**	**05**	**CO3**
IV	Analysis of Time Series: Measurement of Secular Trend-Graphic Method-Semi average method-Moving average method-Method of Least Squares-Parabola curve. **Chapter – 15**	**05**	**CO4**
V	Analysis of Time Series: Measurement of Seasonal Variation-Method of Simple Average, Ratio to Trend Method-Ratio to Moving Average Method-Link Relative Method-Miscellaneous illustrations-Theoretical Questions, Practical Problems. **Chapter – 15**	**05**	**CO5**

TEXT BOOK

1. *R.S.N Pillai, V.Bagavathi,* **Statistics**. MS.Chand and Company Ltd, New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Construct Index numbers and solve problems involving index numbers.
CO2	Apply various tests to test the consistency of index numbers.
CO3	Understand the concepts of Time series Analysis and compute trend and seasonal variations.
CO4	Solve problems using semi-average, moving-average and Least square method.
CO5	Solve problems using Ratio to Trend Method, Ratio to Moving Average Method and Link Relative Method.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAAL402	ADVANCED LEARNERS COURSE II: THEORY OF NUMBERS & INEQUALITIES	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To learn the concepts of arithmetic and geometric mean.
- To learn categories of inequality and to understand the concept of congruence.

Credits: 02 **Total Hours: 25**

UNIT	CONTENTS	Hrs	CO
I	Introduction to Inequality – Geometric and Arithmetic means. **Chapter 4 (Section 1 – 5)**	**05**	**CO1**
II	Weirstrass Inequality – Cauchy's Inequality – Applications to Maxima and Minima. **Chapter 4 (Section 9 – 11,13)**	**05**	**CO2**
III	Prime and Composite numbers – Divisors of given numbers – Euler's function – Integral parts of real numbers – Highest power of a prime – Product of r consecutive integer. **Chapter 5 (Sections: 1 - 11)**	**05**	**CO3**
IV	Congruences and its Properties – Numbers in arithmetic progression – Problems. **Chapter 5(Section 12 - 15)**	**05**	**CO4**
V	Fermat's theorem – Generalisation of Fermat's theorem – Lagrange's theorem – Problems. **Chapter 5 (Section 16,16.1,18)**	**05**	**CO5**

TEXT BOOK

1. *ManicavachagomPillay,T.K.,Natarajan,T. and Ganapathy, K.S*. 2010. **Algebra - Volume II.**S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concept of inequality and compute Geometric mean and Arithmetic mean.
CO2	Compute maximum and minimum value of a function.
CO3	Identify Prime and Composite numbers, Find the Divisors of given numbers, Integral parts of real numbers, Highest power of a prime and Product of r consecutive integer.
CO4	Solve problems involving the concepts arithmetic progression, Congruences and its Properties.
CO5	Understand Fermat's theorem, Generalisation of Fermat's theorem, Lagrange's theorem and solve problems involving these theorems.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

EVALUATION GUIDELINES

1. SUBMISSION OF RECORD NOTE BOOKS DISSERTATION:

Candidates appearing for Practical Examinations shall submit Bonafide Record Note Books prescribed for Practical Examinations, otherwise the candidates will not be permitted to appear for the Practical Examinations.

2. PASSING MINIMUM AND INTERNAL MARK DISTRIBUTION (Theory, Practical)

(i) A. THEORY

The candidate shall be declared to have passed the Examination, if the candidate secure not less than 40 marks put together out of 100 in the Comprehensive Examination in each Theory paper with a passing minimum of 30 marks in External out of 75.

***Internal Marks Distribution** [CA- Total Marks: 25]*

Attendance	: 5 Marks
Assignment	: 5 Marks
Internal Examinations	: 15 Marks
Total	**: 25 Marks**

B.(i) THEORY (If Internal Evaluation is for 100 Marks)

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks out of 100 in Comprehensive Examination (Internal Evaluation only).

***Internal Marks Distribution** [CA- Total Marks: 100]*

Attendance	: 5 Marks
Assignment	: 5 Marks
Class Test	: 15 Marks
Internal Examinations	: 75 Marks
Total	**: 100 Marks**

(ii) PRACTICAL

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks put together out of 100 in the Comprehensive Examination in each Practical paper with a passing minimum of 24 marks in External out of 60.

***Internal Marks Distribution** [CA- Total Marks: 40]*

Experiment	: 10 Marks (10-20 Experiments)
Attendance	: 5 Marks
Record	: 5 Marks
Internal Examinations	: 20 Marks
Total	**: 40 Marks**

(iii) PRACTICAL

Question Paper Pattern and Mark Distribution [Maximum Marks 60]

Question Paper Pattern

- Practical Examinations shall be conducted at the end of concern Semester.
- Student shall write two questions as examiners choice from the practical list.

External Marks Distribution for Statistical Package(Excel) and Statistical software [CE- Total Marks: 60]

For each practical question the marks shall be awarded as follows:

i) Aim	: 5 Marks
ii) Procedure	: 15 Marks
iii) Displaying the Output	: 5 Marks
iv) Result Declaration	: 5 Marks
Total	**: 30 Marks**
Grand Total	**: 2*30= 60 Marks**

External Marks Distribution for Programing in C and Scilab [CE- Total Marks: 60]

For each practical question the marks shall be awarded as follows:

i) Aim	: 5 Marks
ii) Algorithm / Flowchart	: 5 Marks
iii) Writing the Source Code	: 10 Marks
iv) Test and debug the Source Code	: 5 Mars
v) Displaying the Output	: 5 Marks
Total	**: 30 Marks**
Grand Total	**: 2*30= 60 Marks**

(iv) CAREER COMPETENCY SKILLS

- **Viva voce– Semester III**
  - The student has to come in proper dress code for the Viva Voce
  - Questions will be asked to evaluate the reading, speaking and listening skills of the students.
  - E-mail and Letter drafting exercises will be given.

- **On Line Objective Examination (Multiple Choice questions) – Semester IV**
  - 100 questions-100 minutes
  - Twenty questions from each UNIT.
  - Online examination will be conducted at the end of the IV Semester.

3. QUESTION PAPER PATTERN AND MARK DISTRIBUTION

(i) THEORY **(For 75 marks)**

Question Paper Pattern and Mark Distribution

1. **PART – A (10 x 2 = 20 Marks)**
   Answer ALL questions
   Two questions from each UNIT

2. **PART – B (5 x 5 = 25 Marks)**
   Answer ALL questions
   One question from each UNIT with Internal Choice

3. **PART – C (3 x 10 = 30 Marks)**
   Answer ANY THREE questions
   Open Choice – 3 out of 5 questions
   One question from each UNIT

(ii) ***THEORY (*****100% External Evaluation - Advanced Learner Course)**

Question Paper Pattern and Mark Distribution

1. **PART – A (10 x 2 = 20 Marks)**
   Answer ALL questions.
   Two questions from each UNIT.

2. **PART – B (5 x 7 = 35 Marks)**
   Answer ALL questions.
   One question from each UNIT with Internal Choice.

3. **PART – C (3 x 15 = 45 Marks)**
   Answer ANY THREE questions.
   Open Choice – 3 out of 5 questions One question from each UNIT.

Question Paper Pattern and Mark Distribution(For SBC III & IV)

Objective type questions (100 x 1 = 100 Marks)

Answer ALL questions.
Twenty questions from each UNIT.

iii) PRACTICAL **- Add-on Course**

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks put together out of 100 in the Comprehensive Examination in each Practical paper with a passing minimum of 24 marks in External out of 60.

Internal Marks Distribution ***[CA- Total Marks: 40]***

Experiment	: 10 Marks (10-20 Experiments)
Attendance	: 5 Marks
Record	: 5 Marks
Internal Examinations	: 20 Marks
Total	**: 40 Marks**

External Marks Distribution ***[CE- Total Marks: 60]***

For each practical question the marks shall be awarded as follows:

i) Aim	: 5 Marks
ii) Procedure	: 15 Marks
iii) Displaying the Output	: 5 Marks
iv) Result Declaration	: 5 Marks
Total	**: 30 Marks**
Grand Total	**: 2*30= 60 Marks**

Marks may be proportionately reduced for the errors committed in each of the above.

18UMAM501	CORE IX : ABSTRACT ALGEBRA	SEMESTER V

COURSE OBJECTIVES

The course aims

- To provide a detail knowledge about the algebraic structure.
- To understand the subject as tool applicable to almost all other branches of Science, Engineering and Technology.

Credits : 05 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	**Relations and Mappings:** Relations – Equivalence relations – Partial order - Functions – Binary Operations **Chapter 2 (Sections 2.1 to 2.5)**	12	CO1
II	**Groups:** Definition and examples – Elementary Properties of a group – Equivalent definitions of a group – Permutation groups – Sub groups – Cyclic groups – Order of an element. **Chapter 3 (Sections 3.1 to 3.7)**	12	CO2
III	**Groups:** Cosets and Lagrange's Theorem – Normal sub groups and Quotient groups – Isomorphism – Homomorphism. **Chapter 3 (Sections 3.8 to 3.11)**	12	CO3
IV	**Rings:** Definition and examples – Elementary properties of rings – Isomorphism - Types of rings - Characteristic of a ring - Subrings – Ideals – Quotient rings – Maximal and Prime Ideals **Chapter 4 (Sections 4.1 to 4.9)**	12	CO4
V	**Rings:** Field of quotients of an integral domain – Ordered integral domain – Unique factorization domain – Euclidean domain. **Chapter 4 (Sections 4.11 to 4.14)**	12	CO5

TEXT BOOK

1. *Arumugam, S. and Issac, A*. 2003. **Modern Algebra**. Scitech Publications Pvt. Ltd., Chennai.

REFERENCE BOOKS

1. *Sharma, J.N. and Vashishtha, A.R.* 1981. **Abstract Algebra**. Krishna Prakasam Mandir, Meerut.
2. *Santiago, M.L.* 2003. **Modern Algebra**. Arul Publications, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concept of Relation, Function and Binary Operator.
CO2	Defining elementary properties of a group and to acquire knowledge about Permutation groups.
CO3	Acquire knowledge about coset, Normal sub groups, Quotient groups and Isomorphism.
CO4	Learn about the concept of Ring, types of ring and its characterization.
CO5	Gain knowledge on Integral domain and to solve problems using Unique factorization domain and Euclidean domain.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM502	CORE X: REAL ANALYSIS I	SEMESTER V

COURSE OBJECTIVES

The course aims

- To provide detailed knowledge of sequence and series of real functions and their convergence.
- To introduce the concept of metric space and its properties.
- To provide a knowledge about functions of real numbers and their limits and continuity

Credits: 05 **Total Hours:60**

UNIT	CONTENTS	Hrs	CO
I	**Sets and Functions:** Functions - Real valued functions – Equivalence – Countability – Real Numbers - Least upper bounds. **Sequences of Real Numbers:** Sequence and Sub sequence - Limit of a sequence - Convergent sequences - Divergent sequences - Bounded sequences - Monotone sequences. **Chapter 1 (Sections 1.3 to 1.7) Chapter 2 (Sections 2.1 to 2.6)**	**12**	**CO1**
II	**Sequences of Real Numbers:** Operations on convergent sequences - Operations on divergent sequences - Limit superior and Limit inferior - Cauchy sequences. **Chapter 2 (Sections 2.7 to 2.10)**	**12**	**CO2**
III	**Series of Real Numbers:** Convergence and divergence - Series with non negative terms - Alternating series -Conditional convergence and absolute convergence - Tests for absolute convergence - Series whose terms form a nonincreasing sequence - The class l^2. **Chapter 3 (Sections 3.1 to 3.4, 3.6, 3.7, 3.10)**	**12**	**CO3**
IV	**Limits and Metric Spaces:** Limit of a function on the real line - Metric spaces –Limits in metric spaces. **Continuous functions on metric spaces**: Functions continuous at a point on the real line - Reformulation. **Chapter 4 (Sections 4.1 to 4.3) Chapter 5 (Sections 5.1, 5.2)**	**12**	**CO4**
V	**Continuous functions on metric spaces**: Functions continuous on a metric space - Open sets - Closed sets - Discontinuous functions on R^1. **Chapter 5 (Sections 5.3 to 5.6)**	**12**	**CO5**

TEXT BOOK

1. *Richard R Goldberg*. 1970. **Methods of Real Analysis**. Oxford and IBH Publishing Co. Private limited, New Delhi.

REFERENCE BOOK	
1.	*Somasundaram, D. and Choudhary, B. 1997.* **First course in Mathematical Analysis**. Narosa Publishing House, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concept of function and sequence.
CO2	Learn how to find limit superior and limit inferior.
CO3	Identifying, the infinite series is either convergent or divergent.
CO4	Describe metric space and learn how to solve problems including the concept of continuous function.
CO5	Discuss about Open sets and closed set.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM503	CORE XI: OPERATIONS RESEARCH	SEMESTER V

COURSE OBJECTIVES

The course aims

- To formulate and solve problems as networks and graphs.
- To learn the techniques for converting the industrial problems as mathematical problems and solving them.

Credits: 04 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	**Operations Research – An Overview:** Introduction to Operations Research – Advantages and limitations of models – Linear Programming Problem (LPP) – Mathematical formulation – Graphical solution – Simplex method – Big-M method. **Chapter 1 (Sections 1.1 & 1.6) Chapter 2 (Sections 2.1 to 2.3) Chapter 3 (Sections 3.1 to 3.4) Chapter 4 (Sections 4.1, 4.3, 4.4)**	**12**	**CO1**
II	Two phase simplex method – Formulating Dual in LPP – Duality and simplex method – Dual simplex method. **Chapter 4 (Sections 4.4) Chapter 5 (Sections 5.1, 5.3, 5.7 & 5.9)**	**12**	**CO2**
III	**Transportation problem** – Introduction - Mathematical formulation – North West Corner rule - Matrix Minima method – Vogel's Approximation Method – MODI method – Unbalanced TP. **Chapter 10 (Sections 10.1, 10.2, 10.9, 10.13, 10.15)**	**12**	**CO3**
IV	**Assignment Problem** – Introduction - Mathematical formulation - Hungarian method – Unbalanced AP – Travelling Salesman Problem. **Chapter 11 (Sections 11.1 to 11.3 & 11.4, 11.7)**	**12**	**CO4**
V	Network and scheduling by PERT/CPM – Time calculations in networks – Critical Path Method (CPM) – PERT – PERT Calculations. **Chapter 25 (Sections 25.1 to 25.11)**	**12**	**CO5**

TEXT BOOK

1. *Kantiswarup., Gupta, P.K. and Man Mohan.* 2014. **Operations Research.** [Seventeenth Edition]. Sultan Chand and Sons, New Delhi.

REFERENCE BOOKS

1. *Gupta, P.K. and Hira, D.S.* 2004. **Operations Research.** [Eighth Edition]**.** S.Chand and Co., New Delhi.
2. *Hamdy Taha.* 1996. **Operations Research.** [Eighth Edition]. Prentice Hall Publications, New Delhi.
3. *Kantiswarup., Gupta, P.K. and Man Mohan.* 2001. **Operations Research.** [Ninth Edition]. Sultan Chand and Sons, New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Define linear programming problem and to solve the problems using simplex method, Big-M method and Graphical method.
CO2	Understand the concepts two phase simplex method and dual simplex method.
CO3	Solve the problems using north west corner rule, Vogel's approximation method and MODI method.
CO4	Understand the concept of Assignment problem and travelling salesman problem.
CO5	Calculating network and scheduling by PERT/CPM.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAEL501	ELECTIVE I: DISCRETE MATHEMATICS	SEMESTER V

COURSE OBJECTIVES

The course aims

- To introduce the concepts of mathematical logic.
- To learn about the algebraic structures, lattices and Boolean algebra.
- To provide a sound knowledge of graphs and digraphs.

Credits: 04 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Mathematical Logic:** **Introduction:** Statements and Notation. **Connectives:** Negation- Conjunction - Disjunction –Statement formulas and Truth tables – Well-formed Formulas – Tautologies – Equivalence of Formulas – Duality Law – Tautological Implications. **Chapter I (Sections 1-1, 1-2.1 to 1-2.4, 1-2.7 to 1-2.11)**	**10**	**CO1**
II	**Normal Forms:** Disjunctive Normal Forms - Conjunctive Normal Forms - Principal Disjunctive Normal Forms - Principal Conjunctive Normal Forms. **Chapter - 1 (Sections 1-3.1 to 1-3.4)**	**10**	**CO2**
III	**Relations and Orderings:** Relations – Properties of Binary relations in a set- Equivalence relations. **Functions:** Definition and Introduction – Composition of functions – Inverse functions. **Chapter – 2 (Sections 2-3.1,2-3.2, 2-3.5, 2-4.1 to 2-4.3)**	**10**	**CO3**
IV	**Lattices:** **Introduction:** Lattices as Partially Ordered Sets – Some properties of Lattices – Lattices as Algebraic systems- Sub Lattices, Direct product, and Homomorphism – Some special Lattices. **Chapter – 4 (Sections 4-1.1 to 4-1.5)**	**10**	**CO4**
V	**Boolean Algebra:** Definition and Examples - Subalgebra, Direct Product and Homomorphism. **Boolean Functions:** Boolean Forms and Free Boolean Algebras – Value of Boolean Expressions and Boolean Functions. **Chapter – 4 (Sections 4-2.1 to 4-2.2, 4-3.1 to 4-3.2)**	**10**	**CO5**

TEXT BOOK

1. *Tremblay,J.P., Manohar.R.,*2015. **Discrete Mathematical Structures with Applications to Computer Science ,** Tata McGraw-Hill Company**,** New Delhi

REFERENCE BOOKS	
1.	*Venkataraman, M.K., Sridharan,N. and Chandrasekaran,N.* 2001. **Discrete Mathematics.** The National Publishing Company, Chennai.
2.	*Sundaresan, V., Ganapathy Subramanian, K.S. and Ganesan, K.* 2006. **Discrete Mathematics.** Tata Mc Graw Hill, New Delhi.
3.	*Somasundaram, R.M.* 2003. **Discrete Mathematical** structures. Prentice Hall of India Pvt. Ltd., New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of mathematical logic such as negation, conjunction, disjunction and formulate truth table.
CO2	Describe the principle of conjunctive normal form and disjunctive normal form.
CO3	Discuss about relation, function and its properties.
CO4	Acquire knowledge about lattices, homomorphism and its properties.
CO5	Compute Boolean algebra and Boolean function.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAEL502	ELECTIVE I: GRAPH THEORY	SEMESTER V

COURSE OBJECTIVES

The course aims

- To introduce the concepts of graphs.
- To learn about various types of graphs.
- To provide a sound knowledge on Trees and Digraphs.

Credits: 04 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	Introduction – Definitions and examples – Degrees – Sub graphs – Isomorphism – Independent sets and Coverings - Matrices – Operations on Graphs. **Chapter 2 (Sections 2.0 – 2.4, 2.6, 2.8 and 2.9)**	10	CO1
II	Introduction – Walks, Trails and Paths – Connectedness and Components – Blocks – Connectivity. **Chapter 4 (Sections 4.0 – 4.4)**	10	CO2
III	Introduction – Eulerian Graphs – Konigsberg Bridge Problem - Hamiltonian Graphs. **Chapter 5 (Sections 5.0 – 5.2)**	10	CO3
IV	Introduction – Characterization of Trees - Centre of a Tree. **Chapter 6 (Sections 6.0 – 6.2)**	10	CO4
V	Introduction – Definitions and Basic properties – Paths and Connections - Digraphs and Matrices - Tournament. **Chapter 10 (Sections 10.0 – 10.4)**	10	CO5

TEXT BOOK

1. *Arumugam, S. and Ramachandran, S*. 2001. **Invitation to Graph Theory.** Scitech Publications, Chennai.

REFERENCE BOOKS

1. *Parthasarathy, K.R*. 2001. **Basics of Graph Theory**. TMH Publishing Company, Ltd., NewDelhi.

2. *Kumaravelu, S. and Suseela Kumaravelu*. 1996. **Graph Theory**. SKV Printers.

3. *Chodowm, S.A*. 1997. **A First Course in Graph Theory**. Macmillan Publishers, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of graph, sub graph and covering.
CO2	Compute walk, trail, path and connectivity.
CO3	Discuss about Eulerian graph and its theorem.
CO4	Understand the concepts of characterization of tree.
CO5	Describe about digraph, matrices and tournament.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMASB501	SBC III : MATHEMATICS FOR COMPETITIVE EXAMS - I (100 % Internal Evaluation)	SEMESTER V

COURSE OBJECTIVES

The course aims

- To strengthen our students skills to get success in Competitive exams.
- To provide Problem solving skills.

Credits:02 **Total Hours:25**

UNIT	CONTENTS	Hrs	CO
I	**Matrices:** Matrices and Types of Matrices – Determinant of a matrix, Singular and non-singular matrices. **Determinants:** Inverse of a matrix – Rank of a matrix – Solution of simultaneous linear equations – Properties of Determinants – Cramers' rule – Consistency and inconsistency – Properties of Eigen values and Eigen vectors.	05	CO1
II	Theory of Equations : Definition of nth degree equation – Formation and Solutions of non-linear equations – Transformation of equations – Nature of the roots of the equation. Permutation and combination : Notations – factorials – combination and permutation notations - permutation in different situations – conditional permutation and combination – use of multinomial theorem for counting.	05	CO2
III	Sets, Relations and Functions : Description of a set – Different kinds of sets – Venn diagrams and Operations on Sets – Ordered pairs and Cartesian product of sets – Relations – Types of Relations – Relations of congruence modulo m – Composition of relations – Functions – Types of function.	05	CO3
IV	Trigonometric Equations and Inequalities : Trigonometric Equations – General Solution of elementary equations – Different methods of solving trigonometric equations of various kinds – solving trigonometric inequalities.	05	CO4
V	Limits, Continuity and Differentiability **:** Limits of a function – fundamental theorem on limits – methods of evaluation limits – Existence of limits – left and right hand limits and their evaluation – continuity – continuity at a point and in an interval – fundamental theorems on continuity – Differentiability of a function at a point and in an interval.	05	CO5

TEXT BOOK

1. *Er. Anoop K. Srivastava* .2014. **Objective Mathematics for JEE MAIN 2014**. [Eleventh Edition]. Disha Publication. New Delhi.

REFERENCE BOOKS	
1.	*Vittal, P.R.* 2000. **Algebra Calculus and Trigonometry.** [Fifth Edition].Margham Publications, Chennai.
2.	*Somasundaram, D. and Choudhary, B. 1997.* **First course in Mathematical Analysis**. Narosa Publishing House, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concept of matrix , determinant and properties of eigen value, eigen vector.
CO2	Formulating non linear equation and find nature of roots. Compute permutation and combination.
CO3	Discuss sets, relation, function and its properties.
CO4	Understand the concept of trigonometric equation and inequalities.
CO5	Identify limit, continuity and differentiability of function.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM601	CORE XIII: LINEAR ALGEBRA (Fifth Unit as Self-Study)	SEMESTER VI

COURSE OBJECTIVES

The course aims

- To introduce the structures of vector space and dual space.
- To provide basic knowledge of linear transformation.

Credits: 05 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	**Vector Spaces:** Definition and examples – Subspaces – Linear Transformation. **Chapter 5 (Sections 5.1 - 5.3)**	12	CO1
II	**Vector Spaces:** Span of a set – Linear independence – Basis and Dimension – Rank and Nullity – Matrix of a linear Transformation. **Chapter 5 (Sections 5.4 - 5.8)**	12	CO2
III	**Inner Product Spaces:** Introduction - Definition and examples – Orthogonality – Orthogonal Complement. **Chapter 6 (Sections 6.0 - 6.3)**	12	CO3
IV	**Theory of Matrices:** Algebra of Matrices – Types of Matrices – The inverse of a Matrix - Elementary Transformations – Rank of a Matrix. **Chapter 7 (Sections 7.1 to 7.5)**	12	CO4
V	**Theory of Matrices:** Characteristic Equation and Cayley Hamilton Theorem – Eigen Values and Eigen Vectors. **Bilinear forms**: Bilinear forms – Quadratic forms. **Chapter 7 (Sections 7.7, 7.8) Chapter 8 (Sections 8.1 - 8.2)**	12	CO5

TEXT BOOK

1. *Arumugam, S. and Issac, A*. 2014. **Modern Algebra**. Scitech Publications (India) Pvt. Ltd., Chennai.

REFERENCE BOOKS

1. *Sharma, J.N. and Vashishtha, A.R.* 1981. **Abstract Algebra**. Krishna Prakasam Mandir, Meerut.
2. *Santiago, M.L.* 2003. **Modern Algebra**. Arul Publications, Chennai.
3. *Arumugam, Issac and Somasundaran.* 2019. **Modern Analysis**. Yes Dee Publishing Pvt. Ltd.

COURSE OUTCOMES (CO)

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

CO1	Define vector space, sub space and linear transformation.
CO2	Understand the concepts of rank of nullity and matrix linear transformation.
CO3	Discuss about inner product space.
CO4	Obtain theory of matrix.
CO5	Analyze Cayley Hamilton theorem and learn how to solve problems including the concept of eigen value and eigen vector.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM602	CORE XIV: REAL ANALYSIS II	SEMESTER VI

COURSE OBJECTIVES

The course aims

- To introduce the concepts of complete and compact metric spaces.
- To provide detailed knowledge on development of integration of functions of real variables and improper integrals.
- To provide knowledge on the concepts of uniform continuity of functions of real variables.

Credits: 05 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	**Connectedness, Completeness and Compactness:** Connected Sets - Bounded sets and Totally Bounded Sets - Complete Metric Spaces. **Chapter 6 (Sections 6.2 - 6.4)**	**12**	**CO1**
II	**Connectedness, Completeness and Compactness:** Compact Metric Spaces - Continuous functions on compact metric spaces - Continuity of the inverse function - Uniform continuity. **Chapter 6 (Sections 6.5 - 6.8)**	**12**	**CO2**
III	**Calculus:** Sets of measure zero – Definition of the Riemann Integral - Existence of the Riemann Integral – Properties of the Riemann integral. **Chapter 7 (Sections 7.1 - 7.4)**	**12**	**CO3**
IV	**Calculus:** Derivatives - Rolle's theorem - Law of the mean - Fundamental theorems of calculus - Improper integrals - Improper integrals (continued). **Chapter 7 (Sections 7.5 - 7.10)**	**12**	**CO4**
V	**Sequences and series of functions:** Point wise convergence of sequences of functions - Uniform convergence of sequences of functions - Consequences of uniform convergence - Convergence and uniform convergence of series of functions. **Chapter 9 (Sections 9.1 - 9.4)**	**12**	**CO5**

TEXT BOOK

1. *Richard R Goldberg.* 1970. **Methods of Real Analysis**. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.

REFERENCE BOOKS	
1.	*Somasundaram, D. and Choudhary, B.* 1997. **First course in Mathematical Analysis**. Narosa Publishing House, Chennai.
2.	*Arumugam, Issac and Somasundaran*. 2019. **Sequences and Series**. Yes Dee Publishing Pvt. Ltd.

COURSE OUTCOMES (CO)

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

CO1	Acquire knowledge about connected set and Completeness property.
CO2	Understand the concepts of continuity on compact metric space.
CO3	Learn about Reimann integral and existence of Reimann integral.
CO4	Understand the concept of Rolle's theorem, Fundamental theorem of calculus.
CO5	Gain knowledge on Dini's theorem and uniform convergence of series.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM603	CORE XV: COMPLEX ANALYSIS	SEMESTER VI

The course aims

- To learn about functions of complex variables, Bilinear transformation and some special transformation.
- To provide knowledge on the concepts of complex integration and calculus of residues.
- To introduce the concepts of Taylor's and Laurent's Series.

Credits: 05 **Total Hours:60**

UNIT	CONTENTS	Hrs	CO
I	**Analytic Functions:** Complex functions - Limit of a function – Continuity of a function – Uniform continuity – Differentiability and analyticity of a function – Necessary conditions for differentiability – Sufficient conditions for differentiability – C-R equations in polar co–ordinates – Complex function as a function of z and $\bar{z}$ – Examples. **Chapter 4 (Sections 4.1 to 4.10)**	12	CO1
II	**Elementary and Conformal Mappings:** Bilinear Transformation – Special Bilinear Transformations – Circles and Inverse points – Transformation $w = z^2$ – Transformation $w = z^{1/2}$ – Transformation $w = e^z$ – Transformation w = sin z and w = cos z – Conformal mapping – Examples. **Chapter 7 (Sections 7.1 to 7.9)**	12	CO2
III	**Complex Integration:** Simple rectifiable oriented curves – Integration of complex functions – Simple integrals using definition - Definite integrals – Interior and Exterior of a closed curve - Simply connected region – Cauchy's fundamental theorem – Integral along an arc joining two points – Cauchy's Integral formula and formulas for derivatives – examples. **Chapter 8 (Sections 8.1 to 8.9)**	12	CO3
IV	**Taylor's and Laurent's Series:** Taylor's series – Zeros of an analytic function – Laurent's series – Cauchy Product and Division - Singular point or singularity – Isolated singularities – Removable singularity – Pole – Essential singularity – Behaviour of a function at an isolated singularity – Determination of the nature of singularities – Nature of singularity at Infinity – Examples. **Chapter 9 (Sections 9.1 to 9.13)**	12	CO4
V	**Residues:** Residue – Calculation of residues - Real definite integrals – Examples. **Chapter 10 (Sections 10.1 to 10.4)**	12	CO5

TEXT BOOK	
1.	*Duraipandian, P. and Laxmi Duraipandian.* 2001. **Complex Analysis**. Emerald Publishers, Chennai.
REFERENCE BOOKS	
1.	*Churchill.* 1974. **Complex Variable and Applications.** Tata Mcgraw Hill Publishing Company Ltd.
2.	*Sathianarayan.* 1995. **Theory of Functions of Complex Variable.** S. Chand and Company, Meerut.
3.	*Tyagi, B.S.* 1992 – 93. **Functions of Complex Variable**. [Seventeenth Edition]. Pragati Prakasam Publishing Company Ltd., Meerut.
4.	*T. Veerarajan.* 2020. **Complex Analysis**. Yes Dee Publishing Pvt. Ltd.

COURSE OUTCOMES (CO)

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

CO1	Learn about limit of function, differentiability and continuity of function.
CO2	Understand the concepts of bilinear transformation.
CO3	Identifying complex integration and solve the problems using Cauchy's integral formula.
CO4	Discuss Tayler's series, Laurent's Series and determining the nature of singularities.
CO5	Understand the concept of residues and definite integral.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAM604	CORE XVI: NUMERICAL METHODS	SEMESTER VI

COURSE OBJECTIVES

The course aims

- To learn the numerical methods to solve algebraic, transcendental, differential equations and the system of simultaneous linear algebraic equations.
- To introduce the concepts of interpolation using finite differences.

Credits: 04 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**The Solution of Numerical Algebraic and Transcendental Equations:** Bisection method – Iteration Method - Regula Falsi Method - Newton Raphson method – Generalized Newton's method – Horner's Method. **Chapter 3 (Sections 3.1 to 3.5)**	10	CO1
II	**Solution of Simultaneous Linear Algebraic Equations:** Introduction – Gauss elimination method – Gauss Jordan Method – Inversion of a Matrix using Gauss Elimination Method – Iterative methods – Gauss-Jacobi method – Gauss-Seidal method of Iteration. **Chapter 4 (Sections 4.1 to 4.3, 4.7 to 4.9)**	10	CO2
III	**Interpolation (for Equal intervals):** Introduction – Newton's Forward Interpolation Formula - Newton's Backward Interpolation Formula – Equidistant terms with one or more missing values. **Central difference interpolation formulae (For Equal Intervals):** Central Differences and Central Difference Table - Central difference interpolation formulae – Gauss's forward interpolation formula - Gauss's Backward interpolation formula - Stirling's formula. **Chapter 6 (Sections 6.1 to 6.3, 6.7) Chapter-7 (Sections 7.1 to 7.5)**	10	CO3
IV	**Numerical Differentiation:** Introduction - Newton's Forward difference formula – Newton's Backward difference formula - Stirling's formula. **Numerical Integration:** Introduction – Quadrature formula - Trapezoidal rule – Geometrical interpretation – Truncation Error in Trapezoidal Rule – Romberg's Method - Simpson's 1/3 rule - Simpson's 3/8 rule. **Chapter 9 (Sections 9.1 to 9.4, 9.7 to 9.14)**	10	CO4

V	**Numerical Solution of Ordinary Differential Equations:** Solution byTaylor's series – Picard's method of Successive approximations – Euler's method – Improved Euler's Method - Modified Euler's Method - Runge-Kutta methods II order and IV order. **Chapter-11 (Sections 11.5, 11.8 to11.13)**	**10**	**CO5**
TEXT BOOK			
1.	*Kandasamy, P., Thilagavathy, K. and Gunavathi, K.* 2016. **Numerical Methods.** [Third Edition]. S.Chand and Company Ltd., New Delhi.		
REFERENCE BOOK			
1.	*Singaravelu, A.* 2002. **Numerical Methods.** Meenakshi Publications, Arpakkam		

COURSE OUTCOMES (CO)

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

CO1	Understanding solution of algebraic equations and Transcendental equations
CO2	Application of various methods in solving simultaneous linear algebraic equations.
CO3	Applying interpolation formulas
CO4	Application of various numerical difference formulas, trapezoidal rule and Simpson's rule
CO5	Utilizing solution of Taylor's series, Euler's method and Runge-kutta methods

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAEL601	ELECTIVE II: NUMBER THEORY	SEMESTER VI

COURSE OBJECTIVES

The course aims

- Introduction to elementary concepts of number theory.
- To learn about quadratic reciprocity and some functions in number theory.
- To provide the knowledge about Diophantine equations.

Credits: 04 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Divisibility:** Introduction - Divisibility – Primes. **Congruences:** Congruences - Solutions of Congruences. **Chapter 1 (Sections 1.2, 1.3) Chapter 2 (Sections 2.1, 2.2)**	**10**	**CO1**
II	**Congruences:** Prime power moduli – Prime modulus – Primitive roots and Power Residues – Congruences of degree two, Prime Modulus. **Chapter 2 (Sections 2.6 - 2.9)**	**10**	**CO2**
III	**Quadratic Reciprocity:** Quadratic residues – Quadratic Reciprocity – The Jacobi symbol. **Some Functions of Number Theory:** Greatest Integer Function. **Chapter 3 (Sections 3.1 - 3.3) Chapter 4 (Section 4.1)**	**10**	**CO3**
IV	**Some Functions of Number Theory:** Arithmetic functions – The Mobius inverse formula – Recurrence functions. **Chapter 4 (Sections 4.2 - 4.4)**	**10**	**CO4**
V	**Some Diaphantine Equations:** The equation ax+by=c – Simultaneous linear equations – Pythagorean triangles – Assorted examples. **Chapter 5 (Sections 5.1 - 5.4)**	**10**	**CO5**

TEXT BOOK

1. *Ivan Niven, Zuckerman, H.S and Montgomery, H.L.* 2014. **An Introduction to the Theory of Numbers**. [Fifth Edition]. Wiley Eastern Ltd., New Delhi.

REFERENCE BOOKS

1. *Burton, D.M.* 2001. **Elementary Number Theory.** [Ninth Edition]. Universal Book Stall, New Delhi.

2. *Tom. M. Apostal.* 1998**. Introduction to Analytic Number Theory**. [Eighth Edition]**.** Narosa Publication House, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of divisibility and congruence.
CO2	Solve the problems involving the concept of primitive roots and power residue.
CO3	Analyze Quadratic residues and reciprocity .
CO4	Understand the concepts of arithmetic functions and recurrence function.
CO5	Apply the concepts of simultaneous linear equation.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAEL602	ELECTIVE II: OPTIMIZATION TECHNIQUES	SEMESTER VI

COURSE OBJECTIVES

The course aims

- To formulate and solve problems as networks and graphs.
- To learn the techniques for converting the industrial problems as mathematical problems and solving them.

Credits: 05 **Total Hours: 60**

UNIT	CONTENTS	Hrs	CO
I	**Inventory control** – Introduction - Types of inventory – EOQ – Deterministic inventory problem – EOQ problem with price-Break. **Chapter 19 (Sections 19.1 - 19.12)**	**12**	**CO1**
II	**Queuing Theory** –Introduction - Characteristics of Queuing system – Classification of Queues – Poisson process and Exponential distribution – Poisson queueing system – The M/G/1 queuing system. **Chapter 21 (Sections 21.1 - 21.9)**	**12**	**CO2**
III	**Replacement problems and system reliability** – Introduction - Replacement of equipment that fails suddenly – Recruitment and promotion problem – Equipment renewal problem – Reliability and system failure rates. **Chapter 18 (Sections 18.1 - 18.6)**	**12**	**CO3**
IV	**Games and Strategies** - Introduction - Two person zero sum game - The maximum and minimum principle games - Games without saddle points - Mixed strategies - Graphical method – Dominance Property. **Chapter 17 (Sections 17.1 - 17.7)**	**12**	**CO4**
V	**Sequencing problem** – Introduction – n jobs to be operated on two machines – Problems – n jobs to be operated on three machines – Problems – n jobs to be operated on m machines – Problems - Two jobs to be operated on m machines (Graphical method) – Problems. **Chapter 12 (Sections 12.1 - 12.6)**	**12**	**CO5**

TEXT BOOK

1. *Kanti swarup., Gupta, P.K. and Man Mohan. 2014.* **Operations Research.** [Seventeenth Edition]. Sultan Chand and Sons, New Delhi.

REFERENCE BOOKS	
1.	*Gupta, P.K. and Hira, D.S.* 2004. **Operations Research.** [Eighth Edition]. S.Chand and Company, New Delhi.
2.	*Hamdy A Taha.* 1996. **Operations Research**. [Eighth Edition]. Prentice Hall Publications, New Delhi.
3.	*Kantiswarup., Gupta, P.K. and Man Mohan.* 2001. **Operations Research.** [Ninth Edition]. Sultan Chand and Sons, New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of inventory control
CO2	Analyze queuing theory and poisson process.
CO3	Finding recruitment and promotion problems
CO4	Discuss game, strategies on dominance property.
CO5	Compute sequencing problems using graphical method.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAP601	CORE PRACTICAL II: SCILAB	SEMESTER VI

COURSE OBJECTIVES

The course aims

- To provide a sound knowledge about new tool box to optimize non-linear objective functions.
- To provide a soft skill approach to solve the linear and non-linear equations.
- To provide a knowledge about a scientific software approach to solve Engineering and scientific applications.

Credits: 02 **Total Hours:24**

S.No	EXPERIMENT	Hrs.	CO
01.	Elementary math functions and Trigonometric functions	**1**	**CO1**
02.	Creating random numbers defining matrices using colon operator in matrices	**2**	**CO1**
03.	Matrix indexing , creating sub matrix , deleting row or column , finding dimension of a matrix	**2**	**CO1**
04.	Transpose of a matrix and concatenating of a matrix	**2**	**CO2**
05.	Matrix generators eye , zeros , ones , diag and rand	**2**	**CO2**
06.	Dot product , matrix multiplication , matrix powers	**2**	**CO2**
07.	Matrix inverse , determinant and Rank of a matrix	**2**	**CO2**
08.	Eigen values and Eigen vectors	**2**	**CO3**
09.	Solving linear system of equations	**2**	**CO3**
10.	Simple program by using control flow	**2**	**CO4**
11.	Solve for the roots of quadratic equation regardless type	**2**	**CO5**
12.	Plotting a function	**2**	**CO5**

TEXT BOOK

1.	*Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah.* 2000. **Modeling and Simulation in SciLab/Scicos**. Springer.

COURSE OUTCOMES (CO)

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

CO1	Understand the concepts of sci lab in application of mathematical concepts.
CO2	Acquire the knowledge of matrix manipulations and its operations.
CO3	Applying programming concepts and its relevant areas.
CO4	Utilizing the concept of graphics and its applications.
CO5	Solving simultaneous equations and interpolation using sci lab techniques.

18UMASB601	SBC IV : MATHEMATICS FOR COMPETITIVE EXAMS - II (100 % Internal Evaluation)	SEMESTER V

COURSE OBJECTIVES

The course aims

- To strengthen our students skills to get success in Competitive exams.
- To provide Problem solving skills.

Credits:02 **Total Hours:25**

UNIT	CONTENTS	Hrs	CO
I	Algebra of complex number - Conjugate of complex numbers and properties - Graphical representation and properties of modulus - Polar form of complex numbers – Argument - Evaluation of principal argument and its properties - Euler's notation - Logarithm of a complex number - DeMoivre's theorem - nth roots of a complex number and properties cube roots of unity - nth roots of unity.	05	CO1
II	Quadratic equation and its roots - Quadratic equation with real coefficients - Nature of roots, real roots, non real roots, equal roots rational and irrational roots - Symmetric function of roots - Formation of equation with given roots - Sign of roots ,positive roots, negative roots, zero roots, infinite roots, reciprocal roots - Common roots.	05	CO2
III	Introduction - Binomial theorem for positive integral index and characteristics of expansion - Middle term ,greatest coefficient and numerically greatest term in the expansion - Binomial coefficients and properties . Binomial theorem any index and characteristics of expansion - Exponential series and properties of the series - Logarithms and Laws - Logarithmic series and its properties - Calculation of Naperian log and common log.	05	CO3
IV	Introduction of Differential equations, order and degree, linear and non-linear differential equations - Solution of differential equation, general and particular solution. Formation of differential equation - Solution of differential equations of first order and first degree, variable seperable form, homogeneous and linear differential equations - Differential equations reducible to variable seperable form, homogeneous and linear forms - Bernoulli's equations.	05	CO4
V	Vectors, types of vectors - Addition of vectors, difference of vectors, multiplication of a vector by a scalar and properties, collinear vectors and points - Linear combination of vectors - Linearly independent and dependent system of vectors -	05	CO5

	Resolution or components of a vector in a plane and in space - Section formula - Centroid of a triangle - Collinearity of three point - Coplanarity of four points - Scalar product of two vectors, geometrical interpretation and properties - Vector triple product - Scalar product of four vectors, vector product of four vectors - Reciprocal system of vectors.		

TEXT BOOK

1.	*Er. Anoop K. Srivastava* .2014. **Objective Mathematics for JEE MAIN 2014**. [Eleventh Edition]. Disha Publication. New Delhi.

REFERENCE BOOKS

1.	*Vittal, P.R.* 2000. **Algebra Calculus and Trigonometry.** [Fifth Edition].Margham Publications, Chennai.
2.	*Vittal, P.R.* 2000. **Calculus.** Margham publications, Chennai.
3.	*Duraipandian, P. and Laxmi Duraipandian.* 2001. **Complex Analysis**. Emerald Publishers, Chennai.

COURSE OUTCOMES (CO)

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

CO1	Applying the concept of algebraic complex number.
CO2	Utilizing the quadratic equations and its roots.
CO3	Analyzing binomial theorem for positive integral roots.
CO4	Understanding the concept of differential equation.
CO5	Application of vectors and its related fields.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAAL501	ADVANCED LEARNERS COURSE III: ASTRONOMY	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To focuses on the Solar system, Celestial sphere, Dip-Twilight & Keplar's laws.

Credits:02 **Total Hours:25**

UNIT	CONTENTS	Hrs	CO
I	Celestial sphere – Celestial co-ordinates. **Chapter 2 (39 – 68)**	05	CO1
II	The Earth : Section I. **Chapter 3 (87 – 90)**	05	CO2
III	The Earth: Section II. **Chapter 3 (91 – 101)**	05	CO3
IV	Refration **Chapter 4 (117 – 128)**	05	CO4
V	Kepler's law **Chapter 6 (146 – 157)**	05	CO5

TEXT BOOK

1.	*S. Kumaravelu and Susheela Kumaravelu,* **Astronomy**. 1990 Eight edition Janaki Calender Corporation, Sivakasi.

COURSE OUTCOMES (CO)

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

CO1	Acquiring knowledge of Celestial spheres and co-ordinates.
CO2	Understanding solar system, spherical trigonometry.
CO3	Understanding Twilight and geocentric parallex.
CO4	Learning about refraction, Tangent and cassinis formulas
CO5	Gaining the knowledge of kepler's law, eccentric and mean anamolies.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAAL502	ADVANCED LEARNERS COURSE IV: MATHEMATICAL MODELING	SEMESTER IV

COURSE OBJECTIVES

The course aims

- To provide a mathematical background to the principles of Economics.
- To convert the real life and scientific situation as a mathematical problem.

Credits: 02 **Total Hours: 25**

UNIT	CONTENTS	Hrs	CO
I	Mathematical Modelling through Ordinary Differential equations of First Order: Linear Growth and Decay Model – Non-Linear Growth and Decay Model – Component Model – Dynamics problems – Geometrical problems. **Chapter – 2 (Section 2.1 to 2.6)**	05	CO1
II	Mathematical Modelling though Systems of Ordinary Differential Equations of First Order: Population Dynamics – Epidemics – Compartment Models – Economics – Medicine, Arms Race, Battles and international Trade – Dynamics. **Chapter – 3 (Section 3.1 to 3.6)**	05	CO2
III	Mathematical Modelling through Ordinary Differential equations of Second Order: Planetary Motions – Circular Motion and motion and motion of Satellites – Mathematical Modelling through Linear Differential Equations of Second Order - Miscellaneous Mathematical Models. **Chapter 4 (Sections 4.1 to 4.4)**	05	CO3
IV	Mathematical Modelling through Difference equations: Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Economics and Finance – Population Dynamics and Genetics – Probability Theory. **Chapter 5(Sections 5.1 to 5.5)**	05	CO4
V	Mathematical Modelling Through Graphs: Solutions which can be modeled through Graphs – Mathematical Modelling in Terms of Directed Graphs, Signed Graphs, Weighted Diagraphs and Un-oriented Graphs. **Chapter 7 (Section: 7.1 to 7.5)**	05	CO5

TEXT BOOK

1. *J.N. Kapur, 1988*, Mathematical Modelling, Willey Eastern Limited, New Dehil,.

COURSE OUTCOMES (CO)

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

CO1	Understanding mathematical modelling and its various application.
CO2	Applying modelling through systems of differential equations of first order.
CO3	Applying modelling through systems of differential equations of second order.
CO4	Utilizing modelling technique in linear difference equations.
CO5	Application of mathematical modelling through graphs.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

EVALUATION GUIDELINES

1. SUBMISSION OF RECORD NOTE BOOKS DISSERTATION:

Candidates appearing for Practical Examinations shall submit Bonafide Record Note Books prescribed for Practical Examinations, otherwise the candidates will not be permitted to appear for the Practical Examinations.

2. PASSING MINIMUM AND INTERNAL MARK DISTRIBUTION (Theory, Practical)

(i) A. THEORY

The candidate shall be declared to have passed the Examination, if the candidate secure not less than 40 marks put together out of 100 in the Comprehensive Examination in each Theory paper with a passing minimum of 30 marks in External out of 75.

***Internal Marks Distribution** [CA- Total Marks: 25]*

Attendance	: 5 Marks
Assignment	: 5 Marks
Internal Examinations	: 15 Marks
Total	**: 25 Marks**

Mode of examination and Classes are conducted through online (Only for SBC III & IV)

B.(i) THEORY (If Internal Evaluation is for 100 Marks)

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks out of 100 in Comprehensive Examination (Internal Evaluation only).

***Internal Marks Distribution** [CA- Total Marks: 100]*

Attendance	: 5 Marks
Assignment	: 5 Marks
Class Test	: 15 Marks
Internal Examinations	: 75 Marks
Total	**: 100 Marks**

(ii) PRACTICAL

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks put together out of 100 in the Comprehensive Examination in each Practical paper with a passing minimum of 24 marks in External out of 60.

***Internal Marks Distribution** [CA- Total Marks: 40]*

Experiment	: 10 Marks (10-20 Experiments)
Attendance	: 5 Marks
Record	: 5 Marks
Internal Examinations	: 20 Marks
Total	**: 40 Marks**

(iii) PRACTICAL

Question Paper Pattern and Mark Distribution [Maximum Marks 60]

Question Paper Pattern

- Practical Examinations shall be conducted at the end of concern Semester.
- Student shall write two questions as examiners choice from the practical list.

External Marks Distribution for Statistical Package(Excel) and Statistical software [CE- Total Marks: 60]

For each practical question the marks shall be awarded as follows:

i) Aim	: 5 Marks
ii) Procedure	: 15 Marks
iii) Displaying the Output	: 5 Marks
iv) Result Declaration	: 5 Marks
Total	**: 30 Marks**
Grand Total	**: 2*30= 60 Marks**

External Marks Distribution for Programing in C and Scilab [CE- Total Marks: 60]

For each practical question the marks shall be awarded as follows:

i) Aim	: 5 Marks
ii) Algorithm / Flowchart	: 5 Marks
iii) Writing the Source Code	: 10 Marks
iv) Test and debug the Source Code	: 5 Mars
v) Displaying the Output	: 5 Marks
Total	**: 30 Marks**
Grand Total	**: 2*30= 60 Marks**

(iv) CAREER COMPETENCY SKILLS

- **Viva voce– Semester III**
  - The student has to come in proper dress code for the Viva Voce
  - Questions will be asked to evaluate the reading, speaking and listening skills of the students.
  - E-mail and Letter drafting exercises will be given.

- **On Line Objective Examination (Multiple Choice questions) – Semester IV**
  - 100 questions-100 minutes
  - Twenty questions from each UNIT.
  - Online examination will be conducted at the end of the IV Semester.

3. QUESTION PAPER PATTERN AND MARK DISTRIBUTION

***(i) THEORY* (For 75 marks)**

Question Paper Pattern and Mark Distribution

1. **PART – A (10 x 2 = 20 Marks)**
   Answer ALL questions
   Two questions from each UNIT

2. **PART – B (5 x 5 = 25 Marks)**
   Answer ALL questions
   One question from each UNIT with Internal Choice

3. **PART – C (3 x 10 = 30 Marks)**
   Answer ANY THREE questions
   Open Choice – 3 out of 5 questions
   One question from each UNIT

(ii) *THEORY (*100% External Evaluation - Advanced Learner Course)

Question Paper Pattern and Mark Distribution

1. **PART – A (10 x 2 = 20 Marks)**
   Answer ALL questions.
   Two questions from each UNIT.

2. **PART – B (5 x 7 = 35 Marks)**
   Answer ALL questions.
   One question from each UNIT with Internal Choice.

3. **PART – C (3 x 15 = 45 Marks)**
   Answer ANY THREE questions.
   Open Choice – 3 out of 5 questions One question from each UNIT.

***iii) PRACTICAL* - Add-on Course**

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks put together out of 100 in the Comprehensive Examination in each Practical paper with a passing minimum of 24 marks in External out of 60.

***Internal Marks Distribution* [CA- Total Marks: 40]**

Experiment	: 10 Marks (10-20 Experiments)
Attendance	: 5 Marks
Record	: 5 Marks
Internal Examinations	: 20 Marks
Total	**: 40 Marks**

***External Marks Distribution* [CE- Total Marks: 60]**

For each practical question the marks shall be awarded as follows:

i) Aim	: 5 Marks
ii) Procedure	: 15 Marks
iii) Displaying the Output	: 5 Marks
iv) Result Declaration	: 5 Marks
Total	**: 30 Marks**
Grand Total	**: 2*30= 60 Marks**

Mark may be proportionally reduced for the errors committed in each of the above.