BACHELOR OF SCIENCE (MATHEMATICS)
REGULATIONS

ELIGIBILITY

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

DURATION OF THE COURSE

The course shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

OBJECTIVE OF THE COURSE

- Mathematics is the key to success in the field of Science and Engineering.
- It provides knowledge of fundamental basic principles, methods, results and a clear perception of the power of mathematical ideas and to use them effectively in modeling, interpreting and solving the real world problems.
- Mathematics plays an important role in the context of globalization of Indian Economy, Modern Technology, Computer Science and Information Technology.
- This course is aimed at preparing the students to cope up with the latest developments and compete with students from other universities and put them on the right track.

SCHEME OF EXAMINATION

Subject Code	Subject	Hours of Instruction	Exam Duration (Hrs)	CA	CE	Total	Credit Points
First Semester							
Part I							
15UTALA101/ 15UHILA101 / 15UMMLA101/ 15UFRLA101	Tamil I/ Hindi I/ Malayalam I/ French I	5	3	25	75	100	3
Part II							
15UENLA101	Foundation English I	5	3	25	75	100	3
Part III							
15UMAM101	Core I : Classical Algebra	6	3	25	75	100	4
15UMAM102	Core II : Differential Calculus and Trigonometry	5	3	25	75	100	4
15UPHMAA101	Allied I : Physics I	4	3	25	75	100	3
15UPHMAAP101	Allied Practical I : Physics I	3	3	40	60	100	2
Part IV							
15UVE101	Value Education I : Yoga	2	3	25	75	100	2
Total		**30**				**700**	**21**
Second Semester							
Part I							
15UTALA201/ 15UHILA201 / 15UMMLA201/ 15UFRLA201	Tamil II/ Hindi II/ Malayalam II/ French II	5	3	25	75	100	3
Part II							
15UENLA201	Foundation English II	5	3	25	75	100	3
Part III							
15UMAM201	Core III: Integral Calculus	6	3	25	75	100	4
15UMAM202	Core IV: Differential Equations and Laplace Transforms	5	3	25	75	100	4

15UPHMAA201	Allied II: Physics II	4	3	25	75	100	3
15UPHMAAP201	Allied Practical II: Physics II	3	3	40	60	100	2
Part IV							
15UVE101	Value Education II : Environmental Studies	2	3	25	75	100	2
Total		**30**				**700**	**21**

Third Semester

Part I							
15UTALA301/ 15UHILA301 / 15UMMLA301/ 15UFRLA301	Tamil III/ Hindi III/ Malayalam III/ French III	5	3	25	75	100	3
Part II							
15UENLA301	Foundation English III	5	3	25	75	100	3
Part III							
15UMAM301	Core V: Analytical Geometry of 2D and 3D	5	3	25	75	100	4
15UMAM302	Core VI: Statics	5	3	25	75	100	4
15UMAA301	Allied III : Mathematical Statistics I	3	3	25	75	100	3
15UMAAP301	Allied Practical III: Statistical Package (Excel)	2	3	40	60	100	2
Part IV							
15UMASBC301	SBC I: Quantitative Aptitude I (100 % Internal Evaluation)	2	3	100	-	100	2
	NMEC I	2	3	25	75	100	2
Non Credit							
15ULS301	Career Competency Skills I	1	-	-	-	-	-
Total		**30**				**800**	**23**

Diploma*

Fourth Semester							
Part I							
15UTALA401/ 15UHILA401 / 15UMMLA401/ 15UFRLA401	Tamil IV/ Hindi IV/ Malayalam IV/ French IV	5	3	25	75	100	3
Part II							
15UENLA401	Foundation English IV	5	3	25	75	100	3
Part III							
15UMAM401	Core VII: Application of integration and Vector Calculus	5	3	25	75	100	4
15UMAM402	Core VIII: Dynamics	5	3	25	75	100	4
15UMAA401	Allied IV: Mathematical Statistics II	3	3	25	75	100	3
15UMAAP401	Allied Practical IV: Statistical Software	2	3	40	60	100	2
Part IV							
15UMASBC401	SBC II : Quantitative Aptitude II (100 % Internal Evaluation)	2	3	100	-	100	2
	NMEC II	2	3	25	75	100	2
Non Credit							
15ULS401	Career Competency Skill II	1	-	-	-	-	-
Total		**30**				**800**	**23**
Diploma*							
Fifth Semester							
Part III							
15UMAM501	Core IX: Abstract Algebra	6	3	25	75	100	5
15UMAM502	Core X: Real Analysis I	6	3	25	75	100	5
15UMAM503	Core XI: Operations Research	6	3	25	75	100	5
15UMAM504	Core XII: Programming in C	3	3	25	75	100	3
15UMAM505	Core XIII: Numerical Methods (Self Study & 100% External Evaluation)	-	-	-	-	100	3

	Elective I	4	3	25	75	100	4
15UMAMP501	Core Practical I: Programming in C	2	3	40	60	100	2
Part IV							
15UMASBC501	SBC III: Mathematics for Competitive Exams (100 % Internal Evaluation)	2	3	100	-	100	2
Part V							
15UMAE501	Extension Activity	-					2
	Total	**30**				**800**	**31**
Sixth Semester							
Part III							
15UMAM601	Core XIV: Linear Algebra	5	3	25	75	100	5
15UMAM602	Core XV: Real Analysis II	6	3	25	75	100	5
15UMAM603	Core XVI: Complex Analysis	6	3	25	75	100	5
15UMAM604	Core XVII: Sequence and Series (100% Internal Evaluation)	4	3	100	-	100	3
	Elective II	5	3	25	75	100	4
15UMAMP601	Core Practical II: Scilab	2	3	40	60	100	2
Part IV							
15UMASBC601	SBC IV: Statistics for Competitive Exams (100 % Internal Evaluation)	2	3	100	-	100	2
		30				**700**	**26**
					Grand Total	**4500**	**145**

*Students have to undergo a Diploma course during the second year of their course of study.

ELECTIVE I

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

S.No	Subject Code	Name of the Subject
1.	15UMAEL501	Discrete Mathematics
2.	15UMAEL502	Graph Theory

ELECTIVE II

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

S.No	Subject Code	Name of the Subject
1.	15UMAEL601	Optimization Techniques
2.	15UMAEL602	Number Theory

NON MAJOR ELECTIVE COURSE

The department offers the following Non Major Elective Courses for other department students.

S.No	Subject Code	Semester	Name of the Subject
1	15UMAN301	III	Quantitative Aptitude
2	15UMAN401	IV	Basic Statistics

DIPLOMA COURSE

Every student shall have to undergo a Diploma Course during their third and fourth semester as given hereunder:

S.No	Subject Code	Name of the Diploma Course	Total Duration
1	15UMAD301	Mathematics Through Geometrical Software and Model Building. (Practical only)	90 Hours (45 hours in each semester)

FOR COURSE COMPLETION

Students shall complete:

- Language subjects (Tamil/Hindi/Malayalam/French and English) in I, II, III and IV semesters.
- Value Education Yoga and Environmental Studies in I and II Semester respectively.
- Allied subjects in I, II, III and IV Semesters.
- Non Major Elective Courses in III and IV semesters.
- Skill Based Elective Course as internal subjects in V and VI Semesters.
- Diploma Course in III and IV Semesters.
- A self study subject as external evaluation in V Semester.
- A core subject as internal evaluation in VI Semester.
- An extension activity in V semester.

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	17 X 100 = 1700	71
Part III Elective	2X100 = 200	08
Part III Core Practical	2 X 100 = 200	04
Part III Allied	4 X 100 = 400	12
Part III Allied Practical	4 X 100 = 400	08
Part IV (Yoga, EVS, SBC & NMEC)	1 X 100 = 100 1 X 100 = 100 4 X 100 = 400 2X100 = 200	02 02 08 04
Part V Extension Activity		02
Total	**4500**	**145**

15UMAM101	CORE I: CLASSICAL ALGEBRA	SEMESTER I

Total Hours: 60

OBJECTIVES:

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

CONTENTS

UNIT I   (12 Hours)

Determinants: Definition and its properties.

Matrices: Definition – Types –- Rank of a matrix - Rank using Elementary Transformations – System of non-homogeneous linear equations.

Volume II : Chapter 1 (Section 1 – 10) Chapter 2 (Section 1 , 11 – 13, 16)

UNIT II   (12 Hours)

Eigen values and Eigen vectors - Diagonalization of Matrix - Cayley - Hamilton theorem and its problems

Volume II : Chapter 2 (Section 16 , 16.3 , 16.4)

UNIT III   (12 Hours)

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.

Volume I : Chapter 6 (Section 1 – 11)

UNIT IV   (12 Hours)

Symmetric function of the roots - Newton's Theorem on the sum of the powers of the roots - Transformations of equations – Roots with signs changed - Roots multiplied by a given number – Reciprocal roots - Reciprocal equation.

Volume I : Chapter 6 (Section 12 , 14 – 16)

UNIT V   (12 Hours)

To increasing and decreasing the roots of an equation by a given quantity - Removing the terms – Descarte's rule of signs –- Horner's method - Newton's method.

Volume I : Chapter 6 (Section 17 , 19 , 24 , 30)

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 and II only).

2. *Manicavachagom Pillay,T.K., Natarajan,T. and Ganapathy, K.S.* 2007. **Algebra - Volume I.** S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For units III, IV and V).

REFERENCE BOOK:

1. *Vittal, P.R.* 2000. **Algebra Calculus and Trigonometry.** [Fifth Edition]. Margham Publications, Chennai.

15UMAM102	CORE II: DIFFERENTIAL CALCULUS AND TRIGONOMETRY	SEMESTER I

Total hours: 60

OBJECTIVES:

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

CONTENTS

UNIT I (12 Hours)

Successive differentiation – Maxima-Minima - The nth derivative-Standard results- Leibnitz formula for the nth derivative and its problems.
Volume I : Chapter 3 (Sections 1.1 to 2.2)

UNIT II (12 Hours)

Envelopes - Method of finding the Envelope – Curvature: Circle, Radius and Centre of curvature - The co ordinates of centre of curvature in Cartesian co-ordinates only.
Volume I : Chapter 10 (Sections 1.1 to 2.4)

UNIT III (12 Hours)

Evolute and Involute – 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 2.5 to 3.1)

UNIT IV (12 Hours)

Expansions of sin $n\theta$, cos $n\theta$ and tan $n\theta$ - Expansion of $\sin^n\theta$, $\cos^n\theta$ - Hyperbolic functions and its properties.
Chapter 3 (Sections 1 – 3 , 4 excluding examples on formation of equations)
Chapter 4 (Sections 1 – 2.2)

UNIT V (12 Hours)

Inverse hyperbolic functions - Logarithms of a complex quantities – General Principal Values – Summation of series by using complex quantities.
Chapter 4 (Section 2.3) Chapter 5 (Sections 5) Chapter 6 (Section 3)

2015– 2016 onwards)

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 Prakasam mandir, Meerut (UP).
3. *Vittal, P.R.* 2000. **Algebra, Calculus and Trigonometry.** Margham publications, Chennai.

15UPHMAA101/ 15UPHCHA301	ALLIED I: PHYSICS I	SEMESTER I / III

Total Hours : 40

OBJECTIVES:
1. To impart knowledge on the basic principles of Mechanics and Properties of matter.
2. To enhance students skill by introducing application oriented concepts.

CONTENTS

UNIT I (8 Hours)

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.

UNIT II (10 Hours)

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 non uniform bending – expression for the depression of free end of the cantilever - Torsion expression for couple per unit twist - Torsion pendulum – Expression for period of oscillation - Experiment to determine rigidity modulus by torsional pendulum without masses – Rigidity modulus by static torsion –Theory - Surface tension and interfacial surface tension by drop weight method.

UNIT III (8Hours)

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.

UNIT IV (7 Hours)

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.
Sound: Laws of transverse vibration of strings - Sonometer - Musical sound and noise - Characteristic of musical sound.

UNIT V **(7 Hours)**
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.

TEXT BOOKS :
1. *Murugesan.R. 2007.* **Allied Physics - I.** S.Chand & Company. New Delhi.
2. *Kamalakannan, D.* and *Rangarajan. C.* 1992. **Allied Physics Part - I.** [First Edition] S.Viswanathan Printers and 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. New Delhi.
3. *Murugesan. R.* 2005. **Mechanics and Mathematical Method.** [Second Edition]. S. Chand & Company, New Delhi.
4. *Murugeshan. R.* 1995. **Electricity and Magnetism.** [First Edition]. S. Chand & Co, *New* Delhi.

15UPHMAAP101/ 15UPHCHAP301	**ALLIED PRACTICAL I: PHYSICS I**	**SEMESTER I / III**

OBJECTIVES:
1. To provide basic skills in measurements using Microscope, Telescope, spectrometer, potentiometer etc.
2. They also impart knowledge in properties of matter, light and electricity.

List of experiments: (3 Hours for each Lab)
1. Young's modulus - Non - uniform bending – Scale and telescope
2. Torsion pendulum – Rigidity modulus - without masses
3. Compound pendulum
4. Surface tension and interfacial surface tension –Drop weight method
5. Potentiometer –Calibration of low range voltmeter
6. Figure of merit of a galvanometer (table galvanometer)
7. Field along the axis of a coil - B_H (compass box)
8. Spectrometer - Dispersive power of a prism (angle of prism is given)
9. Sonometer - Frequency of a fork
10. Air wedge –Thickness of a wire.

TEXT BOOKS :
1. *Srinivasan, M. N., Balasubramanian. S* and *Ranganathan.R. 2004*. **A BOOK FOR STUDY of Practical Physics.** Sultan Chand & Sons, New Delhi.
2. *Usha Rani. Subbarayan. A.* and *Somasundaram. 2007*. **Practical Physics.** APSARA Publication, Trichy.

15UVE101	**VALUE EDUCATION I: YOGA** மனவளக்கலை யோகா	**SEMESTER I**

Total Hours: 30

CONTENTS

UNIT I (6 Hours)
YOGA AND PHYSICAL HEALTH
1:1 Physical Structure -Three bodies - Five limitations
1:2 Simplified Physical Exercises - Hand Exercises - Leg Exercises - Breathing
Exercises – eye Exercises - Kapalapathi
1:3 Maharasanas 1-2 – massages – acu-puncture – Relaxation
1:4 Yogasanas - Suriya Namaskar – Padamasana –Vajrasanas – Chakrasanas (Side)
   – Viruchasanas – Yoga muthra –Patchimothasanas -Ustrasanas – Vakkarasanas
   Salabasanas.

UNIT II (6 Hours)
ART OF NURTURING THE LIFE FORCE AND MIND
2:1 Maintaining the youthfulness - postponing the ageing process
2:2 Sex and spirituality – significance of sexual vital fluid – Married Life –Chastity.
2:3 Ten Stages of Mind
2:4 Mental Frequency – Methods for Concentration

UNIT III (6 Hours)
SUBLIMATION
3:1 Purpose and Philosophy of life
3:2 Introspection – Analysis of Thought
3:3 Moralization of Desires
3:4 Neutralization of Anger

UNIT IV (6 Hours)
HUMAN RESOURCES DEVELOPMENT
4:1 Eradication of worries
4:2 Benefits of Blessings
4:3 Greatness of Friendship
4:4 Individual Peace and World Peace

UNIT V **(6 Hours)**

LAW OF NATURE

5:1 Unified Force – Cause and Effect System

5:2 Purity of thought and Deed and Genetic Centre

5:3 Love and Compassion

5:4 Cultural Education – Five fold Culture

TEXT BOOK:

1. Manavalakalai Yoga – World Community Service Center

Vethathiri Pathippagam,

156, Gandhij Road, Erode – 638 001.

PH: 0424 – 2263845.

REFERENCE BOOKS:

1. Yoga for Modern Age
2. Journey of Consciousness
2. Simplified Physical Exercises – World Community Service Center

Vethathiri Pathippagam,

156, Gandhij Road, Erode – 638 001.

PH: 0424 – 2263845.

15UMAM201	CORE III: INTEGRAL CALCULUS	SEMESTER II

Total Hours: 60

OBJECTIVES:
1. To learn basic concepts of integration and properties of definite integrals.
2. To learn advanced topic in integration like multiple integrals, beta gamma functions and Fourier series.

CONTENTS

UNIT I (12 Hours)

Integration - List of standard formulae - Integration by partial fractions – Integration of Irrational functions - Integration by parts.
Volume II (1994): Chapter 1 (Sections 7.4, 8, 12)

UNIT II (12 Hours)

Properties of definite integral - Bernoulli's formula - Reduction formula for

$$\int_0^{\frac{\pi}{2}} \sin^n x\, dx, \int_0^{\frac{\pi}{2}} \cos^n x\, dx, \int_0^{\frac{\pi}{2}} \tan^n x\, dx, \int \sec^n x\, dx, \int \cot^n x\, dx, \quad \int_0^{\frac{\pi}{2}} \sin^m x . \cos^n x . dx, \quad \int x^n e^{ax}\, dx \quad \text{and}$$

$$\int x^m (\log x)^n\, dx$$

Volume II (1994): Chapter 1 (Sections 11, 13, 15, 15.1)

UNIT III (12 Hours)

Multiple Integral: Evaluation of double integral – Changing the order of integration – Double integral in polar co-ordinates – Evaluation of Triple integral.
Volume II (1994): Chapter 5 (Sections 2.1 to 4)

UNIT IV (12 Hours)

Beta Gamma Functions: Definition – Recurrence formula of Gamma functions – Properties of Beta functions – Relation between Beta and Gamma functions.
Volume II (1994): Chapter 7 (Sections 2.1 to 5)

UNIT V (12 Hours)

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)

TEXT BOOKS:

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).

2. *Narayanan,S. and Manicavachagom Pillay, T.K.* 1995**. Calculus Vol II.** S.Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For unit V).

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

15UMAM202	CORE IV: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORM	SEMESTER II

Total Hours: 60

OBJECTIVES:

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

CONTENTS

UNIT I (12 Hours)

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 6.1 – 6.3) Chapter IV (Sections 1 – 3)

UNIT II (12 Hours)

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)

UNIT III (12 Hours)

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)

UNIT IV (12 Hours)

Laplace transforms – Standard formula – Elementary theorems - Laplace transform of periodic functions – Problems - Inverse Laplace transforms – Standard formula.
Chapter IX (Sections 1 – 7)

UNIT V (12 Hours)

Partial fractions- Application of Laplace transform: To solve ordinary differential equations with constant co-efficients – To solve system of differential equations.
Chapter IX (Sections 8 – 10)

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.

15UPHMAA201/ 15UPHCHA401	ALLIED II: PHYSICS II	SEMESTER II / IV

Total Hours: 36

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

CONTENTS

UNIT I   (7 Hours)
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 – L - S coupling - J - J Coupling – Pauli's exclusion principle - example of electron configuration - Photo electric effect - Laws - Einstein's equation.

UNIT II   (7 Hours)
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.

UNIT III   (8 Hours)
LASER Physics: LASER - Characteristics of laser – Theory of laser – Population inversion – Optical pumping – Construction and working of: Ruby laser – Helium – Neon 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.

UNIT IV   (7 Hours)
Basic Electronics: Junction diode **-** Zener diode –characteristics - Half wave rectifier - Construction and characteristics of transistors (common emitter only) - Oscillators - Hartley oscillator - Astable multivibrator - Construction and characteristics of FET.

UNIT V   (7 Hours)
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.

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.

15UPHMAAP201/ 15UPHCHAP401	ALLIED PRACTICAL II: PHYSICS II	SEMESTER II / IV

OBJECTIVES:
1. To provide basic skills in measurements using Microscope, Telescope, spectrometer, potentiometer etc.
2. They also impart knowledge in properties of matter, light and electricity.

Allied Physics Practical - II (3 Hours for each Lab)

1. Torsion pendulum – Rigidity modulus –with masses
2. Young's modulus - Uniform bending – Scale and telescope
3. Potentiometer –Calibration of high range Ammeter
4. Thermal Conductivity – Lee's disc method
5. Spectrometer - Grating - wavelength of Mercury spectrum
6. Newton's ring –Radius of curvature
7. Zener diode –Characteristics
8. Basic logic gates - Verification of truth tables
9. NAND as universal gates
10. NOR as universal gates

TEXT BOOKS :
1. *Srinivasan, M. N., Balasubramanian. S* and *Ranganathan.R. 2004.* **A BOOK FOR STUDY of Practical Physics.** Sultan Chand & Sons, New Delhi.
2. *Usha Rani. Subbarayan. A.* and *Somasundaram. 2007.* **Practical Physics.** APSARA Publication, Trichy.

15UVE201	VALUE EDUCATION II: ENVIRONMENTAL STUDIES	SEMESTER II

Total Hours: 30

CONTENTS

UNIT I   **(6 Hours)**

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 sustainable development.

UNIT II   **(6 Hours)**

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.

UNIT III   **(6 Hours)**

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 .

UNIT IV   **(6 Hours)**

Environmental Pollution : Definition – causes, effects and mitigation measure s – 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.

UNIT V   **(6 Hours)**

Population and environment – Population explosion – Environment and human health – HIV/AIDS – Women and Child welfare – Resettlement and Rehabilitation of people, Role of information technology in environmental health – Environmental awareness.

TEXTBOOK:

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

REFERENCE BOOK:

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

15UMAM301	**CORE V: ANALYTICAL GEOMETRY OF 2 D AND 3 D**	**SEMESTER III**

Total Hours: 60

OBJECTIVES:
1. To study in detail about the structures Parabola, Ellipse and Hyperbola.
2. To study in detail about multiple integrals and applications of multiple integrals.

CONTENTS

UNIT I (12 Hours)

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)

UNIT II (12 Hours)

Ellipse: Equation of an Ellipse – 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, 2, 10 , 11)

UNIT III (12 Hours)

Hyperbola: Equation of the hyperbola – Coordinates of a point on the hyperbola in terms of single parameter - Rectangular hyperbola - Parametric representation of $xy=c^2$.

Part I : Chapter8 (Sections 1, 3, 10, 11)

UNIT IV (12 Hours)

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 1to 4)**

UNIT V (12 Hours)

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)**

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.

15UMAM302	**CORE VI: STATICS**	**SEMESTER III**

Total Hours: 60

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

CONTENTS

UNIT I (12 Hours)
Parallelogram law of forces – Triangular law of forces – Perpendicular triangular forces – Converse of the triangular law of forces – Lami's theorem – Like and Unlike parallel forces – Problems – Moments – Definition – Varignon's theorem.
Chapter II (Sections 1 to 9) Chapter III (Sections 1 to 10)

UNIT II (12 Hours)
Couples – Moment of a couple – Theorems on couples – Problems. Coplanar forces: Introduction – Reduction of any number of Coplanar forces – Equation to the line of action of the resultant.
Chapter IV (Sections 1 to 10) Chapter VI (Sections 1 to 9)

UNIT III (12 Hours)
Friction – Coefficient of Friction – Limiting friction – Angle of friction – Cone of Friction – Laws of Friction – Equilibrium of a particle on a rough inclined plane- Equilibrium of a particle on a rough inclined plane under a force parallel to the plane - Equilibrium of a particle on a rough inclined plane under any force.
Chapter VII (Sections 1 to 12)

UNIT IV (12 Hours)
Centre of Gravity: Centre of gravity of uniform bodies – Thin rod – Thin Parallelogram – Circular ring and circular lamina – Triangular lamina – Trapezium – System of three uniform rods forming a triangle – Method of integration – Arc of a circle – Sector of a circle .
Chapter VIII (Sections 1 to 13, 16 to 20)

UNIT V   **(12 Hours)**

Virtual Work – Principle of virtual work for a system of coplanar forces acting on a body – Work done by an extensible string.

Chapter IX (Sections 1 to 8)

TEXT BOOK:

1.   *Venkatraman, M.K.* 2007. **Statics.** [Ninth 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.

15UMAA301	ALLIED III: MATHEMATICAL STATISTICS I	SEMESTER III

Total Hours: 50

OBJECTIVES:

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

CONTENTS

UNIT I (10 Hours)

Random variables – Discrete and continuous random variables – One dimensional and two dimensional random variables - Probability mass function and probability density function - Distribution functions – Joint probability function and Marginal probability functions and conditional distributions – Problems.

Chapter (Sections 5.1 – 5.5)

UNIT II (10 Hours)

Mathematical expectation –Properties- Variance – Properties – Covariance - Moment generating function – Properties - Characteristic function – Properties – Problems - Chebechev's Inequality(Statement with proof).

Chapter (Sections 6.1 – 6.6 , 6.10, 6.10.2, 6.10.3, 6.12, 6.12.1 & 6.13)

UNIT III (10 Hours)

Theoretical Discrete distributions: Binomial, Poisson, Geometric distributions– Derivations, Properties and applications.

Chapter (Sections 7.1 – 7.2.3, 7.2.6, 7.2.7, 7.3, 7.3.2, 7.3.4 - 7.3.6, 7.3.8, 7.3.10, 7.5-7.5.3, 7.8)

UNIT IV (10 Hours)

Theoretical Continuous distributions: Uniform, Normal distribution and Exponential Derivations, Properties and applications.

Chapter (Sections 8.1 – 8.1.3, 8.2, 8.2.2 – 8.2.5, 8.2.7 – 8.2.10, 8.6 & 8.6.1)

UNIT V (10 Hours)

Correlation and Regression: Correlation co-efficient and rank correlation co-efficient – Regression lines and regression co-efficients – Properties – Partial and Multiple correlation co-efficient (Three variables only).

Chapter (Sections 10.1 – 10.3, 10.6, 10.7 ,10.7.1 - 10.7.5)

TEXT BOOK:

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.

15UMAAP301	**ALLIED PRACTICAL III:** **STATISTICAL PACKAGE (EXCEL)**	**SEMESTER III**

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

LIST OF PRACTICALS:
1. Simple Bar diagram
2. Multiple Bar diagram
3. Simple line diagram
4. Multiple line diagram
5. Pie diagram
6. Histogram
7. Mean
8. Median
9. Mode
10. Geometric Mean
11. Harmonic Mean
12. Standard Deviation
13. Coefficient of Variation
14. Karl Pearson's Coefficient of Skewness
15. Bowley's Coefficient of Skewness
16. Karl Pearsons's correlation coefficient
17. Spearman's rank correlation co-efficent

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

15UMASBC301	SBC I : QUANTITATIVE APTITUDE I	SEMESTER III

Total Hours :25

OBJECTIVE :

1. To develop and improve the problem solving skill

UNIT I (5 Hours)

Simplification and Average
Chapters 4 and 6

UNIT II (5 Hours)

Square roots and cube roots, Surds and indices.
Chapter s 5 and 9

UNIT III (5 Hours)

Ratio and proportion, Chain rule.
Chapters 12 and 14

UNIT IV (5 Hours)

Profit and loss, partnership.
Chapters 11 and 13

UNIT V (5 Hours)

Problem on ages and percentage.
Chapters 8 and 10

TEXT BOOK:

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

15ULS301	**CAREER COMPETENCY SKILLS I**	**SEMESTER III**

Total Hours: 15

OBJECTIVE:
1. To enhance employability skills and to develop career competency

UNIT I (3 Hours)

Speed Maths: Squaring of Numbers - Multiplication of Numbers - Finding Square Roots - Finding Cube Roots - HCF, LCM - Decimals - - Averages - Powers and Roots.

UNIT II (3 Hours)

Problems on ages- Ratio and proportion- Chain rule-Percentages- Simple and Compound Interest.

UNIT III (3 Hours)

Time and Work- Time and Distance- Problems on Trains.

UNIT IV (3 Hours)

Analogies - Sentence Formation - Sentence Completion - Sentence Correction - Idioms & Phrases - Jumbled Sentences-- Reading Comprehension –Deriving conclusions.

UNIT V (3 Hours)

Tenses- Articles and Preposition - Change of Voice - Change of Speech - Synonyms & Antonyms - Phrasal Verbs-One Word Substitution- Odd Man Out - Spelling & Punctuation.

15UMAM401	CORE VII : APPLICATION OF INTEGRATION AND VECTOR CALCULUS	SEMESTER IV

Total Hours: 60

OBJECTIVES:
1. To provide a fundamental knowledge of vector differentiation and integration and integral theorems.
2. To learn about the applications of vector calculus.

CONTENTS

UNIT I (12 Hours)
Area under plane curves – Area of the closed curves - Area in polar co-ordinates - Length of a curve - Volume of the solid revolution - Cartesian co-ordinates - Polar co-ordinates - Area of surface of revolution.
Part II : Chapter2 (Sections 1.1, 1.2, 1.4.3, 4.1, 4.2 and 5)

UNIT II (12 Hours)
Applications of Multiple Integrals:
Volumes of solids as double integrals – Volumes as a triple integrals – Areas of Curved Surfaces.
Part II : Chapter6 (Sections 6.2, 6.3 and 6.7)

UNIT III (12 Hours)
Vector Differentiation: Gradient – Directional derivative – Unit vector normal to the Surface - Divergence – Curl – Solenoidal – Irrotational – Vector Identities.
Part II : Chapter 2 (Sections 1 to 11)

UNIT IV (12 Hours)
Vector Integration: Line integral – Surface integral – Volume Integral.
Vector Calculus : Chapter 2 (Section 11)

UNIT V (12 Hours)
Stoke's Theorem – Gauss divergence theorem – Green's theorem – problems.
Vector Calculus : Chapter 3 (Sections 1 to 9)

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.

15UMAM402	CORE VIII: DYNAMICS	SEMESTER IV

Total Hours: 60

OBJECTIVES:
1. To learn the fundamentals of kinematics and the motion of the projectiles.
2. To study about impulsive and central forces.
3. To provide a detail knowledge of Moment of Inertia.

CONTENTS

UNIT I (12 Hours)

Kinematics: Speed – Displacement – Velocity – Composition of Velocities(Parallelogram Law) – Resolution of Velocities – Composition of a velocity along two given directions – Triangle of Velocities – Polygon of Velocities – Resultant of several simultaneous coplanar velocities of a particle – Acceleration – Variable acceleration – Units of acceleration – Composition of accelerations – Relative accelerations – Motion in a straight line under uniform acceleration.
Chapter III (Sections 3.1 – 3.09, 3.17 – 3.22)

UNIT II (12 Hours)

Projectiles: Definitions – Two fundamental principles – The path of a projectile is a parabola – Characteristics of the motion of a projectile – Range on an inclined plane.
Chapter VI (Sections 6.1 – 6.8, 6.12 – 6.14)

UNIT III (12 Hours)

Impulsive Forces: Impulse – Impulsive Force – Impact of two bodies – Motion of a Shot and Gun – Loss of Kinetic energy. Collision of elastic bodies: Definitions – Fundamental Laws of Impact – Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – Oblique impact of two smooth spheres.
Chapter VII (Sections 7.1 – 7.5) and Chapter VIII (Sections 8.1 – 8.8)

UNIT IV (12 Hours)

Simple Harmonic Motion: Simple Harmonic Motion in a straight line – General solution of the S.H.M equation – Composition of two simple harmonic motions of the same period and in the same straight line – Composition of two simple harmonic motions of the same period in two perpendicular directions – Simple pendulum - period of oscillation of a simple pendulum – equivalence simple pendulum –seconds pendulum – Loss or gain in the number of oscillation made by a pendulum. **Chapter X (Sections 10.1 – 10.3, 10.6 – 10.7, 10.12 – 10.16)**

UNIT V   **(12 Hours)**

Central Forces: Velocity and Acceleration in Polar coordinates – Equations of motion in polar coordinates - Motions under a central force – Differential equation of central orbits – Perpendicular from the pole on the target formula in polar coordinates – Pedal equation of the central orbit –Two old problems in central orbits - Apses and apsidal distances .

Chapter XI (Sections 11.1 – 11.3, 11.5 – 11.8, 11.11 – 11.13)

TEXT BOOK:

1. *Venkataraman, M.K.* 2009. **Dynamics.** [Tenth Edition]. Agasthiar Publications, Trichy.

REFERENCE BOOKS:

1. *Narayanan, S.* 1986. **Dynamics**. Sultan Chand and Co., Chennai.
2. *Duraipandian, P.* 1988. **Mechanics.** Emerald Publishers, Chennai.

15UMAA401	ALLIED IV: MATHEMATICAL STATISTICS II	SEMESTER IV

Total Hours: 50

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

CONTENTS

UNIT I (10 Hours)

Population and Sample – Sampling Methods - Parameter and Statistic - Point Estimation – Unbiasedness, Consistency, Efficiency - Cramer Rao Inequality – Sufficiency - Rao Blackwel Theorem.
Chapter (Sections 12.2, 15.1 – 15.4, 15.4.2, 15.5, 15.6, 15.7)

UNIT II (10 Hours)

Methods of Estimation – Maximum Likelihood Estimation– Method of Moments – Properties of these estimators – Interval estimation (Concept only).
Chapter (Sections 15.11, 15.13)

UNIT III (10 Hours)

Test 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 – Problems.
Chapter (Sections 16.1 – 16.3, 16.5)

UNIT IV (10 Hours)

Test of Significance – Standard Error - Large sample test with regard to Mean, Variance, Difference of Mean, Proportions and Difference of Proportions – Problems.
Chapter (Sections 12.4, 12.7.3, 12.8, 12.9, 12.13 - 12.14)

UNIT V (10 Hours)

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 (Sections 13.7, 14.2.8 - 14.2.11, 14.5.4)

TEXT BOOK:

1. *Gupta, S.C. and Kapoor, V.K.* 1994. **Fundamentals of Mathematical Statistics**. [Ninth 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.

15UMAAP401	ALLIED PRACTICAL IV: STATISTICAL SOFTWARE	SEMESTER IV

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

LIST OF PRACTICALS:
1. Simple Bar diagram
2. Multiple Bar diagram
3. Simple line diagram
4. Multiple line diagram
5. Pie diagram
6. Histogram
7. Mean, Median and Mode
8. Standard Deviation, Coefficient of Variation, Skewness and Kurtosis
9. Karl Pearsons's correlation coefficient
10. Spearman's rank correlation coefficient
11. Regression lines
12. t-test for single mean
13. t-test difference of mean
14. t-test for paired data
15. chi-square test for independent of attributes
16. f-test
17. Run test
18. Mann Whitney U test
19. Wilcoxon Signed rank test
20. Krushkal Walis H test

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.

15UMASBC401	SBC II : QUANTITATIVE APTITUDE II	SEMESTER IV

Total Hours: 25

OBJECTIVE:
1. To develop and improve the problem solving skill

UNIT I (5 Hours)
Numbers- HCF and LCM
Text book 1: Chapters 1 and 2

UNIT II (5 Hours)
Time and work and time and distance.
Text book 1: Chapters 15 and 17

UNIT III (5 Hours)
Problems on Trains and Calendar – Clock.
Text book 1: Chapters 18, 27 and 28

UNIT IV (5 Hours)
Coding and Decoding Blood Relations And Puzzle Test – Number, Ranking And
Sequence Test – Mathematical Operators - Inserting The Missing Character.
Text book 2: Part I : Chapters 4, 5 , 6 , 12 , 13 and 16

UNIT V (5 Hours)
Analytical Reasoning – Mirror Images – Water Images – Problems On Cubes And Dice
Text book 2 Part II : Chapters 4 , 5 , 6 and 14

TEXT BOOKS:
1. *Agarwal, R.S.* 2014. **Quantitative Aptitude.** S. Chand and Company Limited, New Delhi. (For Units I,II &III)
2.   *Aggarwal, R.S.* 2013. **A Modern Approach to Verbal and Non – verbal Reasoning.** S. Chand and Company Limited, New Delhi.

15ULS401	CAREER COMPETENCY SKILLS II	SEMESTER IV

Total Hours: 15

OBJECTIVE:
1. To enhance employability skills and to develop career competency

UNIT I (3 Hours)
A to Z Placement Terms-Assertiveness and Self Confidence-Career Opportunities-Skill set (Industry Expectations)

UNIT II (3 Hours)
Principles of Communication (LSRW)-Describing Objects / Situations / People-Information Transfer - Picture Talk - News Paper and Book Review

UNIT III (3 Hours)
 Self Introduction - Situational Dialogues / Role Play (Telephonic Skills) - Oral Presentations- Prepared -'Just A Minute' Sessions (JAM)

UNIT IV (3 Hours)
Dress code- Body Language- - Manners and Etiquettes -Resume Writing

UNIT V (3 Hours)
Presentation Skills **–** Group Discussion-Interviewing Techniques- Mock Interview

15UMAM501	**CORE IX: ABSTRACT ALGEBRA**	**SEMESTER V**

Total Hours: 60

OBJECTIVES:

1. To provide a detail knowledge about the algebraic structure.

2. To understand the subject as tool applicable to almost all other branches of Science, Engineering and Technology.

CONTENTS

UNIT I (12 Hours)

Relations – Equivalence relations – Partial order - Functions – Binary Operations -
Chapter 2 (Sections 2.1 to 2.5)

UNIT II (12 Hours)

Groups: Definition and examples – Elementary Properties of a group – Equivalent definitions of group – Permutation groups – Sub groups – Cyclic groups – Order of an element.
Chapter 3 (Sections 3.1 to 3.7)

UNIT III (12 Hours)

Cosets and Lagrange's Theorem – Normal sub groups and Quotient groups – Isomorphism – Homomorphism.
Chapter 3 (Sections 3.8 to 3.11)

UNIT IV (12 Hours)

Rings: Definition and examples – Elementary properties of rings – Isomorphism - Types of rings - Characteristics of rings - Subrings – Ideals – Quotient ring – Maximal and Prime Ideals – Homomorphism of rings.
Chapter 4 (Sections 4.1 to 4.10)

UNIT V (12 Hours)

Field of quotients of an integral domain – Ordered integral domain – Unique factorization domain – Euclidean domain.
Chapter 4 (Sections 4.11 to 4.14)

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.

15UMAM502	CORE X: REAL ANALYSIS I	SEMESTER V

Total hours: 60

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

CONTENTS

UNIT I **(12 Hours)**

Introduction – Functions - Real valued functions – Equivalence – Countability - Uncountable sets - Least upper bounds – Sequences - Sub sequences - 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)

UNIT II **(12 Hours)**

Operations on convergent sequences - Operations on divergent sequences - Limit superior - Limit inferior - Cauchy sequence.
Chapter 2 (Sections 2.7 to 2.10)

UNIT III **(12 Hours)**

The Convergence and divergence - Series with non negative terms - Alternating series - Conditional convergence and absolute convergence - Tests for absolute convergence - Series whose terms form a non increasing sequence - The class l^2 - The Schwartz inequality - The Minkowski's inequality - Norm of an element in l^2.
Chapter 3 (Sections 3.1 to 3.4, 3.6, 3.7, 3.10)

UNIT IV **(12 Hours)**

Limit of a function on the real line - Metric spaces – Definition and examples - Limits in metric spaces - Continuous functions on metric spaces - Functions continuous at a point.
Chapter 4 (Sections 4.1 to 4.3) Chapter 5 (Sections 5.1, 5.2)

UNIT V **(12 Hours)**

Functions continuous on a metric space - Open sets - Closed sets - Discontinuous functions on R^1.
Chapter 5 (Sections 5.3 to 5.6)

TEXT BOOK:

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

REFERENCE BOOKS:

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

15UMAM503	CORE XI: OPERATIONS RESEARCH	SEMESTER V

Total Hours: 60

OBJECTIVE:
1. To learn the techniques for converting the industrial problems as mathematical problems and solving them.

CONTENTS

UNIT I (12 Hours)

Introduction to Operations Research – Uses and limitations – Linear Programming Problem(LPP) – Mathematical formulation – Graphical solution – Simplex method – Big-M method.
Chapter 2 (Sections 2.1 & 2.2) Chapter 3 (Sections 3.1 to 3.4) Chapter 4 (Sections 4.1, 4.3, 4.4)

UNIT II (12 Hours)

Two phase simplex method - Duality 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)

UNIT III (12 Hours)

Transportation problem – Mathematical formulation – North West Corner rule - Matrix Minima method – Vogel's Approximation Method – MODI method – Unbalanced TP.
Chapter 10 (Sections 10.7 to 10.11, 10.13)

UNIT IV (12 Hours)

Assignment Problem – Mathematical formulation - Hungarian method – Unbalanced AP – Travelling Salesman Problem.
Chapter 11 (Sections 11.3 & 11.4)

UNIT V (12 Hours)

Network and scheduling by PERT/CPM – Time calculations in networks – Critical Path Method (CPM) – PERT – PERT Calculations.
Chapter 21 (Sections 21.1 to 21.7)

TEXT BOOK:
1. *Kantiswarup., Gupta, P.K. and Man Mohan.* 2001. **Operations Research.** [Ninth 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.

15UMAM504	CORE XII: PROGRAMMING IN C	SEMESTER V

Total Hours: 50

OBJECTIVES:

On completion of the course the students shall have knowledge on:
1. Principles of Programming through C.
2. How to solve the given problem in the form of coding by using C.

CONTENTS

UNIT I **(10 Hours)**

Overview of C: History of C - Importance of C – Sample Programs - Basic Structure of C Programs - Executing a 'C' program. **Constants, Variables, and Data Types :** Introduction - Character Set - C Tokens - Keywords and Identifiers - Constants - Variables - Data Types - Declaration of Variables – Declaration of Storage Class- Defining Symbolic Constants - Overflow and Underflow of Data. **Operators and Expressions**: Arithmetic Operators - Relational Operators - Logical Operators- Assignment Operators - Increment and Decrement Operators - Conditional Operator- Bitwise Operators - Special Operators - Arithmetic Expressions - Evaluation of Expressions - Precedence of Arithmetic Operators - Type Conversions in Expressions.

UNIT II **(10 Hours)**

Managing Input and Output Operations: Reading a Character - Writing a Character - Formatted Input - Formatted Output. **Decision Making and Branching:** Decision making with IF statement – Simple IF statement – The IF…..ELSE statement – Nesting of IF…..ELSE statements – The ELSE IF Ladder - The Switch Statement – The?: Operator – The GOTO Statement - **Decision Making and Looping:** The WHILE statement – The DO statement – The FOR statement - Jumps in LOOPS.

UNIT III **(10 Hours)**

Arrays: Introduction – One-Dimensional Arrays - Declaration of One-Dimensional Arrays - Initialization of One-Dimensional Arrays – Two-Dimensional Arrays - Initializing Two-Dimensional Arrays – Multi-Dimensional Arrays - Dynamic Arrays. **Character Arrays and Strings:** Declaring and Initializing String Variables - Reading Strings from Terminal - Writing Strings to Screen - Arithmetic Operations on Characters - Putting Strings Together - Comparison of Two Strings - String Handling Functions.

UNIT IV (10 Hours)

User-defined Functions: Need for User-Defined Function - A Multi-Function Program - Elements of User-Defined Function - Definition of Functions - Return Values and their Types - Function Calls - Function Declaration - Category of Functions - No Arguments and No Return Values – Arguments but No Return Values – Arguments with Return Values – No Arguments but Returns a Value – Functions that Return Multiple Values - Nesting of Functions - Recursion - Passing Arrays to Functions - Passing Strings to Functions – The Scope, Visibility and Lifetime of Variables. **Structures and Unions:** Defining a Structure - Declaring Structure Variables - Accessing Structure Members - Structure Initialization - Copying and Comparing Structure Variables - Operations on Individual Members - Array of Structures - Arrays within Structures - Structures within Structures - Structures and Functions - Unions - Size of Structures - Bit Fields.

UNIT V (10 Hours)

Pointers: Introduction - Understanding Pointers - Declaring Pointer Variable - Initialization of Pointer Variables - Accessing a Variable through its Pointer - Pointers and Arrays - Pointers as Function Arguments - Pointers and Structures. **File Management in C:** Introduction – Defining and Opening a File - Closing a File - Input/Output Operations on Files - Error Handling during I/O Operations - Random Access to Files - Command Line Arguments.

TEXT BOOK:
1. *Balagurusamy, E*. 2009. **Programming in ANSI C.** [Fourth Edition]. Tata Mc-Graw Hill, New Delhi.

REFERENCE BOOKS:
1. *Suresh Srivastava, K.* 1999. **C in Depth**. [First Edition]. BPB Publications, New Delhi.
2. *Yashavant Kanetkar*. 1999**. Let Us C**. [Third Edition]. BPB Publications, New Delhi.
3. *Thamarai, S., Selvi and Murugesan, R*. 1999. **C for all**. [First Edition]. Anuradha Agencies, Kumbakonam.

	CORE XIII:NUMERICAL METHODS (Self Study & 100% External Evaluation)**)**	
15UMAS501		**SEMESTER V**

OBJECTIVES:

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

CONTENTS

UNIT I

Solution of Algebraic and Transcendental Equations: Bisection method – The Method of False Position – The Iteration Method - Newton Raphson method – Generalized Newton's method.
Chapter 3 (Sections 3.1 to 3.4.4)

UNIT II

Solution of Simultaneous Linear Algebraic Equations: Direct methods – Gauss elimination method – Gauss Jordan Method - Modification of Gauss method to compute the inverse – Solution of Linear systems: Iterative methods – Gauss-Jacobi method – Gauss-Seidal method.
Chapter 4 (Sections 4.1 to 4.3, 4.8 and 4.9)

UNIT III

Newton's formulae for interpolation – Central difference interpolation formulae: Gauss central difference formulae – Stirling's formula.
Chapter 6 (Sections 6.1 to 6.7) Chapter-7 (Sections 7.1 to 7.5)

UNIT IV

Numerical Differentiation – Newton's Forward and Backward difference formula - Stirling's formula – Numerical Integration: Trapezoidal rule - Simpson's 1/3 rule - Simpson's 3/8 rule – Romberg Integration.
Chapter 9 (Sections 9.1 to 9.4, 9.7 to 9.14)

UNIT V

Solution of Taylor's series – Picard's method of Successive approximations – Euler's method – Modified Euler's Method - Runge-Kutta methods II order and IV order.
Chapter-11 (Sections 11.5 to11.13)

TEXT BOOK:

1. *Kandasamy, P., Thilagavathy, K. and Gunavathi, K.* 2010. **Numerical Methods.** [Third Edition]. S.Chand and Company Ltd., New Delhi.

REFERENCE BOOK:

1. *Singaravelu, A.* 2002. **Numerical Methods.** Meenakshi Publications, Arpakkam.

15UMAEL501	ELECTIVE I: DISCRETE MATHEMATICS	SEMESTER V

Total hours: 50

OBJECTIVES:
1. To introduce the concepts of mathematical logic.
2. To learn about the algebraic structures, lattices and Boolean algebra.
3. To provide a sound knowledge of graphs and digraphs.

CONTENTS

UNIT I (10 Hours)

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)

UNIT II (10 Hours)

Normal forms: Disjunctive Normal Forms - Conjunctive Normal Forms - Principal Disjunctive Normal Forms - Principal Disjunctive Normal Forms.
Chapter - 1 (Sections 1-3.1 to 1-3.4)

UNIT III (10 Hours)

Relations and Functions: 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)

UNIT IV (10 Hours)

Lattices : Lattices as partially ordered set– 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)

UNIT V   **(10 Hours)**

Boolean algebra and Boolean Functions: Definition and Examples- sub-algebra, Direct product and Homomorphism - Boolean forms and Free Boolean Algebras – Value of Boolean Expressions and Boolean Functions.
Chapter – 4 (Sections 4-2.1 to 4-3.2)

TEXT BOOK:

1. *Tremblay,J.P., Manohar.R.,1997.* **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.

15UMAEL502	ELECTIVE I: GRAPH THEORY	SEMESTER V

Total hours: 50

OBJECTIVES:
1. To introduce the concepts of graphs.
2. To learn about various types of graphs.
3. To provide a sound knowledge on Trees and Digraphs.

CONTENTS

UNIT I   **(10 Hours)**
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)

UNIT II   **(10 Hours)**
Introduction – Walks, Trails and Paths – Connectedness and Components – Blocks – Connectivity.
Chapter 4 (Sections 4.0 – 4.4)

UNIT III   **(10 Hours)**
Introduction – Eulerian Graphs – Konigsberg Bridge Problem - Hamiltonian Graphs.
Chapter 5 (Sections 5.0 – 5.2)

UNIT IV   **(10 Hours)**
 Introduction – Characterization of Trees - Centre of a Tree.
Chapter 6 (Sections 6.0 – 6.2)

UNIT V   **(10 Hours)**
Introduction – Definitions and Basic properties – Paths and Connections - Digraphs and Matrices - Tournament.
Chapter 10 (Sections 10.0 – 10.4)

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.

15UMAMP501	**CORE PRACTICAL I** **PROGRAMMING IN C**	**SEMESTER V**

LIST OF PRACTICAL:

1. Find the Largest Number in a given series.
2. Sort the given Numbers in Ascending and Descending Order.
3. Find the Roots of the given equation using Bisection Method.
4. Find the Roots of the given equation using Newton Raphson Method.
5. Solve the given equation using Regula-Falsi Position Method.
6. Solve the given equation using Trapezoidal Rule.
7. Solve the given equation using Simpson's $1/3^{th}$ and $3/8^{th}$ Rule.
8. Transpose the given Matrix.
9. Solving the given simultaneous equation using Gauss Elimination.
10. Solving the given differential equation using Euler's Method.
11. Solve the given equation using Runge-Kutta Method.

	SBC III : MATHEMATICS FOR COMPETITIVE EXAMS (100 % Internal Evaluation)	
15UMASBC501		**SEMESTER V**

Total Hours: 25

OBJECTIVES:
1. To strengthen our students skills to get success in Competitive exams.
2. To provide Problem solving skills.

CONTENTS

UNIT I **(5 Hours)**

Matrices and Determinants: Definition – Types – Determinants and their expansion – Singular and non-singular matrix – 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.

UNIT II **(5 Hours)**

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.
(Chapter 5: Sections 5.4 to 5.8)

UNIT III **(5 Hours)**

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.

UNIT IV **(5 Hours)**

Trigonometric Equations and Inequalities : Trigonometric Equations – General Solution of elementary equations – Different methods of solving trigonometric equations of various kinds – solving trigonometric inequalities.

UNIT V   **(5 Hours)**

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.

TEXT BOOK:

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

15UMAM601	CORE XIV: LINEAR ALGEBRA	SEMESTER VI

Total Hours: 60

OBJECTIVES:
1. To introduce the structures of vector space and dual space.
2. To provide basic knowledge of linear transformation.

CONTENTS

UNIT I (12 Hours)
Vector Spaces: Definition and examples – Subspaces – Linear Transformation.
Chapter 5 (Sections 5.1 - 5.3)

UNIT II (12 Hours)
Span of a set – Linear independence – Basis and Dimension – Rank and nullity – Matrix of a linear Transformation.
Chapter 5 (Sections 5.4 - 5.8)

UNIT III (12 Hours)
Inner product spaces: Definition and examples – Orthogonality – Gram–Schmidt Orthogonalisation Process – Orthogonal Complement.
Chapter 6 (Sections 6.0 - 6.3)

UNIT IV (12 Hours)
Theory of Matrices: Algebra of Matrices – Types of Matrices – Elementary Transformations – Rank of a Matrix.
 Chapter 7 (Sections 7.1 to 7.3 , 7.4 and 7.5)

UNIT V (12 Hours)
Characteristic Equation and Cayley Hamilton Theorem – Eigen values and Eigen vectors.
Bilinear forms - Definition and examples – Quadratic forms.
Chapter 7 (Sections 7.7, 7.8) Chapter 8 (Sections 8.1 - 8.2)

TEXT BOOK:
1. *Arumugam, S. and Issac, A*. 2003. **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.

15UMAM602	CORE XV: REAL ANALYSIS II	SEMESTER VI

Total Hours: 60

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

CONTENTS

UNIT I **(12 Hours)**
Connected Sets - Bounded sets and totally bounded sets - Complete metric spaces – Contraction - Picard's fixed point theorem.
Chapter 6 (Sections 6.2 - 6.4)

UNIT II **(12 Hours)**
Compact metric spaces - Continuous functions on compact metric spaces - Continuity of the inverse functions - Uniform continuity.
Chapter 6 (Sections 6.5 - 6.8)

UNIT III **(12 Hours)**
Sets of measure zero - Riemann integral - Existence of Riemann integral – Properties of the Riemann integral.
Chapter 7 (Sections 7.1 - 7.4)

UNIT IV **(12 Hours)**
Derivatives - Rolle's theorem - Law of the mean - Fundamental theorems of calculus - Improper integrals continued.
Chapter 7 (Sections 7.5 - 7.10)

UNIT V **(12 Hours)**
Point wise convergence of sequences of functions - Uniform convergence of sequences of functions - Dini's theorem for sequences - Consequences of uniform convergence - Convergence and uniform convergence of series of functions.
Chapter 9 (Sections 9.1 - 9.4)

TEXT BOOK:

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

REFERENCE BOOK:

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

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15UMAM603	CORE XVI: COMPLEX ANALYSIS	SEMESTER VI

Total Hours: 60

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

CONTENTS

UNIT I (12 Hours)
Analytical Function: Limit of a function – Continuity – 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)

UNIT II (12 Hours)
Bilinear Transformation: Elementary Transformation – Translation, Rotation, Magnification - Bilinear Transformations – 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)

UNIT III (12 Hours)
Complex Integration: Simple rectifiable oriented curves – Integration of complex functions – Simple integrals using definition - Definite integrals - 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)

UNIT IV (12 Hours)
Taylor's and Laurent's Series: Taylor's series – Zeros of an analytic function – Laurent's series - 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)

UNIT V **(12 Hours)**
Calculus of residues: Residue – Calculation of residues - Real definite integrals – Examples.
Chapter 10 (Sections 10.1 to 10.4)

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.

15UMAM604	**CORE XVII: SEQUENCE AND SERIES** **(100 % Internal Evaluation)**	**SEMESTER VI**

Total Hours: 60

OBJECTIVES:
1. To understand the functions of Bounded variations.
2. To know the application of Power series (Problems only).

CONTENTS

UNIT I **(12 Hours)**

Sequences: Introduction - Convergence sequences - Divergent sequences **–** Oscillatory sequences - Bounded sequences – Some important limit theorems – Cauchy sequences – Monotonic sequences – Cluster points of a sequence - Limit superior and limit inferior of a sequence – Sub sequences.
Chapter 3 (sections 1 - 11)

UNIT II **(12 Hours)**

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.
Volume I: Chapter 3 (sections: 1, 6, 9, 10) (exclude 1.1, 1.2, 1.3)

UNIT III **(12 Hours)**

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.
Volume I: Chapter 4 (Sections: 2, 3, 5, 7, 9)

UNIT IV **(12 Hours)**

Infinite series : Introduction – Sequences of partial sums of a series – Convergent series - Cauchy's general principle of convergence for series - A necessary condition for the convergence – Series of positive term – A fundamental result for series of positive terms – Geometry series - Comparison tests – An important comparison series - Cauchy's n^{th} root test - D'Alembert's ratio test - Raabe's test.
Chapter 4 (Sections 1 – 13)

UNIT V **(12 Hours)**

Cauchy's condensation test – Another important comparison series – Kummer's test-Gauss's test – Bertrand and de Morgan's test – Maclaurin's integral test – Logarithmic test – Series of arbitrary terms - Alternative series- Absolute convergence - conditional convergence – Some tests for series of arbitrary terms.

Chapter 4 (Sections 14 - 25)

TEXT BOOKS:

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)

2. *Manicavachagom Pillay,T.K., Natarajan,T. and Ganapathy, K.S.* 2007.**Algebra Volume I.** S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai. (For units II, III).

REFERENCE BOOK:

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

15UMAEL601	ELECTIVE II: OPTIMIZATION TECHNIQUES	SEMESTER VI

Total hours: 50

OBJECTIVE:

1. To learn the techniques for converting the industrial problems as mathematical problems and solving them.

CONTENTS

UNIT I (10 Hours)

Inventory control – Types of inventory – EOQ – Deterministic inventory problem – EOQ problem with price-Break.

Chapter 19 (Sections 19.1 - 19.8)

UNIT II (10 Hours)

Queuing Theory – Characteristics of Queuing system – Classification of Queues – Poisson process and Exponential distribution – Poisson queues – The M/G/1 queuing system.

Chapter 20 (Sections 20.1 - 20.8)

UNIT III (10 Hours)

Replacement problems and system reliability – 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)

UNIT IV (10 Hours)

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)

UNIT V (10 Hours)

Sequencing problem – Definition – Basic assumptions – 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)

TEXT BOOK:

1. *Kanti swarup., Gupta, P.K. and Man Mohan. 2001.* **Operations Research.** [Ninth 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.

15UMAEL602	ELECTIVE II: NUMBER THEORY	SEMESTER VI

Total hours: 50

OBJECTIVES:
1. Introduction to elementary concepts of number theory.
2. To learn about quadratic reciprocity and some functions in number theory.
3. To provide the knowledge about Diophantine equations.

CONTENTS

UNIT I   **(10 Hours)**
Divisibility and Congruence: Divisibility – Primes – Congruences – Solutions of Congruences.
Chapter 1 (Sections 1.2, 1.3) Chapter 2 (Sections 2.1, 2.2)

UNIT II   **(10 Hours)**
Congruence: Prime power modulii – Prime modulus – Congruences of degree two - Prime modulus – Primitive roots and Power Residues.
Chapter 2 (Sections 2.6 - 2.9)

UNIT III   **(10 Hours)**
Quadratic Reciprocity: Quadratic residues – Quadratic Reciprocity – The Jacobi symbol – Greatest Integer function.
Chapter 3 (Sections 3.1 - 3.3) Chapter 4 (Section 4.1)

UNIT IV   **(10 Hours)**
 Some Functions of Number Theory: Arithmetic functions – The Mobius inverse formula – Recurrence functions.
Chapter 4 (Sections 4.2 - 4.4)

UNIT V   **(10 Hours)**
Some Diaphantine Equations: The equation ax+by=c – Simultaneous linear equations – Pythagorean triangles – Assorted examples.
Chapter 5 (Sections 5.1 - 5.4)

TEXT BOOK:
1. *Ivan Niven and Zuckerman, H.S.* 1989. **An Introduction to the Theory of Numbers**. [Third 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.

15UMAP601	CORE PRACTICAL II: SCILAB	SEMESTER VI

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

CONTENTS

UNIT I
Introduction to Scilab : What is SciLab – Installation – Line editor – documentation – Scilab on the web.
Chapter – 1 Section 1.1 to 1.4.

UNIT II
Scilab Objects :   Matrix construction and manipulation – Strings – Boolean Matrices – Polynomial matrices – Sparse Matrices – Lists – Functions
Chapter – 2 Section 2.1.1 to 2.1.7

UNIT III
Scilab Programming: Branching – Iterations – Scilab functions – Debugging Programs.
Input and output functions : Display of variables – Formatted input and output functions – Input Output in Binary mode – Accessing the host system – Graphical user interface. .
Chapter – 2 Section 2.2.1 to 2.2.4 and 2.3.1 – 2.3.5

UNIT IV
Scilab Graphics: Basic Graphing – Graphic tour – Graphics objects Scilab Graphics and LaTex.
Chapter – 2 Section 2.4.1 to 2.4.4

UNIT V
Numerical Techniques: Solution of non-linear equations – Solution of simultaneous linear equations – Interpolation – Straight line fitting - Numerical integration – Numerical differentiation.

LIST OF PRACTICALS:
1. Elementary math functions and Trigonometric functions
2. Creating random numbers defining matrices using colon operator in matrices
3. Matrix indexing , creating sub matrix , deleting row or column , finding dimension of a matrix
4. Transpose of a matrix and concatenating of a matrix
5. Matrix generators eye , zeros , ones , diag and rand
6. Dot product , matrix multiplication , matrix powers
7. Matrix inverse , determinant and Rank of a matrix
8. Eigen values and Eigen vectors
9. Solving linear system of equations
10. Simple program by using control flow
11. Solve for the roots of quadratic equation regardless type
12. Plotting a function

TEXT BOOK:

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

15UMASBC601	SBC IV : STATISTICS FOR COMPETITIVE EXAMINATIONS (100 % Internal Evaluation)	SEMESTER VI

Total Hours: 25

OBJECTIVES:
1. To strengthen our students skills to get success in Competitive exams.
2. To provide Problem solving skills.

UNIT I (5 Hours)

Uses, Scope and limitation of Statistics, Collection Classification and tabulation of data, Diagrammatic and Graphical representation.

UNIT II (5 Hours)

Simple random sample - stratified, systematic, Cluster (Single stage) - Sampling and Non-Sampling errors.

UNIT III (5 Hours)

Time series - Different Components - Trend and Seasonal Variations - Determination and elimination.

UNIT IV (5 Hours)

Index Numbers - Construction and uses - Different kinds of simple and weighted index numbers - Reversal tests - construction and use of cost of living index numbers.

UNIT V (5 Hours)

Vital Statistics - Birth and death rates - Crude and standard death rates, Fertility rates - Life table construction and uses.

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

15UMAN301	NMEC I : QUANTITATIVE APTITUDE	SEMESTER IV

Total Hours: 24

OBJECTIVE:

1. To create and improve the problem solving skill.

CONTENTS

UNIT I (5 Hours)

Problems on Time & Work.
Chapter: 15

UNIT II (5 Hours)

Problems on Trains.
Chapter: 18

UNIT III (4 Hours)

Logarithm based problems.
Chapter: 23

UNIT: IV (5 Hours)

Problems on Areas.
Chapter 24

UNIT V (5 Hours)

Problems on Volumes, Surface Areas.
Chapter 25

TEXT BOOK:

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

15UMAN401	NMEC II : BASIC STATISTICS	SEMESTER IV

Total Hours: 24

OBJECTIVE:

1. To learn the basic concepts of Statistical tools and methods.

CONTENTS

UNIT I (4 Hours)

Statistics – Definition – Classification and Tabulation – Formation of Frequency Distribution.

UNIT II (5 Hours)

Measures of central tendency: Arithmetic Mean, Median and Mode only.

UNIT III (5 Hours)

Measures of Dispersion: Range, Standard Deviation and Coefficient of Variation only.

UNIT IV (5 Hours)

Correlation – Definition – Properties - Karl Pearson Coefficient of Correlation - Spearman Rank correlation.

UNIT V (5 Hours)

Regression Lines – Properties of regression coefficients – Difference between correlation and Regression.

TEXT BOOK:

1. *Pillai, R.S.N and Bagavathi.* 2010. **Statistics.** S.Chand and Company Ltd., New Delhi.

REFERENCE BOOKS:

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

2. *Gupta,S.P.* **Statistical Methods.** [Twenty Eighth Edition]**.** Sultan Chand and Sons, New Delhi.

15UMAD401	**DIPLOMA COURSE : MATHEMATICS THROUGH GEOMETRICAL SOFTWARE AND MODEL BUILDING (PRACTICAL ONLY)**	**SEMESTER III & IV**

Geometer's Sketch Pad (GSP)

1. Introduction to GSP (Construct a human body)

2. Centroid and Orthocentre of a triangle

3. Concept of Π

4. Sum of angles in a triangle

5. To construct the Quadrilaterals (Square, Rectangle, Parallelogram)

6. Pythagoras, Napoleon's Theorem

7. Tessellations

Conic Section

8. Parabola

9. Ellipse

10. Hyperbola

Centimetre Cubes

11. Method of Completing Squares

12. Sum of first n natural numbers and odd numbers

13. Product of two binomials

14. To find the HCF of two given numbers

15. To Compare like fractions

Geoboard

16. To explain the parts of the circle

17. To construct different types of angles

18. To find the formula for the area of a rectangle

19. Sine, Cosine and tangent of an angle

20. Parallel lines intersected by a transversal

Some Structs and Nodes

21. To classify the polygons based on the number of sides and vertices

22. To verify the congruency of a triangle

23. Nth term of the series using patterns

Pentablocks

24. To find the area of the triangle formed by joining the midpoints of a given triangle

25. Area of trapezium

Frameworks

26. To Construct the three dimensional solid

27. Different types of pyramids

Patty Paper

28. Perpendicular from the vertex of right angle to the hypotenuse

29. Midpoint point of hypotenuse of a right angle triangle

Tangrams

30. Pythagoras theorem

Introduction & Installation Drawings vs. Geometric Constructions 7

1. Introduction and Installation of GeoGebra,

2. Creating drawings with GeoGebra.

3. Drawings, Constructions, and Drag Test.

4. Rectangle Construction.

5. Navigation Bar and Construction Protocol.

6. Equilateral Triangle Construction.

7. GeoGebra's Properties Dialog.

Geometric Constructions & Use of Commands

8. Square Construction.

9. Regular Hexagon Construction.

10. Circumscribed Circle of a Triangle Construction.

11. Visualize the Theorem of Thales.

12. Constructing Tangents to a Circle.

13. Exploring Parameters of a Quadratic Polynomial.

14. Using Sliders to Modify Parameters.

Algebraic Input, Functions & Export of Pictures to the Clipboard32

15. Parameters of a Linear Equation.

16. Library of Functions – Visualizing Absolute Values.

17. Library of Functions – Superposition of Sine Waves

18. Introducing Derivatives – The Slope Function.

19. Exploring Polynomials.

20. Exporting a Picture to the Clipboard.

21. Inserting Pictures into a Text Processing Document.

Transformations & Inserting Pictures into the Graphics View

22. Creating a 'Function Domino' Game.

23. Creating a 'Geometric Figures Memory' Game.

24. Exploring Symmetry with GeoGebra.

25. Resizing, Reflecting and Distorting a Picture.

26. Exploring Properties of Reflection.

27. Translating Pictures.

28. Rotating Polygons.

GUIDELINES

1. SUBMISSION OF RECORD NOTE BOOKS:

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 and 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 secure not less than 40 marks out of 100 in the Comprehensive Examination (Internal Evaluation only).

Internal Marks Distribution [CA- Total Marks: 100]

Attendance	: 10 Marks
Assignment	: 20Marks (2 Assignments Compulsory)
Seminar	: 10 Marks
Internal Examinations	: 60 Marks
Total	**: 100 Marks**

(ii) PRACTICAL

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 Practical paper with a passing minimum of 24 marks in External out of 60.

(i) 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**

(ii)Question Paper Pattern and Mark Distribution for external examination [Maximum Marks 60]

Question Paper Pattern

- Practical Examinations shall be conducted at the end of every 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 Programming in C and Scilab [CE- Total Marks: 60]
For each practical question the marks shall be awarded as follows:

Aim	: 5 Marks
Algorithm / Flowchart	: 5 Marks
Writing the Source Code	: 10Marks
Test and debug the Source Code	: 5 Marks
Displaying the Output	: 5 Marks
Total	**: 30 Marks**
Grand Total	**: 2* 30= 60 Marks**

iii) METHODOLOGY OF ASSESSMENT - CAREER COMPETENCY SKILLS

1. CCS I
- 100 questions-100 minutes
- Twenty questions from each UNIT.
- On line examination will be conducted at the end of the III Semester.

2. CCS II -Viva Voce (IV Semester)
- A Student has to come in proper dress code and he/she should bring 2 copies of Resume for the Viva Voce.

- A student may be asked to

  o Give Self Introduction

  o Submit the resume to the examiner(s) and answer the questions based on it.

  o Speak on any given topic for at least two minutes.

  o Give a presentation for 10 minutes on a topic of their choice.

  o Sit with other students in a Group for a Discussion.

3. QUESTION PAPER PATTERN AND MARK DISTRIBUTION *THEORY*
Question Paper Pattern and Mark Distribution **(For 75 marks)**

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

Question Paper Pattern and Mark Distribution **(For 100 marks)**

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
One question from each UNIT
Open Choice – 3 out of 5 questions

*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

UG ALLIED COURSES OFFERED BY THE DEPARTMENT OF MATHEMATICS

	Course	Subject	Offered for the students of
SEMESTER – I			
1	15UMACSA101/ 15UMACAA101/ 15UMAECA101	Basic Mathematics	B.Sc. Computer Science, BCA, and B.Sc. Electronics & Communication
2	15UMAPHA101/ 15UMACHA101	Algebra and Differential Calculus	B.Sc. Physics and B.Sc. Chemistry
3	15UMABAA101	Business Mathematics & Statistics	BBA
SEMESTER – II			
4	15UMACSA201/ 15UMACAA201/ 15UMAECA201	Algebra and Calculus	B.Sc. Computer Science, BCA, and B.Sc. Electronics & Communication
5	15UMAPHA201/ 15UMACHA201	Integral Calculus and Vector Calculus	B.Sc. Physics and B.Sc. Chemistry
SEMESTER – III			
6	15UMACSA301	Statistical Methods	B.Sc. Computer Science
7	15UMABAA301	Operations Research	BBA
8	15UMACOA301 / 15UMACCA301	Business Mathematics and Operations Research	B.Com and B.Com CA
SEMESTER – IV			
9	15UMACSA401	Operations Research	B.Sc. Computer Science
10	15UMACOA401 / 15UMACCA401/	Business Statistics	B.Com and B.Com CA
11	15UMABCA401	Mathematics for Biology	B.Sc. Bio-Chemistry
12	15UMABCA402	Biostatistics	B.Sc. Biochemistry
13.	15UMAMBA	Mathematics and Statistics for Microbiology	B.Sc. Microbiology
13	15UMABTA401	Mathematics and Statistics for Biology	B.Sc. Biotechnology
14	15UMABTAP401	Practical : Statistical Software	B.Sc. Biotechnology