

# UG (Science) Programme – Course Structure under CBCS

(Applicable to the candidates admitted from the academic year 2017 -2018 onwards)

10.02.2017

SEM	COURSE CODE	PART	COURSE	COURSE TITLE	Ins. Hrs /Week	CREDIT	MARKS		TOTAL
							CIA	ESE	
I	17U1LT1/LA1/LF1/LH1/LU1	I	Language – I		6	3	25	75	100
	17UCN1E1	II	English - I		6	3	25	75	100
	17UMA1C1	III	<b>Core – I</b>	Differential Calculus and Trigonometry	5	5	25	75	100
	17UMA1C2		<b>Core – II</b>	Solid Geometry	3	2	25	75	100
	17UPH1A1		<b>Allied – I</b>	Fundamentals of Physics	5	4	25	75	100
	17UPH1A2P		<b>Allied – II</b>	Properties of Matter - Practicals	3	2	20	80	100
	17UCN1VE	IV	Value Education	Value Education	2	2	-	100	100
<b>TOTAL</b>					<b>30</b>	<b>21</b>			<b>700</b>
II	17U2LT2/LA2/LF2/LH2/LU2	I	Language – II		6	3	25	75	100
	17UCN2E2	II	English – II		6	3	25	75	100
	17UMA2C3	III	<b>Core – III</b>	Integral Calculus	6	5	25	75	100
	17UMA2C4		<b>Core – IV</b>	Classical Algebra	3	2	25	75	100
	17UPH2A3		<b>Allied – III</b>	Essentials of Physics	4	3	25	75	100
	17UPH2A4P		<b>Allied – IV</b>	Optical, Thermal and Electricity - Practicals	3	2	20	80	100
	17UCN2ES	IV	Environmental Studies	Environmental Studies	2	2	-	100	100
<b>TOTAL</b>					<b>30</b>	<b>20</b>			<b>700</b>
III	17U3LT3/LA3/LF3/LH3/LU3	I	Language– III		6	3	25	75	100
	17UCN3E3	II	English – III		6	3	25	75	100
	17UMA3C5	III	<b>Core– V</b>	Ordinary and Partial Differential Equations	4	4	25	75	100
	17UMA3C6		<b>Core– VI</b>	Vector Calculus	3	2	25	75	100
	17UMA3A5:1		<b>Allied–V</b>	Mathematical Statistics I	4	3	25	75	100
	17UMA3A6:1		<b>Allied–VI</b>	Mathematical Statistics II	3	2	25	75	100
	17U**3N1	IV	Non Major Elective -I#		2	2	-	100	100
	17UCN3S1		Skill Based Elective - I	Soft Skills Development	2	2	-	100	100
<b>TOTAL</b>					<b>30</b>	<b>21</b>			<b>800</b>
IV	17U4LT4/LA4/LF4/LH4/LU4	I	Language–IV		6	3	25	75	100
	17UCN4E4	II	English– IV		6	3	25	75	100
	17UMA4C7	III	<b>Core– VII</b>	Sequences and Series	5	5	25	75	100
	17UMA4C8		<b>Core - VIII</b>	Laplace Transform and Fourier Series	3	2	25	75	100
	17UMA4A7:1		<b>Allied– VII</b>	Mathematical Statistics III	5	3	25	75	100
	17UMA4A8:1		<b>Allied–VIII</b>	Mathematical Statistics IV	3	2	25	75	100
	17U**4N2	IV	Non Major Elective – II#		2	2	-	100	100
17UCN4EA	V	Extension Activities	NCC, NSS, etc.	-	1	-	-	-	
<b>TOTAL</b>					<b>30</b>	<b>21</b>			<b>700</b>
V	17UMA5C9	III	<b>Core – IX</b>	Mechanics	6	5	25	75	100
	17UMA5C10		<b>Core – X</b>	Real Analysis	5	5	25	75	100
	17UMA5C11		<b>Core – XI</b>	Modern Algebra	5	5	25	75	100
	17UMA5C12		<b>Core - XII</b>	Numerical Methods	5	5	25	75	100
	17UMA5M1 A/B		Major Based Elective – I**		5	4	25	75	100
	17UMA5S2 A/B/C P	IV	Skill Based Elective - II@		2	2	-	100	100
	17UMA5S3 A/B/C P		Skill Based Elective – III@		2	2	-	100	100
17UMA5EC1		<b>Extra Credit - I</b>	Astronomy	-	<b>4*</b>	--	<b>100*</b>	<b>100*</b>	
<b>TOTAL</b>					<b>30</b>	<b>28</b>			<b>700</b>
VI	17UMA6C13	III	<b>Core– XIII</b>	Complex Analysis	5	5	25	75	100
	17UMA6C14		<b>Core– XIV</b>	Number Theory	5	5	25	75	100
	17UMA6C15		<b>Core - XV</b>	Discrete Mathematics	5	5	25	75	100
	17UMA6C16		<b>Core -XVI</b>	Graph Theory	5	5	25	75	100
	17UMA6M2 A/B T/P		Major Based Elective-II**		5	4	25	75	100
	17UMA6M3 A/B		Major Based Elective-III**		4	4	25	75	100
	17UCN6GS	V	Gender Studies	Gender Studies	1	1	-	100	100
	17UMA6EC2		<b>Extra Credit - II</b>	Replacement and Sequencing Models	-	<b>4*</b>	--	<b>100*</b>	<b>100*</b>
<b>TOTAL</b>					<b>30</b>	<b>29</b>			<b>700</b>
<b>GRAND TOTAL</b>					<b>180</b>	<b>140</b>			<b>4300</b>

\* Not considered for Grand Total and CGPA

# Non Major Elective Courses offered to the other Departments:

SEM	COURSE CODE	PART	COURSE	COURSE TITLE	Ins. Hrs /Week	CREDIT	MARKS		TOTAL
							CIA	ESE	
III	17UMA3N1	IV	Non Major Elective- I#	Mathematics for Competitive Examinations – I	2	2	-	100	100
IV	17UMA4N2	IV	Non Major Elective – II#	Mathematics for Competitive Examinations – II	2	2	-	100	100

@ Skill Based Electives Courses offered to our Department:

SEM	Elective No.	COURSE CODE	COURSE TITLE
V	II	17UMA5S2A	Quantitative Aptitude
		17UMA5S2BP	SPSS LAB
		17UMA5S2CP	PageMaker
V	III	17UMA5S3A	Reasoning
		17UMA5S3BP	MatLab
		17UMA5S3CP	CorelDraw

\*\* Major Based Electives Courses offered to our Department:

SEM	Major Based Elective No.	COURSE CODE	COURSE TITLE	Ins. Hrs /Week	CREDIT	MARKS		TOTAL
						CIA	ESE	
V	I	17UMA5M1A	Operations Research	5	4	25	75	100
		17UMA5M1B	Combinatorics	5	4	25	75	100
VI	II	17UMA6M2AT	C Programming	3	2	10	40	50
		17UMA6M2AP	C Programming - Practical	2	2	10	40	50
		17UMA6M2B	Data Structures and Algorithms	5	4	25	75	100
VI	III	17UMA6M3A	Linear Algebra	4	4	25	75	100
		17UMA6M3B	Z and Fourier Transform	4	4	25	75	100

### Allied Mathematics for B.Sc Computer Science

SEM	COURSE CODE	PART	COURSE	COURSE TITLE	Ins. Hrs /Week	CREDIT	MARKS		TOTAL
							CIA	ESE	
I	17UMA1A1	III	Allied -I	Calculus	4	3	25	75	100
	17UMA1A2		Allied -II	Numerical Methods	4	3	25	75	100
	TOTAL				<b>8</b>	<b>6</b>			<b>200</b>
II	17UMA2A3	III	Allied - III	Operations Research	4	3	25	75	100
	17UMA2A4		Allied -IV	Statistics	3	2	25	75	100
	TOTAL				<b>7</b>	<b>5</b>			<b>200</b>
GRAND TOTAL					<b>15</b>	<b>11</b>	-	-	<b>400</b>

### Allied Mathematics for B.Sc (Physics)

SEM	COURSE CODE	PART	COURSE	COURSE TITLE	Ins. Hrs /Week	CREDIT	MARKS		TOTAL
							CIA	ESE	
III	17UMA3A5:2	III	Allied-V	Algebra and Trigonometry	4	3	25	75	100
	17UMA3A6:2		Allied-VI	Calculus	3	2	25	75	100
TOTAL				<b>7</b>	<b>5</b>			<b>200</b>	
IV	17UMA4A7:2	III	Allied- VII	Differential Equations	4	3	25	75	100
	17UMA4A8:2		Allied-VIII	Vector Calculus and Fourier series	4	2	25	75	100
TOTAL				<b>8</b>	<b>5</b>			<b>200</b>	
GRAND TOTAL					<b>15</b>	<b>10</b>	-	-	<b>400</b>

### Allied Mathematics for B.Sc (Chemistry)

SEM	COURSE CODE	PART	COURSE	COURSE TITLE	Ins. Hrs /Week	CREDIT	MARKS		TOTAL
							CIA	ESE	
III	17UMA3A5:3	III	Allied-V	Algebra and Trigonometry	4	3	25	75	100
	17UMA3A6:3		Allied-VI	Calculus and Finite Differences	3	2	25	75	100
TOTAL				<b>7</b>	<b>5</b>			<b>200</b>	
IV	17UMA4A7:3	III	Allied- VII	Differential Equations	4	3	25	75	100
	17UMA4A8:3		Allied-VIII	Statistics and Vector Calculus	4	2	25	75	100
TOTAL				<b>8</b>	<b>5</b>			<b>200</b>	
GRAND TOTAL					<b>15</b>	<b>10</b>	-	-	<b>400</b>

**SEMESTER I: CORE-I**  
**DIFFERENTIAL CALCULUS AND TRIGONOMETRY**

**Course Code : 17UMA1C1**  
**Hours/Week : 5**  
**Credits : 5**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks: 75**

**Objective:**

To get the knowledge about Differentiation and Trigonometry and to acquire the knowledge of problem solving ability.

**Prerequisite:**

This course requires the basic knowledge in differentiation, integration and trigonometric functions.

**UNIT I**

**15 hours**

Successive Differentiation: The nth derivatives of Standard result - Trigonometrical transformation of functions - #Formation of equations involving derivatives# - Leibnitz formula for the nth derivative of a product - Related problems.

**UNIT II**

**15 hours**

#Homogeneous functions# - Partial derivatives of a function of two functions - Maxima and Minima of function of two variables - Lagrange's Method of undetermined Multipliers.

**UNIT III**

**15 hours**

Curvature: Circle, Radius and Center of Curvature - Cartesian Formula for the Radius of Curvature - Coordinates of the Center of Curvature – Evolute and Involute – Radius of curvature when the curve is given in polar co-ordinates.

**UNIT IV**

**15 hours**

Expansion of  $\sin n\theta$ ,  $\cos n\theta$ , and  $\tan n\theta$  - Powers of sines and cosines of  $\theta$  in terms of functions of multiples of  $\theta$ .

**UNIT V**

**15 hours**

Hyperbolic functions: Relations between Hyperbolic functions – Inverse hyperbolic functions – logarithms of complex numbers.

# **# Self-study portion.**

**Text Books:**

**T.B-1** T.K.Manicavachagom Pillay and Others, Calculus Volume-I, S. Viswanathan Publishers Pvt. Ltd. (2004).

**T.B-2** S. Narayanan and T.K. Manicavachagom Pillay, Trigonometry, S. Viswanathan Publishers, Pvt. Ltd., (2006).

<b>UNIT I</b>	Chapter III	Sections 1.1 -1.6,2.1,2.2	<b>T.B- 1</b>
<b>UNIT II</b>	Chapter VIII	Sections 1.6, 1.7, 4, 5	<b>T.B- 1</b>
<b>UNIT III</b>	Chapter X	Sections 2.1 – 2.6	<b>T.B- 1</b>
<b>UNIT IV</b>	Chapter III	Sections 1-2, 4	<b>T.B- 2</b>
<b>UNIT V</b>	Chapter IV	Sections 1,2 and Chapter V Section 5	<b>T.B- 2</b>

**Books for Reference:**

1. S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).
2. P.K.Mittal, Trigonometry, Vrinda Publications(P) Ltd (2007).

**Prepared By**

Dr. M. Mohammed Jabarullah  
Ms. A. Thagasin Banu.

**SEMESTER I: CORE-II  
SOLID GEOMETRY**

**Course Code : 17UMA1C2**  
**Hours/Week : 3**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks: 75**

**Objective:**

To get the knowledge about Three Dimensional Geometry and to acquire the knowledge of problem solving ability.

**Prerequisite:**

This course requires the basic knowledge about analytical geometry.

**UNIT I 9 hours**

Direction cosines- Direction ratios- General equation of the plane- Intercept form- #Normal form#- Angle between two planes.

**UNIT II 9 hours**

Length of the perpendicular- Equation of the planes bisecting the angle between two planes- #Straight line as the intersection of two planes# - Symmetrical form.

**UNIT III 9 hours**

Equation of a straight line passing through two given points- Condition for a line to be parallel to a plane – Coplanar lines – Shortest distance between two skew lines – simple problems.

**UNIT IV 9 hours**

#Equation of a sphere # - Finding centre and radius – Length of the tangent plane to a sphere.

**UNIT V 9 hours**

Equation of a circle on a sphere – Intresection of two spheres – Tangent plane to a sphere – Simple problems.

**# # Self-study portion.**

**Text Book:**

T.K.Manicavachagom Pillay, T. Narayanan, Analytical Geometry, Part II – 3 Dimensions, S.Viswananthan Publishers Pvt Ltd.(2009)

<b>UNIT I</b>	Chapter I	Sections 7, 8	and	Chapter II	Sections 1, 2, 3, 7
<b>UNIT II</b>	Chapter II	Sections 10, 11	and	Chapter III	Sectons 1, 2, 3
<b>UNIT III</b>	Chapter III	Sections 4, 5, 7 & 8			
<b>UNIT IV</b>	Chapter IV	Sections 2-5			
<b>UNIT V</b>	Chapter IV	Sections 6-8			

**Books for Reference:**

1. Shanti Narayanan, Analytical Solid Geometry, S.Chand & Company Ltd, New Delhi(2007).
2. M.L. Khanna , Solid Geometry, Jai Prakash Nath & co, Educational Publishers, 25<sup>th</sup> Edition(2005).

**Prepared By:**

Dr. P. Muruganantham

Ms. M. Affrose Begum

**SEMESTER II: CORE-III**  
**INTEGRAL CALCULUS**

**Course Code** : 17UMA2C3  
**Hours/Week** : 6  
**Credits** : 5

**Max. Marks** : 100  
**Internal Marks** : 25  
**External Marks**: 75

**Objective:**

To inculcate the basics of integration, Beta, Gamma functions and their applications.

**Prerequisite:**

This course requires the basic knowledge of equations, differentiation, integration, limits and trigonometric functions.

**UNIT I** **18 hours**

Revision of all integral models - Simple problems.

**UNIT II** **18 hours**

Definite integrals - Integration by parts & reduction formula – Bernoulli’s formula - Integration as summation.

**UNIT III** **18 hours**

Geometric Application of integration – Area under plane curves: Cartesian co-ordinates – Area of a closed curve – Areas in polar co-ordinates. Evaluation of the double integral in Cartesian and polar co-ordinates – Changing the order of integration.

**UNIT IV** **18 hours**

Triple integrals – Change of variables – Change of variables in case of two variables and three variables – Transformation from Cartesian to polar co-ordinates and to spherical polar co-ordinates.

**UNIT V** **18 hours**

Beta & Gamma functions and the relation between them – Integration using Beta & Gamma functions.

**Text Book:**

S.Narayanan and T.K.Manicavachagom Pillay, Calculus Volume II, S.Viswanathan (Printers & publishers) Pvt Limited, Chennai -2011.

<b>UNIT I</b>	Chapter 1	Sections 1 - 10.
<b>UNIT II</b>	Chapter 1	Sections 11 - 14, 15.1 & 15.2.
<b>UNIT III</b>	Chapter 2	Sections 1.1 - 1.4 and Chapter 5 Sections 2.2, 3.1 & 3.2
<b>UNIT IV</b>	Chapter 5	Section 4 and Chapter 6 Sections 2.1- 2.4
<b>UNIT V</b>	Chapter 7	Sections 2.1 - 2.3, 3 – 6.

**Books for Reference:**

1. M.L. Khanna, Integral Calculus, 20<sup>th</sup> Edition, 1997, Jai Prakash Nath & Co, Meerut.
2. S. Arumugam and A. Thangapandi Isaac, Calculus, 2008 Edition, New Gamma Publishing House.

**Prepared By:**

Mr. S. Masoothu

Ms. J. Sarthaj Banu



**SEMESTER II: CORE-IV**  
**CLASSICAL ALGEBRA**

**Course Code : 17UMA2C4**  
**Hours/Week : 3**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks: 75**

**Objective:**

To acquire the basic knowledge about inequalities and to solve equations in different methods.

**Prerequisite:**

This course requires the basic knowledge in matrices, inequalities, algebraic and trigonometric formulae.

**UNIT I** **9 hours**  
Inequalities - Triangle inequalities - Arithmetic, Geometric and Harmonic means.

**UNIT II** **9 hours**  
Cauchy - Schwarz inequality - Some more inequalities and related problems.

**UNIT III** **9 hours**  
Relation between the roots and coefficients of equations - Symmetric function of the roots - Sum of the powers of the roots of an equation.

**UNIT IV** **9 hours**  
Transformation of equation - #Roots with sign changed#, Roots Multiplied by a given number, #Reciprocal roots# - Reciprocal equation - Diminishing, Increasing the roots of a given equation by a given quantity.

**UNIT V** **9 hours**  
Descarte's rule of signs – Newton's method of divisors – Horner's method.

**# # Self-study portion.**

**Text Books:**

**T.B-1** S. Arumugam and A. Thangapandi Isaac, Sequences and series, New Gamma Publishing House (1991).

**T.B-2** T.K. Manicavachagom Pillai, T. Natarajan, and K.S. Ganapathy, Algebra, Volume-I, S. Viswanathan Publishers, Pvt. Ltd. (2004).

<b>UNIT I</b>	Chapter 2	Sections 2.1 – 2.3	<b>T.B-1</b>
<b>UNIT II</b>	Chapter 2	Sections 2.4 – 2.6	<b>T.B-1</b>
<b>UNIT III</b>	Chapter 6	Sections 11, 12, 13	<b>T.B-2</b>
<b>UNIT IV</b>	Chapter 6	Sections 15, 16, 17	<b>T.B-2</b>
<b>UNIT V</b>	Chapter 6	Sections 24, 29.4, 30	<b>T.B-2</b>

**Books for Reference:**

1. S. Arumugam, A. Thangapandi Isaac, Algebra (Theory of Equations, Inequalities and Theory of numbers), New Gamma Publishing House (2006).
2. T.K. Manicavachagom Pillai, T. Natarajan, and K.S. Ganapathy, Algebra, Volume-II, S.Viswanathan Publishers, Pvt. Ltd. (2008).

**Prepared By:**

Mr. N. Mohamed Thoiyab

Ms. B. Shafina Banu

**SEMESTER III: CORE-V**  
**ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**

**Course Code** : 17UMA3C5  
**Hours/Week** : 4  
**Credits** : 4

**Max. Marks** : 100  
**Internal Marks**: 25  
**External Marks**: 75

**Objective:**

To study the methods used to solve differential equations of first order and second order and to solve the partial differential equations of first order

**Prerequisite:**

This course requires the basic knowledge of differentiation, integration and its properties.

**UNIT I** **12 hours**  
Linear equation – Bernoulli’s equation – Exact differential equations.

**UNIT II** **12 hours**  
Equations of the first order but of higher degree - Equations solvable for  $dy/dx$  - Equations solvable for  $y$  - #Equations solvable for  $x$ # – Clairaut’s form – Equations that do not contain  $x$  explicitly - Equations that do not contain  $y$  explicitly - Homogeneous equations in  $x$  and  $y$ .

**UNIT III** **12 hours**  
Linear Equations with constant coefficients - The operator  $D$  - Complementary function of a linear equation with constant coefficients – Particular integrals.

**UNIT IV** **12 hours**  
Linear equations with variable co-efficients – Equations reducible to the linear equations – Variation of parameters.

**UNIT V** **12 hours**  
Partial Differential Equations of the first order - Classification of integrals - Derivation of PDE by elimination of constants and functions - Lagrange’s method of solving the linear equation - Special methods - Standard forms I, II, #III and IV (Clairaut’s form)#.  
**# # Self-study portion.**

**Text Book:**

S. Narayanan and T. K. Manicavachagom Pillay, Differential Equation and its Application, S. Viswanathan Publishers Pvt. Ltd., Ninth edition (1996)

<b>UNIT I</b>	Chapter II	Sections 4, 5, 6.1 – 6.4
<b>UNIT II</b>	Chapter IV	Sections 1 – 4
<b>UNIT III</b>	Chapter V	Sections 1 – 4
<b>UNIT IV</b>	Chapter V	Sections 5, 6
	Chapter VIII	Section 4

**UNIT V** Chapter XII Sections 1 –5

**Books for Reference:**

1. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co. (2010).
2. M.L. Khanna, Differential Equations, Jai Prakash Nath and Co. (2004).

**Prepared By:**

Dr. R. Jahir Hussain

Ms. M. S. Afya Farhana

**SEMESTER III: CORE-VI**  
**VECTOR CALCULUS**

**Course Code : 17UMA3C6**

**Hours/Week : 3**

**Credits : 2**

**Max. Marks : 100**

**Internal Marks: 25**

**External Marks: 75**

**Objective:**

To acquire the knowledge on differential operator, vector differentiation and vector integration.

**Prerequisite:**

This course requires the basic knowledge about vectors, differentiation and integration.

**UNIT I**

**9 hours**

Vector differentiation – Differentiation of vectors – #A few results on differentiation of Vectors# – Meaning of the derivative of position vector - Physical applications - #Level surfaces# – Vector differential operator - Gradient - Direction and magnitude of gradient – Simple problems.

**UNIT II**

**9 hours**

Divergence and curl - Formula involving operator  $\nabla$ , operators involving twice – Simple problems.

**UNIT III**

**9 hours**

Vector integration - Line integral – Surface integral – Volume integral – Simple problems.

**UNIT IV**

**9 hours**

Gauss divergence theorem – Green’s theorem (in space) (Statement only) – Simple Problems using theorems.

**UNIT V**

**9 hours**

Stoke’s theorem - Green’s theorem (in plane) (Statement only) – Simple problems using theorems.

**# # Self-study portion.**

**Text Books:**

S. Narayanan and T. K. Manicavachagom Pillay, Vector Algebra and Analysis, S. Viswanathan Publishers Pvt. Ltd., Revised Edition (1995)

UNIT I	Chapter 4	Sections 1 - 8
UNIT II	Chapter 4	Sections 9 - 12
UNIT III	Chapter 6	Sections 1 - 5
UNIT IV	Chapter 6	Sections 6, 7
UNIT V	Chapter 6	Sections 9, 10

**Books for Reference:**

1. M.L. Khanna, Vector Calculus, Jai Prakash Nath and Co., Eighth Edition (1986).
2. P.R. Vittal, Vector analysis, Analytical Geometry & sequences and series, Margham Publications, Chennai (2004).

**Prepared By:**

Dr. A. Mohamed Ismayil

Ms. M. Affrose Begum

**SEMESTER III: ALLIED – V  
MATHEMATICAL STATISTICS I**

**Course Code : 17UMA3A5:1**  
**Hours/Week : 4**  
**Credits : 3**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To impart the students with knowledge in Basic Mathematical Statistics.

**Prerequisite:**

This course requires the basic knowledge of data classification and random variable.

**UNIT I** **12 hours**

Arithmetic Mean - Properties of Arithmetic Mean - Weighted mean – Median. #Merits and Demerits of Mean, Median#.

**UNIT II** **12 hours**

Mode - Geometric mean - Harmonic mean. Graphical Location of the Partition values. #Merits and Demerits of Mode, Geometric Mean and Harmonic Mean#.

**UNIT III** **12 hours**

Dispersion-characteristics for ideal measure of dispersion - Measures of Dispersion - Range - Q.D - M.D - S.D, coefficient of dispersion - #Coefficient of variation# - Simple problems.

**UNIT IV** **12 hours**

Moments Pearson's  $\beta$  and  $\gamma$  Co-efficient - Skewness - Kurtosis - simple problems. Fitting of a Straight Line - Fitting of second Degree Parabola – # Fitting of Polynomial of Kth Degree# – Change of Origin - Simple problems.

**UNIT V** **12 hours**

Most Plausible Solution of a system of Linear Equations - Conversion of Data to Linear Form – Fitting of a power curve – Fitting of Exponential curves - Simple problems.

**# # Self-study portion.**

**Text Book:**

S.C. Gupta & V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons Publication, Third edition, (2010).

<b>UNIT I</b>	Chapter 2	Sections 2.3 – 2.6
<b>UNIT II</b>	Chapter 2	Sections 2.7 – 2.9.1 & 2.11.1
<b>UNIT III</b>	Chapter 3	Sections 3.1 – 3.7, 3.7.3, 3.8
<b>UNIT IV</b>	Chapter 3	Sections 3.9, 3.10 - 3.12
	Chapter 9	Sections 9.1 – 9.1.1 – 9.1.4
<b>UNIT V</b>	Chapter 9	Sections 9.2 – 9.3

**Books for Reference:**

1. Murray R. Spiegel, John Jschiller, R. Alu Srinivasan, Probability and Statistics, Third Edition, Shaum's Outline Series (2010).
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons Publication, Eleventh Edition (2013).

**Prepared By:**

Mr. S. Mohamed Yusuff Ansari

Dr. A. Prasanna

Ms. S. Sharmila Banu

Ms. K. Prasanna Devi



**SEMESTER III: ALLIED – VI**  
**MATHEMATICAL STATISTICS II**

**Course Code : 17UMA3A6:1**  
**Hours/Week : 3**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To impart the students with knowledge in Probability.

**Prerequisite:**

This course requires the basic knowledge about probability, random variables, functions, sets and operations of sets.

**UNIT I**

**9 hours**

Classical probability-empirical probability - #Sets and elements of sets - Operation on sets – Algebra of sets# - Axiomatic approach towards probability.

**UNIT II**

**9 hours**

Addition and Multiplication theorems - Conditional probability - Baye's theorem - Simple problems.

**UNIT III**

**9 hours**

Random variable - Distribution function – Properties - Probability mass function - Probability density function– Simple problems.

**UNIT IV**

**9 hours**

Joint probability mass function - #Joint probability density function# - Marginal and Conditional distribution– Simple problems.

**UNIT V**

**9 hours**

Mathematical Expectation - Addition theorem of Expectation - Multiplication theorem of Expectation - Moment Generating Function - Cumulant Generating Function and cumulants - #Additive Property of Cumulants# – Simple problems.

**# # Self-study portion.**

**Text Book:**

S.C. Gupta & V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons Publication, Third edition, (2010).

<b>UNIT I</b>	Chapter 4	Sections 4.1, 4.3.1, 4.3.2, 4.4, 4.5
<b>UNIT II</b>	Chapter 4	Sections 4.6.2 – 4.8
<b>UNIT III</b>	Chapter 5	Sections 5.1 – 5.4.1
<b>UNIT IV</b>	Chapter 5	Sections 5.5.1 – 5.5.5
<b>UNIT V</b>	Chapter 6	Sections 6.1 – 6.4, 6.9, 6.10, 6.10.1.

**Books for Reference:**

1. Murray R. Spiegel, John Jschiller, R. Alu Srinivasan, Probability and Statistics, Third Edition, Shaum's Outline Series (2010).
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons Publication, Eleventh Edition (2013).

**Prepared By:**

Mr. S. Mohamed Yusuff Ansari

Dr. A. Prasanna

Ms. S. Sharmila Banu

Ms. K. Prasanna Devi

**SEMESTER IV: CORE-VII  
SEQUENCES AND SERIES**

**Course Code : 17UMA4C7**  
**Hours/Week : 5**  
**Credits : 5**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To get the knowledge of some simple techniques for testing the convergence of sequences and series and to be familiar with variety of well-known sequences and series with a developing intuition about the behaviour of new ones.

**Prerequisite:**

This course requires the basic knowledge of sets, functions, numbers and mappings.

**UNIT I** **15 hours**

Intervals in  $\mathbb{R}$  - Bounded sets - lub and glb - Bounded functions - Sequences – Bounded sequences - Monotonic sequences - Convergent sequences - Divergent and oscillating sequences - Algebra of limits.

**UNIT II** **15 hours**

Behaviour of monotonic sequences - Some theorems on limits – Subsequences.

**UNIT III** **15 hours**

Limit points - Cauchy sequences - Upper and lower limits of a sequence - Infinite series – Comparison Test.

**UNIT IV** **15 hours**

Kummer's test – D'Alembert's ratio test – Raabe's test – De Morgan and Bertrand's test – Gauss' test.

**UNIT V** **15 hours**

Cauchy's root test - Cauchy's condensation test - Alternating series – Leibnitz's test - Absolute convergence.

**Text Book:**

S. Arumugam and A. Thangapandi Isaac, Sequences and series, New Gamma Publishing House (1991).

**UNIT I** Chapter I Sections 1.2 - 1.5 and Chapter III Sections 3.1 – 3.6

**UNIT II** Chapter III Sections 3.7 – 3.9

**UNIT III** Chapter III Sections 3.10-3.12 and Chapter IV Sections 4.1, 4.2

**UNIT IV** Chapter IV Section 4.3

**UNIT V** Chapter IV Section 4.4 and Chapter V Sections 5.1, 5.2

**Books for Reference:**

1. Richard R. Goldberg, Methods of Real Analysis, Oxford and IBH Publishing Co. & Pvt.Ltd. (1970).
2. M.K. Singal and Asha Rani Singal, A first course in Real Analysis, R. Chand & Co. (1999).

**Prepared By:**

Mr. S. Masoothu  
Ms. B. Shafina Banu

**SEMESTER IV: CORE - VIII**  
**LAPLACE TRANSFORM AND FOURIER SERIES**

**Course Code: 17UMA4C8**

**Hours/Week: 3**

**Credits : 2**

**Max. Marks : 100**

**Internal Marks : 25**

**External Marks : 75**

**Objective:**

To get the knowledge about Laplace Transforms and Fourier series and to acquire the knowledge of problem solving ability.

**Prerequisite:**

This course requires the basic knowledge in differentiation and integration.

**UNIT I**

**9 hours**

Laplace transforms – Sufficient condition for the existence of the Laplace transforms – Properties of Laplace transforms – Laplace transforms of periodic function – Some general theorems - #Evaluation of integrals#.

**UNIT II**

**9 hours**

The inverse Laplace transforms -Inverse transforms of functions – Related problems.

**UNIT III**

**9 hours**

Application of Laplace transforms - Solution of ODE with constant coefficients – Solution of Systems of Differential equations - Solution of differential equations with variable coefficients.

**UNIT IV**

**9 hours**

Fourier series: Definition of Fourier series - Finding Fourier expansion of a periodic function with period  $2\pi$ .

**UNIT V**

**9 hours**

Odd and Even function – Half range Fourier series – Development in cosine and sine series.

**# # Self-study portion.**

**Text Books:**

**T.B-1** S. Narayanan and T.K. Manicavachagom Pillay, Differential Equations and its applications, S. Viswanathan (Printers and Publishers) Pvt., Ltd. (2006).

**T.B-2** T.K Manicavachagom Pillay and S. Narayanan, Calculus Volume - III, S. Viswanathan Publishers Pvt., Ltd. (2008).

<b>UNIT I</b>	Chapter IX	Sections 1 - 5	<b>T.B-1</b>
<b>UNIT II</b>	Chapter IX	Sections 6, 7	<b>T.B-1</b>
<b>UNIT III</b>	Chapter IX	Sections 8 - 11	<b>T.B-1</b>
<b>UNIT IV</b>	Chapter VI	Sections 1, 2	<b>T.B-2</b>
<b>UNIT V</b>	Chapter VI	Sections 3, 4, 5	<b>T.B-2</b>

**Books for Reference:**

1. Murray R. Spiegel, Schaum's Outline of Theory and Problems of Laplace Transforms, McGraw Hill, (1965).
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, INC, 9<sup>th</sup> Edition, (2006).

**Prepared By:**

Dr. M. Mohammed Jabarullah

Ms. M. S. Afya Farhana

**SEMESTER IV: ALLIED – VII**  
**MATHEMATICAL STATISTICS III**

**Course Code** : 17UMA4A7:1  
**Hours/Week** : 5  
**Credits** : 3

**Max. Marks** : 100  
**Internal Marks** : 25  
**External Marks:** 75

**Objective:**

To get the knowledge about various discrete and continuous probability distributions, correlation and regression.

**Prerequisite:**

This course requires the basic knowledge about basic definitions of statistics.

**UNIT I**

**15 hours**

Theoretical discrete distribution – Binomial distribution: Moments, Recurrence relation  
Moment generating Function Characteristic Function and Cumulants – Simple problems.

**UNIT II**

**15 hours**

Theoretical discrete distribution – Poisson distribution: Moments, Recurrence relation,  
Moment generating Function, Characteristic Function and #Cumulants# - Theoretical  
continuous distribution - Uniform distribution - Simple Problems.

**UNIT III**

**15 hours**

Theoretical continuous distribution - Normal distribution, Moment generating Function,  
Cumulant Generating Function, Moments; #Area Property#, Fitting of Normal Distribution –  
Simple problems.

**UNIT IV**

**15 hours**

Theoretical continuous distribution - Gamma Distribution, Moment generating Function,  
Cumulant Generating Function, Additive property, Beta Distribution of first kind, Exponential  
Distribution - Simple Problems.

**UNIT V**

**15 hours**

Bivariate distribution, Correlation, Scatter diagram, Pearson's Coefficient of Correlation,  
Properties, Rank correlation, Regression - Lines of Regression, #Regression Coefficient and its  
properties# - Simple Problems.

# **# Self-study portion.**

**Text Book:**

S.C. Gupta & V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons  
Publication, Third edition, (2010).

<b>UNIT I</b>	Chapter 7	Sections 7.2, 7.2.1, 7.2.2, 7.2.4, 7.2.6 – 7.2.9
<b>UNIT II</b>	Chapter 7	Sections 7.3.1, 7.3.2, 7.3.4 – 7.3.8
	Chapter 8	Sections 8.1 – 8.1.4

<b>UNIT III</b>	Chapter 8	Sections 8.2, 8.2.3 – 8.2.8, 8.2.10, 8.2.11 and 8.2.14
<b>UNIT IV</b>	Chapter 8	Sections 8.3, 8.4, 8.6
<b>UNIT V</b>	Chapter 10	Sections 10.1–10.3, 10.6, 10.7, 10.7.1, 10.7.3, 10.7.4 (Except properties)

**Books for Reference:**

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons Publication, Eleventh Edition (2013).
2. H.C. Saxena and P.U. Surendran, Statistical Inference, S. Chand & Co. (1967).
3. Marek Fisz, Probability and Mathematical Statistics, John Wiley & Sons (1963).

**Prepared By:**

Mr. S. Mohamed Yusuff Ansari

Dr. A. Prasanna

Ms. S. Sharmila Banu

Ms. K. Prasanna Devi

**SEMESTER IV: ALLIED – VIII**  
**MATHEMATICAL STATISTICS IV**

**Course Code : 17UMA4A8:1**  
**Hours/Week : 3**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To understand the concept of Sampling and applications of Chi-square, t-test and F-test.

**Prerequisite:**

This course requires the basic knowledge in data collection, samples and random variables.

**UNIT I**

**9 hours**

Sampling Introduction - Types of sampling parameter and statistic - #Sampling distribution Standard Error# - Tests of significance - Null Hypothesis.

**UNIT II**

**9 hours**

Test for single proportion - Test for difference of proportions-Test of significance of single mean - Test of significance of Difference of means.

**UNIT III**

**9 hours**

Chi-Square variate - Application of Chi-square - Chi-square test for population variance and independence of attributes.

**UNIT IV**

**9 hours**

Student's t definition - Application of t-distribution test for single mean - Difference of means - #Test for correlation Coefficient#

**UNIT V**

**9 hours**

F-Statistic definition - Application of F-distribution - F-test for equality of population Variance.

**# # Self-study portion.**

**Text Book:**

S.C. Gupta & V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons Publication, Third edition, (2010).

<b>UNIT I</b>	Chapter 12	Sections 12.1 – 12.5
<b>UNIT II</b>	Chapter 12	Sections 12.9.1, 12.9.2, 12.13 and 12.14
<b>UNIT III</b>	Chapter 13	Sections 13.1, 13.5, 13.5.1 - 13.5.3
<b>UNIT IV</b>	Chapter 14	Sections 14.2, 14.2.5 – 14.2.8
<b>UNIT V</b>	Chapter 14	Sections 14.3, 14.3.1, 14.3.2



**Books for Reference:**

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons Publication, Eleventh Edition (2013).
2. H.C. Saxena and P.U. Surendran, Statistical Inference, S. Chand & Co. (1967).
3. Marek Fisz, Probability and Mathematical Statistics, John Wiley & Sons (1963).

**Prepared By:**

Mr. S. Mohamed Yusuff Ansari

Dr. A. Prasanna

Ms. S. Sharmila Banu

Ms. K. Prasanna Devi

**SEMESTER V: CORE-IX  
MECHANICS**

**Course Code : 17UMA5C9**  
**Hours/Week : 6**  
**Credits : 5**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To get the knowledge about forces acting on a rigid bodies and to acquire the knowledge of velocities on moving bodies.

**Prerequisite:**

This course requires the basic knowledge in speed, velocity, acceleration, etc.,

**UNIT I**

**18 hours**

Force: Newton's Laws of motion – Resultant of two forces on a particle - Equilibrium of a particle: Equilibrium of a particle under three forces.

**UNIT II**

**18 hours**

Forces on a rigid body: Moment of force - Parallel forces – Forces along the sides of a triangle - Couples – #Resultant of several coplanar forces#. Equilibrium of a rigid body under three coplanar forces – Cotangent formulae.

**UNIT III**

**18 hours**

Types of forces - A specific reduction of forces: Problems involving frictional forces – Hanging Strings: Equilibrium of a uniform homogeneous string– #Suspension bridge#.

**UNIT IV**

**18 hours**

Kinematics: Velocity – Projectiles - Forces on projectile –Projectile projected on an inclined plane.

**UNIT V**

**18 hours**

Impact: Impact of sphere –Impact of two smooth spheres – Impact of a smooth sphere on a plane – Direct Impact of a smooth sphere on a plane - Oblique Impact of two smooth spheres.

# # Self-study portion.

**Text Book:**

P. Duraipandian, Laxmi Duraipandian and MuthamizhJarapragasam, Mechanics, S.Chand & Company Ltd, (2012)

<b>UNIT I</b>	Chapter 2	Sections 2.1.1, 2.2
	Chapter 3	Sections 3.1
<b>UNIT II</b>	Chapter 4	Sections 4.1,4.4 - 4.7 (Except 4.7.1, 4.7.2 ), 4.9
<b>UNIT III</b>	Chapter 2	Sections 2.1.2
	Chapter 5	Sections 5.2 (Except 5.2.1)
	Chapter 9	Sections 9.1, 9.2
<b>UNIT IV</b>	Chapter 1	Sections 1.2
	Chapter 13	Sections 13.1 & 13.2
<b>UNIT V</b>	Chapter 14	Sections 14.2 to 14.5

**Books for Reference:**

1. M.K.Venkataraman, Statics, Agasthiyar Publications, (2002).
2. M.K.Venkataraman, Dynamics, Agasthiyar Publications, (2002).

**Prepared by:**

Dr. A. Mohamed Ismayil  
Ms. A. Nafiunisha

**SEMESTER V: CORE-X  
REAL ANALYSIS**

**Course Code** :17UMA5C10  
**Hours/Week** : 5  
**Credits** : 5

**Max. Marks** : 100  
**Internal Marks** : 25  
**External Marks** : 75

**Objective:**

To describe and prove continuity, differentiability and integrability conditions for real functions with the help of limiting properties and to prove mean value theorems.

**Prerequisite:**

This course requires the basic knowledge about number system, sets and functions.

**UNIT I**

**15 hours**

Order relation in  $\mathbb{R}$  - Absolute value – Completeness - #Countable and Uncountable sets# - Neighbourhoods - Open sets - Closed sets - Limit points of a set - Existence of limit points of a set.

**UNIT II**

**15 hours**

Limits - Continuous functions - Types of discontinuities - #Uniform continuity#.

**UNIT III**

**15 hours**

Derivability of a function - Derivability and Continuity - Algebra of derivatives - Darboux's Theorem on derivatives.

**UNIT IV**

**15 hours**

Rolle's Theorem - Lagrange's Mean Value Theorem - Cauchy's Theorem - Taylor's Theorem - #Taylor's series# - Power series expansion.

**UNIT V**

**15 hours**

Riemann integration - Darboux's theorem - Conditions for integrability - Integrability of continuous and monotonic functions - Fundamental Theorem of Calculus - First mean value Theorem.

# # Self-study portion.

**Text Books:**

**T.B-1** M.K. Singhal and Asha Rani Singhal, A First Course in Real Analysis, R. Chand & Co. (2008).

**T.B-2** Shanthi Narayan, A Course of Mathematical Analysis, S. Chand & Co. (1995).

<b>UNIT I</b>	Chapter I	Sections 4-6, 10 &	
	Chapter II	Sections 2 - 5, 5.1	<b>T.B- 1</b>
<b>UNIT II</b>	Chapter V	Sections 1 – 3, 8	<b>T.B- 1</b>
<b>UNIT III</b>	Chapter VI	Sections 1 – 3, 5	<b>T.B- 1</b>
<b>UNIT IV</b>	Chapter VII	Sections 1 – 6	<b>T.B- 1</b>
<b>UNIT V</b>	Chapter VI	Sections 6.2,6.3,6.5,6.6,6.8,6.8.3,6.9.1	<b>T.B- 2</b>

**Books for Reference:**

1. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBHP Publishing Co., New Delhi(1970).
2. Robert G. Bartie and Donald R. Sherbert, Introduction to Real Analysis, Wiley India Pvt.,Ltd. Third Edition (2007).

**Prepared by:**

Mr. S. Masoothu

Ms. S. Ameena Banu

**SEMESTER V: Core XI  
MODERN ALGEBRA**

**Course Code : 17UMA5C11**

**Hours/Week : 5**

**Credits : 5**

**Max. Marks : 100**

**Internal Marks: 25**

**External Marks: 75**

**Objective:**

To introduce the concepts of Group, Ring, Ideals, polynomial rings and their properties.

**Prerequisite:**

This course requires the basic knowledge in sets, operations, functions, permutation and field.

**UNIT I**

**15 hours**

Groups – #Elementary Properties of a Group# - Equivalent definitions of a group – Permutations - Subgroups.

**UNIT II**

**15 hours**

Cyclic Group - Order of an element - Cosets - Lagrange's theorem - Normal subgroups - Quotient group.

**UNIT III**

**15 hours**

Rings – #Elementary properties of rings# - Isomorphism - Types of rings - Characteristic of a ring - Subrings.

**UNIT IV**

**15 hours**

Ideals - Quotient rings - Maximal and prime ideals - Homomorphism of rings - Field of quotients of an integral domain - Ordered integral domain.

**UNIT V**

**15 hours**

Unique Factorization Domain - Euclidean domain – Principle Ideal Domain - Polynomial rings - Polynomial rings over unique factorization domain.

**# # Self-study portion.**

**Text Book:**

S. Arumugam and A. Thangapandi Isaac, Modern Algebra, Scitech Publications (India) Pvt. Ltd. (2003).

**UNIT I** Chapter III Sections 3.0 – 3.5

**UNIT II** Chapter III Sections 3.6 – 3.9

**UNIT III** Chapter IV Sections 4.1 – 4.6

**UNIT IV** Chapter IV Sections 4.7 – 4.12

**UNIT V** Chapter IV Sections 4.13 – 4.17

**Books for Reference:**

1. M.L. Santiago, Modern Algebra, Arul Publications (1993).
2. S.G. Venkatachalapathy, Modern Algebra, Maragham Publications (2003).

**Prepared by:**

Dr. A. Solairaju

Ms. B. Fathima Kani

**SEMESTER V: CORE-XII  
NUMERICAL METHODS**

**Course Code : 17UMA5C12**  
**Hours/Week : 5**  
**Credits : 5**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To solve the numerical problem in efficiency with various methods.

**Prerequisite:**

This course requires the basic knowledge in linear system of equations and matrices.

**UNIT I** **15 hours**

Solution of Algebraic and Transcendental equation – Bisection Method - #Iteration Method# - Method of false position - Newton-Raphson Method.

**UNIT II** **15 hours**

Interpolation: Finite differences – Forward differences - #Backward differences# - Central differences - Symbolic relations - Newton's formula for interpolation. Interpolation with unevenly spaced points – Lagrange's interpolation formula.

**UNIT III** **15 hours**

Numerical differentiation and integration – Numerical differentiation (Excluding cubic spline Method), Maximum and Minimum values of a tabulated function) - Numerical integration -Trapezoidal Rule - Simpson's Rule.

**UNIT IV** **15 hours**

Matrices and linear system of equation: Gaussian Elimination Method - Method of Factorization - Iterative Method – Gauss Jacobi - Gauss Seidel Methods.

**UNIT V** **15 hours**

Numerical solution of ordinary differential equations – Solution by Taylor series - Picard's method of successive approximations - Euler method - #Modified Euler Method# - Runge–Kutta Methods of second order and fourth order.

**# # Self-study portion.**

**Text Books:**

S.S. Sastry, Introductory Methods of Numerical Analysis, Fourth Edition (2009).

**UNIT I** Chapter 2 Sections 2.1 - 2.5  
**UNIT II** Chapter 3 Sections 3.3, 3.6, 3.9.1  
**UNIT III** Chapter 5 Sections 5.1, 5.2(Excluding 5.2.1 and 5.2.2), 5.4, 5.4.1, 5.4.2  
**UNIT IV** Chapter 6 Sections 6.3.2, 6.3.4, 6.4  
**UNIT V** Chapter 7 Sections 7.2 - 7.4, 7.4.2, 7.5



**Books for Reference:**

- 1.F.B.Hildebrand,Introduction to Numerical analysis, Second edition, Tata McgrawHill(1987).
- 2.A.Singaravelu,Numerical Methods, Meenachi Agency(2000)

**Prepared by:**

Major. N. Abdul Ali  
Ms. G. Mehboobnisha

**SEMESTER V: Major Based Elective - I**  
**OPERATIONS RESEARCH**

**Course Code** : 17UMA5M1A  
**Hours/Week** : 5  
**Credits** : 4

**Max. Marks** : 100  
**Internal Marks**: 25  
**External Marks**: 75

**Objective:**

To introduce the various techniques of Operations Research and to make the students to solve the real life problems using LPP models, Transportation model, Assignment model and Network scheduling.

**Prerequisite:**

This course requires the basic knowledge on solving system of equations and network diagrams.

**UNIT I** **15 hours**

Introduction – Origin and development of OR – Nature and features of OR – #Applications of OR# – General Linear Programming Problem – Mathematical Formulation of LPP – Graphical Solution Method, Alternative Optimal Solution, Unbounded Solution, Infeasible Solution – Canonical and Standard forms of LPP – Basic Solution – Basic Feasible and Infeasible Solution – Degenerate Solution.

**UNIT II** **15 hours**

Simplex Algorithm – Use of Artificial Variables – Two Phase Method and Big-M Method – Degeneracy in Linear Programming.

**UNIT III** **15 hours**

Introduction – General Primal Dual Pair – Formulating a Dual Problem – #Primal-Dual Pair in matrix form# - Duality and Simplex Method, Dual Simplex Method.

**UNIT IV** **15 hours**

Introduction – LP formulation of the Transportation Problem – Finding an Initial Basic Feasible Solution using North West Corner Rule, #Least Cost Entry Method# and VAM – MODI Method – Assignment Problem – Hungarian method.

**UNIT V** **15 hours**

Introduction – #Network: Basic Components, Logical Sequencing# - Rules of Network Constructions – Critical Path Analysis – Probability consideration in PERT - Distinction between CPM and PERT.

**Note:** Theoretical proofs are not expected.

# # Self-study portion.

**Text Book:**

Kanti Swarup, P.K. Gupta and Manmohan, Operations Research, Fourteenth Edition, Sulthan Chand and Sons(Reprint 2009).

<b>UNIT I</b>	Chapter 1	Sections 1.1, 1.2, 1.3, 1.10, 3.4, 2.3, 3.1, 3.2, 3.3, 3.5, 4.1
<b>UNIT II</b>	Chapter 4	Sections 4.3, 4.4, 4.5
<b>UNIT III</b>	Chapter 5	Sections 5.1, 5.2, 5.3, 5.4, 5.7, 5.9
<b>UNIT IV</b>	Chapter 10	Sections 10.1, 10.2, 10.9, 10.13, 11.1, 11.2, 11.3
<b>UNIT V</b>	Chapter 25	Sections 25.1, 25.2, 25.3, 25.4, 25.6, 25.7, 25.8

**Books for Reference:**

- 1.P.K. Gupta and Manmohan, Problems in Operations Research(Method and Solutions) Sulthan Chand and Sons.
2. J.K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd (2000).

**Prepared by:**

Dr. S. Ismail Mohideen

Ms. M. Afrose Begum

**SEMESTER V: MAJOR BASED ELECTIVE – I  
COMBINATORICS**

**Course Code : 17UMA5M1B**  
**Hours/Week : 5**  
**Credit : 4**

**Max Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To impart the students with knowledge in Combinatorics.

**Prerequisite:**

This course requires the basic knowledge on sets and functions.

**UNIT I**

**15 hours**

Multisets and Compositions – Weak Compositions – Compositions - Set Partitions – Stirling Numbers of the Second Kind – Recurrence Relations for Stirling Numbers of the Second Kind – When the Number of Blocks Is Not Fixed - Partitions of Integers – Nonincreasing Finite Sequences of Integers – Ferrers Shapes and Their Applications – Euler’s Pentagonal Number Theorem - The inclusion - Exclusion Principle – Two Intersecting Sets – Three Intersecting Sets – Any Number of Intersecting Sets.

**UNIT II**

**15 hours**

Power Series – Generalized Binomial Coefficients – Formal Power Series – Solving Recursions - Ordinary Generating Functions – Exponential Generating Functions .

**UNIT III**

**15 hours**

Product of Generating Function – Ordinary Generating Functions – Exponential Generating Functions - Composition of Two Generating Functions – Ordinary Generating Functions – Exponential Generating Functions - A Different Type of Generating Function

**UNIT IV**

**15 hours**

The cycle Structure of Permutations – Stirling Numbers of the First Kind – Permutations of a Given type - Cycle Structure and Exponential Generating Functions – Inversions – Counting Permutations with Respect to Inversions.

**UNIT V**

**15 hours**

Unimodality – Log-Concavity – Log-Concavity Implies Unimodality – The Project Property – Injective Proofs - The Real Zeros Property

**Text Book:**

Miklos Bona, Introduction to Enumerative Combinatorics, TATA McGRAW-HILL Editions 2007.

<b>UNIT I</b>	Chapter 2	Sections 2.1-2.4
<b>UNIT II</b>	Chapter 3	Sections 3.1-3.2
<b>UNIT III</b>	Chapter 3	Sections 3.3-3.5
<b>UNIT IV</b>	Chapter 4	Section 4.2-4.4
<b>UNIT V</b>	Chapter 8	Section 8.1-8.3

**Books for Reference:**

1. V.K. Balakrishnan – Theory and problems of combinatorics – Schaums outline series – TATA McGRAW HILL.

**SEMESTER V: Skill Based Elective - I**  
**QUANTITATIVE APTITUDE**

**Course Code : 17UMA5S2A**  
**Hours/Week : 2**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : --**  
**External Marks : 100**

**Objective:**

To make the students competent enough to get through competitive examinations.

**Prerequisite:**

This course requires the basic knowledge in arithmetic operations on integers.

**UNIT I** **6 hours**

Numbers – H.C.F and L.C.M of Numbers – Decimal Fractions – Simplification – Square Roots and Cube Roots - Average

**UNIT II** **6 hours**

Problems on Numbers – Problems on Ages- Surds and Indices – Percentage – Profit and Loss- Ratio and Proportion.

**UNIT III** **6 hours**

Partnership- Chain Rule -Time and work- Pipes and Cistern

**UNIT IV** **6 hours**

Problems on Trains – Boats and streams - Alligations or Mixture – Simple Interest – Compound Interest

**UNIT V** **6 hours**

Area – Volume and Surface Areas –Calendar- Clocks – Permutations and Combinations.

**Text Book:**

Dr. R.S. Aggarwal, Quantitative Aptitude, S. Chand and Company Ltd, (2012).

**UNIT I** Chapters 1 to 6  
**UNIT II** Chapters 7 to 12  
**UNIT III** Chapters 13 to 17  
**UNIT IV** Chapters 18 to 22  
**UNIT V** Chapters 24,25,27,28 and 30

**Books for Reference:**

1. R. V. Praveen, Quantitative Aptitude and Reasoning, PHI Private Limited, (2012).
2. Edgar Thorpe, Course in Mental Ability and Quantitative Aptitude, 3<sup>rd</sup> Edition, Mc Graw Hill Education,(2012).

**Note:**

**100 Multiple choice questions only. 20 Questions from each unit.**

**Prepared by:**

Mr. S. Masoothu and Mr. D. Dhamodharan

**SEMESTER V: SKILL BASED ELECTIVE – II**  
**SPSS LAB**

**Course Code : 17UMA5S2BP**  
**Hours/Week : 2**  
**Credit : 2**

**Max. Marks : 100**  
**Internal Marks : -**  
**External Marks : 100**

**Objective:**

To provide concepts used in routines in SPSS on the following problems.

**Prerequisite:**

This course requires the basic knowledge of operating computers.

**List of Practicals:**

1. Mean, Standard deviation, Variance.
2. Bar diagram, Line diagram, Pie chart and Histogram.
3. Co efficient of correlation.
4. Regression equation of X on Y.
5. Regression equation of Y on X.
6. Application of t-test for one sample problem.
7. Application of t-test for two sample problems.
8. Application of t-test for testing the significance of Correlation Coefficient.
9. One-tailed and Two-tailed tests.
10. Application of analysis of variance.

**Prepared by:**

Dr. M. Mohamed Jabarulla  
Dr. S. Shajitha Begum

## SEMESTER V: SKILL BASED ELECTIVE – II

### PageMaker

**Course Code : 17UMA5S2CP**

**Hours/Week : 2**

**Credit : 2**

**Max Marks : 100**

**Internal Marks : --**

**External Marks : 100**

**Objective:** At the end of the program the students will be able to understand the fundamentals of PageMaker and creating cards, book works, building booklets, completing the book.

**Prerequisite:**

This course requires the basic knowledge in text editor.

**List of Practicals:**

1. Create a brochure for Seminar / Workshop.
2. Create a Visiting Card.
3. Create your Resume.
4. Create an advertisement for job in well-known form.
5. Create a Newspaper Report.
6. Create a document by importing Graphic Image from Clip Art.
7. Create a Wedding Card / New year Greeting Card.
8. Type a document using Story Editor.
9. Input a text from Word Document into a PageMaker document.
10. Create a document on Importance of Text Wrap, applying proper font size, tabs, alignment & indentation.
11. Importing and exporting, story editing and printing.
12. Creating book works, building booklets, completing the book.

**Prepared by:**

Dr. R. Jahir Hussain

Dr. S. Shajitha Begum

**SEMESTER V: Skill Based Elective - II**  
**REASONING**

**Course Code : 17UMA5S3A**  
**Hours/Week : 2**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : --**  
**External Marks : 100**

**Objective:**

To make the students competent enough to succeed in competitive examinations.

**Prerequisite:**

This course requires the basic knowledge in analytical reasoning.

**UNIT I**

**6 hours**

Number Series- Alphabet Series – Alpha – Numeric Series, Analogy- Completing the Analogous Pair- Direct Analogy, Classification.

**UNIT II**

**6 hours**

Coding – Decoding – Letter Coding - Direct letter Coding- Number/Symbol Coding – Substitution – Deciphering Message word codes – Deciphering Number and symbol codes, Blood Relations.

**UNIT III**

**6 hours**

Puzzle Test- Classification Type- Seating Arrangements- Comparison Type – Sequential order- Selection Based on Given Conditions- Family Based Puzzles.

**UNIT IV**

**6 hours**

Sequential Output Tracing. Direction Sense Test

**UNIT V**

**6 hours**

Logical Venn Diagrams, Logical Deduction – Two-Premise Arguments.

**Text Books:**

Dr. R.S. Aggarwal , Verbal & Non-Verbal Reasoning, Revised Edition, S. Chand and Company Ltd,(2008).

<b>UNIT I</b>	Chapters	1 to 3	Section I
<b>UNIT II</b>	Chapters	4 and 5	Section I
<b>UNIT III</b>	Chapter	6	Section I
<b>UNIT IV</b>	Chapters	7 and 8	Section I
<b>UNIT V</b>	Chapter	9	Section I and Chapter 1 Section II

**Books for Reference:**

1. R. V. Praveen, Quantitative Aptitude and Reasoning, PHI Private Limited, (2012).
2. Edgar Thorpe, Course in Mental Ability and Quantitative Aptitude, 3<sup>rd</sup> Edition, Mc Graw Hill Education,(2012).



**Note:**

**100 Multiple choice questions only. 20 Questions from each unit.**

**Prepared by:**

Dr. M. Mohamed Jabarulla

Dr. S. Sajitha Begum

**SEMESTER V: SKILL BASED ELECTIVE - III**  
**MATLAB**

**Course Code : 17UMA5S3BP**  
**Hours/Week : 2**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To get the knowledge of solving Mathematical and Numerical problems using MATLAB.

**Prerequisite:**

This course requires the basic knowledge in numerical methods.

**List of Practicals:**

1. Solving equation of higher degrees and solving Linear programming problems.
  2. Solving equation of higher degrees using Bisection method.
  3. Solving system of equations by matrix method and find the eigen values and eigen vectors of a matrix of order 4 by 4 or #higher order#.
  4. Solving system of non-linear equations- Gauss Jacobi iteration Method.
  5. Find the differentiation of different functions of second and third derivatives and find the Integration of different functions with limits and double and #triple integrals# .
  6. Find the integration using Simpsons 3/8 rule.
  7. Solving ordinary differential equations with initial condition and solving system of ordinary differential equations.
  8. Solving ordinary differential equations using Runge– Kutta Fourth order method.
  9. Creating and plotting 2-Dgraphs.
  10. Creating and plotting 3-Dgraphs.
- # # Self-study portion.**

**Text Books:**

**T.B-1** Rudra Pratap, Getting Started with MATLAB a Quick Introduction for Scientists and Engineers, Oxford University Press (2010)

**T.B-2** Rizwan Butt, Introduction to Numerical Analysis Using MATLAB, Infinity Science Press LLC, Published by Firewall Media, New Delhi (2008).

**Books for Reference:**

1. Brian R. Hunt, Ronald L. Lipsman and Jonathan M. Rosenberg, A Guide to MATLAB for Beginners and Experienced Users, Cambridge University Press, 2001.
2. David Houcque, Introduction to Matlab for Engineering Students, Northwestern University (Aug. 2005)

**Prepared by:**

Dr. A. Mohamed Ismayil and Ms. K. Prasanna Devi

**SEMESTER V: SKILL BASED ELECTIVE-III  
CORELDRAW**

**Course Code : 17UMA5S3CP**  
**Hours/Week : 2**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : -**  
**External Marks: 100**

**Objective:**

To train students with the best features of Coreldraw.

**Prerequisite:**

This course requires the basic knowledge in photo editing.

**List of Practicals:**

1. Getting Started with Coreldraw
2. Case Study: Visiting Card
3. Understanding the Color Palette
4. Case Study: Sticker
5. Case Study: Letterhead with Logo
6. Working with the Objects
7. Case Study: Wedding Card
8. Case Study: Flex Banner
9. Understanding other Controls (Layers and Tables)
10. Case Study: Brochure
11. Case Study: Product Box Package
12. Case Study: Book Cover

**Books for Reference:**

1. Stephen Copestake, CorelDraw in easy steps, Dreamtech Press, (2005).
2. CorelTRACE and CorelMOSAIC, Coreldraw, Galgotia Publications Pvt. Ltd., (1994).

**Prepared by:**

Mr. S. Masoothu  
Mr. D. Dhamodharan

**SEMESTER V: EXTRA CREDIT – I  
ASTRONOMY**

**Course Code : 17UMA5EC1**  
**Hours/Week : -**  
**Credit : 4\***

**Max. Marks : 100\***  
**Internal Marks : -**  
**External Marks : 100\***

**Objective:**

To provide knowledge about the universe, scientific thinking to problems in astronomy, the observational foundations of astronomy's greatest discoveries and the nature of galaxy.

**Prerequisite:**

This course requires the basic knowledge about solar system, date and time evolution.

**UNIT I**

Celestial sphere and diurnal motion – Celestial coordinates – Sidereal time.

**UNIT II**

Morning and evening stars – Circumpolar stars - Zones of earth - Perpetual day -Twilight.

**UNIT III**

Refraction – Laws of refraction – Tangent formula - Horizontal refraction - Geocentric parallax – Horizontal parallax.

**UNIT IV**

Kepler’s laws - Anomalies – Kepler’s equation - Calendar.

**UNIT V**

Moon - Sidereal and synodic months – Elongation – Phase of moon – Eclipses - Umbra and penumbra – Lunar and solar eclipses – Maximum and minimum number of eclipses in a year.

**Text Book:**

S. Kumaravel and Susheela Kumaravel, Astronomy, Prentice-Hall (2000).

<b>UNIT I</b>	Chapter II	Sections 39 – 76
<b>UNIT II</b>	Chapter III	Sections 80 – 83, 87 – 89, 111 - 116
<b>UNIT III</b>	Chapter IV	Sections 117 – 128
	Chapter V	Sections 135 – 144
<b>UNIT IV</b>	Chapter VI	Sections 146 – 149, 156 – 159
	Chapter VII	Sections 175 – 179
<b>UNIT V</b>	Chapter XII	Sections 229 – 241
	Chapter XIII	Sections 256 – 263, 267, 268, 271 - 275

**Books for Reference:**

1. W.M. Smart, Textbook on Spherical Astronomy, Cambridge University Press (1999).
2. Barlow, Elementary Mathematical Astronomy, Barlow Prentice-Hall (1983).

**Prepared by:**

Dr. M. Mohamed Jabarulla

## SEMESTER VI: CORE-XIII

### COMPLEX ANALYSIS

Course Code :17UMA6C13

Hours/Week : 5

Credits : 5

Max. Marks : 100

Internal Marks: 25

External Marks: 75

#### Objective:

To introduce concepts of the fundamentals complex analysis and to know the foundations of complex number system.

#### Prerequisite:

This course requires the basic knowledge in complex number system, functions, limits, continuity and differentiability.

#### UNIT I

15 hours

Functions of complex variable – #Limits – Theorems on Limits# – Continuous functions – Differentiability – Cauchy – Riemann equations – Analytic functions- Harmonic functions.

#### UNIT II

15 hours

Conformal Mapping – Elementary transformations – Bilinear transformations – Cross ratio – #Fixed points of Bilinear Transformation# – Some special bilinear transformations.

#### UNIT III

15 hours

Definite integral – Cauchy's Theorem – Cauchy's integral formula- #Higher derivatives#.

#### UNIT IV

15 hours

Taylor's series – Laurent's series –# Zeroes of Analytic functions#- Singularities.

#### UNIT V

15 hours

Residues – Cauchy's Residue Theorem- Evaluation of definite integrals.

# # Self-study portion.

#### Text Book:

S. Arumugam, A. Thangapandi Isaac and A. Somasundaram, Complex Analysis, New Scitech Publications (India) Pvt. Ltd. 10<sup>th</sup> Reprint (2009).

UNIT I Chapter II Sections 2.1 – 2.8

UNIT II Chapter II Sections 2.9 &  
Chapter III Sections 3.1 – 3.5

UNIT III Chapter VI Sections 6.1 – 6.4

UNIT IV Chapter VII Sections 7.1 – 7.4

UNIT V Chapter VIII Sections 8.1 – 8.3

#### Books for Reference:

1. J.N. Sharma, Functions of a Complex variable, Krishna Prakasan Media (P) Ltd, 13<sup>th</sup> Edition (1996-97).

2. T.K. Manicavachagom Pillay, Complex Analysis, S.Viswanathan Publishers Pvt. Ltd.(1994).

**Prepared by:**

Dr. R. Jahir Hussain

Ms. S. Ameena Banu

## SEMESTER VI: CORE-XIV

### NUMBER THEORY

Course Code :17UMA6C14

Hours/Week :5

Credits :5

Max. Marks : 100

Internal Marks: 25

External Marks: 75

#### Objective:

To promote the basic ideas of elementary theory of numbers and basic concepts of Computational Mathematics.

#### Prerequisite:

This course requires the basic knowledge in number system, GCD, LCM, prime numbers, etc.,

#### UNIT I

15 hours

Divisibility Theory in the integers: The Division Algorithm- The Greatest Common Divisor-The Euclidean Algorithm-The Diophantine Equation  $ax+by=c$ .

#### UNIT II

15 hours

Primes and Their Distribution: The Fundamental theorem of Arithmetic- The Sieve of Eratosthenes- #The Goldbach Conjecture#.

#### UNIT III

15 hours

The Theory of Congruences: Carl Friedrich Gauss-Basic Properties of Congruence-Binary and Decimal Representations of Integers-Linear Congruences and The Chinese Remainder Theorem.

#### UNIT IV

15 hours

Fermat's Theorem: Pierre de Fermat- Fermat's Little Theorem and Pseudoprimes-Wilson's Theorem- The Fermat-Kraitchik Factorization Method.

#### UNIT V

15 hours

Number Theoretic Functions: The Sum and Number of Divisors-The Mobius Inversion Formula- The Greatest Integer Function-#An Application to the Calendar#.

# # Self-study portion.

#### Text Book:

David M.Burton,Elementary Number Theory,Sixth Edition,Tata McGraw Hill(2010).

UNIT I Chapter II Sections 2.2-2.5

UNIT II Chapter III Sections 3.1-3.3

UNIT III Chapter IV Sections 4.1-4.4

UNIT IV Chapter V Sections 5.1-5.4

UNIT V Chapter VI Sections 6.1-6.4

#### Books for Reference:

1. Ivan Niven and Herberts S.Zuckerman, An introduction to the Theory of Numbers,

- Wiley Eastern Ltd, Third Edition (1972).
2. George E. Andrews, Number Theory, Dover publicatios, INC, New York (1994).

**Prepared by:**

Dr. A. Nagoor Gani

Ms. A. Nafiunisha



**SEMESTER VI: CORE-XV  
DISCRETE MATHEMATICS**

**Course Code : 17UMA6C15**  
**Hours/Week : 5**  
**Credits : 5**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To enrich the knowledge in the field of logic, functions, Lattices, Boolean algebra and Languages and Grammars.

**Prerequisite:**

This course requires the basic knowledge in sets, functions, permutations and combinations, etc.,

**UNIT I**

**15 hours**

Logic: Propositions and logical operations - Logical Connectives and Compound Statements – Quantifiers - Conditional statements - Mathematical induction - Mathematical statements - #Logic and Problem Solving#.

**UNIT II**

**15 hours**

Counting: Permutations – Combinations - Pigeonhole principle - The extended pigeonhole Principle - Elements of probability - Assigning Probabilities to Events - #Equally Likely Outcomes# - Recurrence relations.

**UNIT III**

**15hours**

Functions: Functions - Special types of Functions - Invertible functions- Functions for Computer Science - #Hashing functions# - Growth of Functions - Permutation Functions.

**UNIT IV**

**15 hours**

Order relations and structures: Partially ordered sets – Hasse Diagrams – Topological Sorting – #Isomorphism# - Extremal elements of partially ordered sets – Lattices - Isomorphic Lattices - Properties of Lattices - Special types of lattices - Finite Boolean Algebras – Functions on Boolean Algebras.

**UNIT V**

**15 hours**

Languages and Finite –State Machines: Languages- Grammars - Representations of Special Grammars and Languages – BNF Notation – Syntax Diagrams – Regular Grammars and Regular Expressions - Finite – State Machines – #Machine Congruence and Quotient Machines#.

**# # Self-study portion.**

**Text Book:**

Kolman, Busby and Ross, Discrete Mathematical Structures, PHI learning private ltd, New Delhi, sixth edition, (2009).

<b>UNIT I</b>	Chapter II	Sections	2.1, 2.2, 2.4-2.6.
<b>UNIT II</b>	Chapter III	Sections	3.1-3.5.
<b>UNIT III</b>	Chapter V	Sections	5.1-5.4
<b>UNIT IV</b>	Chapter VI	Sections	6.1-6.5
<b>UNIT V</b>	Chapter X	Sections	10.1 – 10.3

**Books for Reference:**

1. J.P.Tremblay and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, Thirty-Ninth Reprint (2011).
2. Rakesh Dube, Adesh Pandey and Ritu Gupta, Discrete Structures and Automata Theory, Narosa Publishing House (2000).

**Prepared by:**

Dr. A. Nagoor Gani

Ms. S. Ameena Banu

**SEMESTER VI: CORE-XVI  
GRAPH THEORY**

**Course Code : 17UMA6C16**  
**Hours/Week : 5**  
**Credits : 5**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To introduce some of the most important notions of Graph Theory and develop their skills and solving basic exercises.

**Prerequisite:**

This course requires the basic knowledge in logic and set theory.

**UNIT I**

**15 hours**

Graph – #Applications of Graphs# – Finite and Infinite graphs – Incidence and Degree – Isolated vertex, pendant vertex and Null graphs. Paths and Circuits: Isomorphism – Sub-graphs – Walks, Paths and Circuits – Connected and disconnected graphs – Euler graphs.

**UNIT II**

**15 hours**

Operations on Graphs – More on Euler Graphs – Hamiltonian Paths and circuits - #Travelling Salesman Problem#. Trees and fundamental circuits: Trees – Properties of Trees – Pendant vertices in a Tree – Distance and centers in a Tree.

**UNIT III**

**15 hours**

Spanning Trees – Fundamental circuits – #Finding all spanning trees of graph# – Spanning trees in a weighted graph - Cut sets and cut vertices: Cut sets – Properties of a cut set – All cut sets in a graph.

**UNIT IV**

**15 hours**

Fundamental circuits and cut sets – Connectivity and Separability. Planar and dual graphs: Planar graphs – Kuratowski's two graphs – Representation of a planar graph.

**UNIT V**

**15 hours**

Matrix Representation of graphs: Incidence Matrix – Circuit matrix – Fundamental circuit matrix and Rank of circuit matrix – Cut set matrix – Relationship among  $A_f$ ,  $B_f$  and  $C_f$  – #Path matrix#.

# # Self-study portion.

**Text Book:**

Narsingh Deo, Graph theory with application to Engineering and Computer Science, Prentice Hall of India Pvt. Ltd. (2005).

<b>UNIT I</b>	Chapter 1	Sections 1.1 – 1.5. Chapter 2 Sections 2.1, 2.2, 2.4 – 2.6
<b>UNIT II</b>	Chapter 2	Sections 2.7 – 2.10 Chapter 3 Sections 3.1 – 3.4
<b>UNIT III</b>	Chapter 3	Sections 3.7 – 3.10 Chapter 4 Sections 4.1 – 4.3
<b>UNIT IV</b>	Chapter 4	Sections 4.4, 4.5 Chapter 5 Sections 5.2 – 5.4

**UNIT V** Chapter 7 Sections 7.1 – 7.4, 7.6 – 7.8

**Books for Reference:**

1. V.R. Kulli, College Graph Theory, Viswa International Publications, Gulbarga, India (2012).
2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory, Tata McGraw Hill Higher Education Private Limited, New Delhi, Eight reprint (2012).

**Prepared by:**

Dr. R. Jahir Hussain

Dr. S. Sajitha Begum

**SEMESTER VI: MAJOR BASED ELECTIVE-II  
C PROGRAMMING**

**Course Code : 17UMA6M2AT**  
**Hours/Week : 3**  
**Credits : 2**

**Max. Marks : 50**  
**Internal Marks: 10**  
**External Marks: 40**

**Objective:**

To develop the logical skills and to expose the students to understand the various tools in solving numerical problems.

**Prerequisite:**

This course requires the basic knowledge in text editor and databases.

**UNIT I**

**9 hours**

Constants, Variables and Data Types – Character set – C tokens – #Keywords and identifiers# – Constants – Variables – Data types– Assigning values to variables – Defining symbolic Constants – Operators – Arithmetic operators – Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operator – Bitwise operators – #Special operators# – Managing Input and Output Operators – Reading character – Writing a character – Formatted input – Formatted output.

**UNIT II**

**9 hours**

Decision Making and Branching – Decision making with IF statement – Simple IF statement – The IF ELSE statement – Nesting IF...ELSE statements – The switch statement – The ?: operator – The GOTO statement - Decision Making and Looping – The WHILE, DO, FOR statement.

**UNIT III**

**9 hours**

Handling of Character String – Declaring and initializing string variables – Reading strings from terminal – writing strings to screen – Arithmetic operations on characters – Putting strings together – Comparisons of two strings – String Handling functions – Arrays – One-dimensional and Two-dimensional array.

**UNIT IV**

**9 hours**

User-Defined Functions – Need for user-defined functions – #A multi-function program# – The form of C functions – Return values and their types – Calling a function – Category of functions – No arguments and no return values – Arguments with return values – Handling of non-integer functions – Nesting of functions – Recursion.

**UNIT V**

**9 hours**

File Management in C – Defining and opening a file – closing file – Input/Output operations on files – #Error handling during I/O operations# – Random access to files.

# # Self-study portion.

**Text Book:**

E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill, Third Edition (2005).

UNIT I	Chapter 2	Sections 2.2 – 2.7, 2.10 - 2.11;	Chapter 3	Sections 3.2 - 3.9
	Chapter 4	Sections 4.2 - 4.5		
UNIT II	Chapter 5	Sections 5.2 - 5.5, 5.7-5.9;	Chapter 6	Sections 6.2 - 6.4
UNIT III	Chapter 8	Sections 8.2 - 8.8;	Chapter 7	Sections 7.2 - 7.6
UNIT IV	Chapter 9	Sections 9.2 - 9.16		
UNIT V	Chapter 12	Sections 12.2 - 12.6		

**Books for reference:**

1. Yashvant Kanetkar, Let us C, Seventh Edition, BPB Publications, (2007).
2. Peter Van Der Linder, Expert C programming, Pearson (1994).

**Prepared by:**

Dr. A. Nagoor Gani  
Dr. S. Sajitha Begum

**SEMESTER VI: MAJOR BASED ELECTIVE-II**  
**C PROGRAMMING - PRACTICAL**

**Course Code : 17UMA6M2AP**  
**Hours/Week : 2**  
**Credits : 2**

**Max. Marks : 50**  
**Internal Marks : 10**  
**External Marks: 40**

**Objective:**

To enable the students to apply Numerical Methods in Computer Environment.

**Prerequisite:**

This course requires the basic knowledge in computer basics.

**List of Practical:**

1. Write a C program to find the positive root of an algebraic equation using Bisection Method.
2. Write a C program to find the positive root of an algebraic equation using Newton Raphson Method.
3. Write a C program to solve the system of linear equations using Gauss Elimination Method.
4. Write a C program using Gauss-Jacobi Method.
5. Write a C program to solve the system of linear equations using Gauss-Seidal Method.
6. Write a C program to evaluate a definite integral using Trapezoidal rule.
7. Write a C program to evaluate a definite integral using Simpson's 1/3rd rule.
8. Write a C program to find the approximate value using Euler's Method.
9. Write a C program using Runge-Kutta second order Method.

**Books for reference:**

1. Yashavant P. Kanetkar, Let Us C, BPB Publications, Sixth Revised Edition, (2005).
2. E. Balagurusamy, Programming in ANSI C, Tata McGrawHill Publishing Company, Fourth Edition, 2009.
3. M.K.Venkatraman, Numerical methods in Science and Engineering, National Publisher Company, Fifth Edition, 2001.

**Prepared by:**

Dr. A. Nagoor Gani  
Dr. S. Sajitha Begum

**SEMESTER VI: MAJOR BASED ELECTIVE – II**  
**DATA STRUCTURE AND ALGORITHMS**

**Course Code : 17UMA6M2B**  
**Hours/Week : 5**  
**Credit : 4**

**Max Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To understand the concepts of data structures and algorithms.

**Prerequisite:**

This course requires the basic knowledge in algorithms, arrays, structures and graph theory.

**UNIT I** **15 hours**

Introductions and Preliminaries : Basic terminology, Elementary data organization, Data structures – Data structure operations, Algorithms : complexity, time-space Tradeoff – Mathematical Notations and Functions – Control Structures – Complexity of Algorithms.

**UNIT II** **15 hours**

Arrays and Stacks : Arrays – Introduction – Linear Array, Representation of Linear Array in Memory, Traversing Linear Arrays, Inserting and Deleting, Multidimensional Arrays – Stacks – Array Representation of Stack, Arithmetic Expressions: Polish Notation - #Recursion#.

**UNIT III** **15 hours**

Queues and Linked Lists: Queues – De-queues – Array Representation Queues – Insertion and Deletion – Linked List, Representation of Linked Lists in memory, Traversing a Linked List, Insertion into a Linked List, Deletion from a Linked List, #Two-Way Linked Lists#.

**UNIT IV** **15 hours**

Trees and Graphs: Binary Trees, Representing Binary Trees in Memory, Traversing binary tree – threads, Binary Search Tree, Searching and Inserting in Binary Search Tree, Deleting in Binary Search tree – Graph Theory – Terminology, Sequential Representation of Graph: Adjacency Matrix, Path Matrix.

**UNIT V** **15 hours**

Sorting and Searching: Sorting –Bubble Sort, Insertion Sort, Selection Sort, #Merge Sort#, Quick sort, Heap Sort – Searching; Liner Search, Binary Search.

#.....#self-study portion

**Text Book:**

Seymour Lipschutz and G.A. Vijaylakshmi Pai(Schaum's Series), Data Structures, Tata McGraw Hill Publishing Company Ltd., New Delhi, Indian Adopted Edition, 2006 .

<b>UNIT I</b>	Chapter I	Sections 1.1-1.5,	Chapter II	Sections 2.2, 2.4, 2.5
<b>UNIT II</b>	Chapter IV	Sections 4.1-4.5, 4.9,	Chapter VI	Sections 6.1-6.3, 6.5,6.7
<b>UNIT III</b>	Chapter VI	Sections 6.1.0-6.1.2,	Chapter V	Sections 5.1-5.4,5.7-5.8,5.1.0.
<b>UNIT IV</b>	Chapter VI	Sections 7.1-7.9,	Chapter VII	Sections 8.1-8.3



**UNIT V** Chapter IX Section 9.1-9.6, 4.6-4.8, 6.6, 7.17.

**Books for Reference**

1. Ashok N. Kamthane, Introduction to Data Structures in C, Pearaon Edition,2007.

**SEMESTER VI: Major Based Elective III**  
**LINEAR ALGEBRA**

**Course Code : 17UMA6M3A**  
**Hours/Week : 4**  
**Credits : 4**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To understand the concept of the algebraic properties of Vector space and Matrices.

**Prerequisite:**

This course requires the basic knowledge in sets, relations, functions, matrices, permutation and polynomials

**UNIT I**

**12 hours**

Vector Spaces – Definition - #Examples# - Subspaces–Algebraic Properties on subspaces – Examples - Linear Transformations–Fundamental theorem on homomorphism on vector spaces - Span of a set.

**UNIT II**

**12 hours**

Linear independence - Basis and dimension for a vector space - #Examples# - Rank and nullity of a linear transformation - Matrix of a linear transformation.

**UNIT III**

**12 hours**

Inner Product Space –Definition - #Examples# - Orthogonality–Orthogonal set and Orthonormal set – Orthonormal basis - Examples - Orthogonal Complement – Properties on orthogonal of a subset - a subspace of an inner product space.

**UNIT IV**

**12 hours**

Theory of Matrices – Algebra of matrices–Matrix of composition of two transformations - #Types of matrices# - Inverse of a matrix–Determinants – Properties on inverse of a matrix - Elementary transformations – Canonical form of a matrix

**UNIT V**

**12 hours**

#Rank of matrix# - Simultaneous linear equations - Characteristic equation – Cayley Hamilton theorem – Characteristic polynomial of a matrix - Eigen values and vectors

# **# Self-study portion**

**Text Book:**

S. Arumugam and A. Thangapandi Isaac, Modern Algebra, SciTech Publications (India) Pvt. Ltd, Chennai, Reprint (2013).

**UNIT I** Chapter V Sections 5.0 – 5.4

**UNIT II** Chapter V Sections 5.5 – 5.8

**UNIT III** Chapter VI Sections 6.0 – 6.3

**UNIT IV** Chapter VII Sections 7.0 – 7.4  
**UNIT V** Chapter VII Sections 7.5 – 7.8

**Books for Reference:**

1. P.B. Bhattacharya, S.K.Jain and S.R.Nagpaul, First Course in Linear Algebra,Wiley Eastern Limited (1985).
2. K.S.Narayanan and T.K. ManicavachagomPillay, Modern Algebra, Volume I, S.Viswanathan Pvt., Ltd. (1982).

**Prepared by:**

Dr. A. Solairaju  
Ms. B. Fathima Kani

**SEMESTER VI: MAJOR BASED ELECTIVE – III  
Z AND FOURIER TRANSFORMS**

**Course Code : 17UMA6M3B**  
**Hours/Week : 4**  
**Credit : 4**

**Max Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To impart the students with knowledge of Z and Fourier Transforms.

**Prerequisite:**

This course requires the basic knowledge in integration and Fourier series.

**UNIT I** **12 hours**

Introduction – Z-transform – Z-transform of standard series- properties of a Z-transform – Inverse Z -transform – solution of difference equation.

**UNIT II** **12 hours**

Integral Transform – Definition –Fourier Integral Theorem complex form of the Fourier Integral – Complex form of the Fourier Integral – Second kind of derivation – Fourier cosine and sine integrals.

**UNIT III** **12 hours**

Fourier Transform – Properties of Fourier Transformation – Convolution Theorem for Fourier Transforms – Parseval’s Identity for Fourier transform – Dirac-Delta function and its Fourier Transformation.

**UNIT IV** **12 hours**

Infinite Fourier Transformation cosine and sine Transformation and properties – Parseval’s Identities .

**UNIT V** **12 hours**

Relations between the Fourier Transforms of the derivatives of a function – Fourier cosine and sine transform of  $n^{\text{th}}$  derivative – Application of Fourier Transforms.

**Text Book:**

**T.B-1** Sarveswara Rao Koneru, Engineering Mathematics, Universities Press(India) Private Limited, 2004(Reprint)

**T.B-2** M.K. Venkataraman, Engineering Mathematics-III B, National Publishing Company Thirteenth edition 1998.

<b>UNIT I</b>	Chapter 21	Sections 21.1-21.5	<b>T.B 1</b>
<b>UNIT II</b>	Chapter IV	Sections 1-5	<b>T.B 2</b>
<b>UNIT III</b>	Chapter IV	Sections 6-10	<b>T.B 2</b>
<b>UNIT IV</b>	Chapter IV	Section 11-13	<b>T.B 2</b>
<b>UNIT V</b>	Chapter V	Section 14-16	<b>T.B 2</b>

**Prepared by:** Dr. R. Jahir Hussain

**SEMESTER VI: EXTRA CREDIT COURSE-II  
REPLACEMENT AND SEQUENCING MODELS**

**Course Code : 17UMA6EC2**

**Hours/Week : -**

**Credit : 4\***

**Max. Marks : 100\***

**Internal Marks : -**

**External Marks: 100\***

**Objective:**

To provide mathematical techniques of Replacement and sequencing models and to get optimal solution.

**Prerequisite:**

This course requires the basic knowledge in optimization.

**UNIT I**

Replacement and maintenance models – Types of failure- Replacement of items – whose efficiency deteriorates with time – related problems.

**UNIT II**

Replacement policy for items whose running cost increases with time but value of money changes with constant rate during a period – General cost function – related problems.

**UNIT III**

Replacement of items that completely fail - Individual replacement policy – Group replacement policy – Examples – Other replacement problems – Equipment renewal problem.

**UNIT IV**

Sequencing problem – Notations terminology and assumptions - Processing n jobs through two machines – Processing n jobs through three machines – Related problems.

**UNIT V**

Processing n job through m machines – Processing two jobs through m machines – Related Problems.

**Text Book:**

J.K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd. 5<sup>th</sup> Edition (2013).

**UNIT I** Chapter 17 Sections 17.1, 17.2, 17.3(model 1)

**UNIT II** Chapter 17 Sections 17.3(model 2)

**UNIT III** Chapter 17 Sections 17.4, 17.5

**UNIT IV** Chapter 20 Sections 20.2, 20.3, 20.4

**UNIT V** Chapter 20 Sections 20.5, 20.6

**Books for Reference:**

1. P. Prem Kumar Gupta and D.S. Hira, Operations research, S. Chand (2000).
2. Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons Pvt. Ltd., Twelfth Edition (2004).

**Prepared by:**

Dr. A. Nagoor Gani

Mr. H. Sheik Mujibur Rahman

**SEMESTER III: NON MAJOR ELECTIVE -I**  
**MATHEMATICS FOR COMPETITIVE EXAMINATIONS – I**

**Course Code : 17UMA3N1**

**Hours/Week : 2**

**Credit : 2**

**Max. Marks : 100**

**Internal Marks : -**

**External Marks : 100**

**Objective:**

To enable the students to appear competitive examinations confidently.

**Prerequisite:**

This course requires the basic knowledge in arithmetic operations on integers.

**UNIT I**

**6 hours**

Numbers: Various types of numbers – Arithmetic operations on numbers  
(Shortcut Methods) – Various tests for Divisibility – Prime and Composite numbers.

**UNIT II**

**6 hours**

HCF and LCM of numbers - Decimal fractions: Arithmetic operations on Decimal Fractions - H.C.F and L.C.M of Decimals – Rule for converting Pure and Mixed Recurring Decimals into a Vulgar Fractions.

**UNIT III**

**6 hours**

Simplification - Square Root- Square Root by means of Factors – General Method – Square Root of Decimal Fractions - Square Root of Vulgar Fractions - Cube Root.

**UNIT IV**

**6 hours**

Average – Percentage: Problems based on Population and Depreciation - Ratio and Proportion.

**UNIT V**

**6 hours**

Partnership – Chain rule: Direct proportion, Indirect Proportion.

**Text Book:**

R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company Ltd (2007).

**Books for Reference:**

1. R.V.Praveen, Quantitative Aptitude and Reasoning, Second Edition, Prentice Hall of India Ltd.(2013)
2. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fifth edition, McGraw Hill Education Ltd.(2014)

**Note:**

**100 Multiple choice questions only. 20 Questions from each unit.**

**Prepared By:**

Mr. N. Mohamed Thoiyab

Ms. J. Sarthaj Banu

**SEMESTER IV: NON MAJOR ELECTIVE - II**  
**MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II**

**Course Code : 17UMA4N2**

**Hours/Week : 2**

**Credit : 2**

**Max. Marks : 100**

**Internal Marks : -**

**External Marks : 100**

**Objective:**

To enable the students to appear competitive examinations confidently.

**Prerequisite:**

This course requires the basic knowledge in arithmetic operations on integers.

**UNIT I**

Time and work - Pipes and Cisterns.

**6 hours**

**UNIT II**

Time and Distance – Trains - Boats and Streams.

**6 hours**

**UNIT III**

Profit and Loss - Mixture.

**6 hours**

**UNIT IV**

Simple interest and Compound interest - Calendar.

**6 hours**

**UNIT V**

Volume and Area of Solid figures.

**6 hours**

**Text Book:**

R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company Ltd. (2007).

**Books for Reference:**

1. R.V.Praveen, Quantitative Aptitude and Reasoning, Second Edition, Prentice Hall of India Ltd.(2013)
2. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fifth edition, McGraw Hill Education Ltd.(2014)

**Note:**

**100 Multiple choice questions only. 20 Questions from each unit.**

**Prepared By:**

Mr. N. Mohamed Thoiyab

Ms. J. Sarthaj Banu



**SEMESTER I: ALLIED-I  
CALCULUS  
(For Computer Science)**

**Course Code : 17UMA1A1**  
**Hours/Week : 4**  
**Credits : 3**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks: 75**

**Objective:**

To get the knowledge about Differentiation, Integration and Differential equations and to acquire the knowledge of problem solving ability.

**Prerequisite:**

This course requires the basic knowledge in differentiation, integration and trigonometric functions.

**UNIT I**

**12 hours**

Successive Differentiation: The nth derivatives of Standard result - #Formation of equations involving derivatives# - Leibnitz formula for the nth derivative of a product - Related problems.

**UNIT II**

**12 hours**

Properties of definite Integrals – Integration by parts - Reduction formulae for  $\int x^n e^{ax} dx$ ,  $\int x^n \cos ax dx$ ,  $\int \sin^n x dx$ ,  $\int \cos^n x dx$ .

**UNIT III**

**12 hours**

Differential equations of the first order with higher degree - Equations solvable for p - Equations Solvable for y – #Equations Solvable for x# - Clairaut's form

**UNIT IV**

**12 hours**

#Linear Differential Equations with constant coefficients# - particular integral- Special method of finding P.I – Derivation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Different integrals of P.D.E.

**UNIT V**

**12 hours**

Standard type of first order partial differential equations I, II, III and IV (Clairaut's form) - Lagrange's equations.

**# # Self-study portion.**

**Text Books:**

**T.B-1** S.Narayanan, T.K.Manicavachagom Pillay, Calculus Volume-I, S. Viswanathan Publishers Pvt. Ltd. (2004).

**T.B-2** S.Narayanan, T.K.Manicavachagom Pillay, Calculus Volume-II, S. Viswanathan Publishers Pvt. Ltd. (2004).

**T.B-3** T S.Narayanan, T.K.Manicavachagom Pillay, Calculus Volume-III, S. Viswanathan Publishers Pvt. Ltd. (2008).

<b>UNIT I</b>	Chapter III	Sections 1.1 – 1.4, 1.6,2.1	<b>T.B- 1</b>
<b>UNIT II</b>	Chapter 1	Sections 11, 12, 13.1 –13.4	<b>T.B- 2</b>
<b>UNIT III</b>	Chapter 1	Sections 5.1–5.4, 6.1,6.2	<b>T.B- 3</b>
<b>UNIT IV</b>	Chapter 2	Sections 1 – 4	<b>T.B- 3</b>
	Chapter 4	Sections 1 – 3	<b>T.B- 3</b>
<b>UNIT V</b>	Chapter 4	Sections 5.1-5.4, 6	<b>T.B- 3</b>

**Books for Reference:**

1. S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).
2. A. Abdul Rasheed, Allied Mathematics, Vijay Nicole Imprints private limited, chennai (2008).

**Prepared by:**

Dr. P. Muruganantham  
Mr. N. Mohamed Thoiyab

**SEMESTER I: ALLIED - II  
NUMERICAL METHODS  
(For Computer Science)**

**Course Code : 17UMA1A2**  
**Hours/Week : 4**  
**Credits : 3**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To enhance the power of ideas for solving the problems in Numerical Methods, Differential Equation and Integral equations.

**Prerequisite:**

This course requires the basic knowledge in linear system of equations and matrices.

**UNIT I** **12 hours**

Solution of Algebraic equations by the bisection method – The iteration method – The method of false position.

**UNIT II** **12 hours**

Solving algebraic equations by Newton- Raphson Method – The Generalized Newton's method - Interpolation: Finite Differences – Forward differences – Backward difference

**UNIT III** **12 hours**

Exact solutions to a set of linear equations using Gauss Elimination method and Gauss – Jordan Method – Inversion of a matrix using Gauss –Elimination method

**UNIT IV** **12 hours**

Numerical Integration: Trapezoidal Rule – Simpson's 1/3 rule - Simpson's 3/8 rule

**UNIT V** **12 hours**

Numerical Solution of Ordinary Differential Equations - Numerical solutions to an Ordinary Differential Equation by Euler's Method - Runge-Kutta's second order and fourth order method.

**Text Book:**

P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company Ltd (2010).

**UNIT I** Chapter 3 Section 3.1, 3.2 and 3.3

**UNIT II** Chapter 3 Sections 3.4 , Chapter 5 Sections 5.1

**UNIT III** chapter 4 Sections 4.1, 4.2 and 4.3

**UNIT IV** Chapter 9 Sections 9.9, 9.13 and 9.14.

**UNIT V** Chapter 11 Sections 11.9, 11.12 and 11.13.

**Book for Reference:**

S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India Learning Private Limited, Fourth Edition (2009).

**Prepared by:**

Mr. U. Abuthahir

Mr. M. Sathik Jaseen

**ALLIED MATHEMATICS – III**  
**OPERATIONS RESEARCH**  
**(For Computer Science)**

**Course Code : 17UMA2A3**  
**Hours/Week : 4**  
**Credit : 3**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To understand and identify the need of using Operations Research and situations in which Linear Programming technique, Transportation problem, assignment problem and Sequencing problem.

**Prerequisite:**

This course requires the basic knowledge on solving system of equations and network diagrams.

**UNIT I** **12 hours**

Operations Research: – Nature and Features of Operations Research – Applications of OR - Advantages and Limitations Operations Research - Mathematical Formulation of the Problem

**UNIT II** **12 hours**

Solving a LPP by Graphical Method - General Linear Programming Problem (LPP) – Canonical Standard Forms - Solving LPP with ( $\leq$ ) constraints using Simplex Method.

**UNIT III** **12 hours**

Transportation Problem - Finding Initial Basic Feasible Solution by North West Corner Rule, Least Cost Entry Method and Vogel's Approximation method for a given Transportation Problem (Balanced and unbalanced )

**UNIT IV** **12 hours**

Transportation Problem Solve Using MODI Method - Assignment Problem (Balanced and unbalanced) – Hungarian Method

**UNIT V** **12 hours**

Network scheduling by CPM - Networks basic components - Logical sequencing - Rules of Network constructions - Critical Path Analysis.

**Note:** Theoretical proof not expected.

**Text Book:**

Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons Pvt. Ltd., Twelfth Edition, 2004.

<b>UNIT I</b>	Chapter 1 & 2	Sections	1.1, 1.2, 1.7, 2.1, 2.2
<b>UNIT II</b>	Chapter 3 & 4	Sections	3.2, 3.4, 3.5, 4.3
<b>UNIT III</b>	Chapter 10	Sections	10.1 to 10.8
<b>UNIT IV</b>	Chapter 10 & 11	Sections	10.11, 11.1 to 11.4

**UNIT V**      Chapter 21      Sections      21.1 to 21.5

**Books for Reference:**

1. P. Prem Kumar Gupta and D.S. Hira, Operations research, S. Chand (2000).
2. J.K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd. (2000).

**Prepared by:**

Dr. A. Prasanna

Mr. H. Sheik Mujibur Rahman

**ALLIED MATHEMATICS – IV**  
**STATISTICS**  
**(For Computer Science)**

**Course Code : 17UMA2A4**  
**Hours/Week : 3**  
**Credit : 2**

**Max Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To impart the students with knowledge in Basic Mathematical Statistics.

**Prerequisite:**

This course requires the basic knowledge of data classification and random variable.

**UNIT I**

**9 hours**

Arithmetic Mean - Properties of Arithmetic Mean - Weighted mean – Median.  
#Merits and Demerits of Mean, Median#.

**UNIT II**

**9 hours**

Mode - Geometric mean - Harmonic mean. Graphical Location of the Partition values. #Merits and Demerits of Mode, Geometric Mean and Harmonic Mean#.

**UNIT III**

**9 hours**

Dispersion-characteristics for ideal measure of dispersion - Measures of Dispersion - Range - Q.D - M.D - S.D, coefficient of dispersion - #Coefficient of variation# - Simple problems.

**UNIT IV**

**9 hours**

Correlation – Bivariate distribution, correlation – scatter diagram – Karl- Pearson’s coefficient of correlation – Rank correlation

**UNIT V**

**9 hours**

Regression - Properties of correlation and regression coefficients. (Numerical Problems only)

**Text Book:**

S.C. Gupta & V.K.Kapoor, Elements of Mathematical Statistics, Sultan Chand and Sons, Third Edition, Reprint 2010.

<b>UNIT I</b>	Chapter 2	Sections 2.3 – 2.6
<b>UNIT II</b>	Chapter 2	Sections 2.7 – 2.9.1 & 2.11.1
<b>UNIT III</b>	Chapter 3	Sections 3.1 – 3.7, 3.7.3, 3.8
<b>UNIT IV</b>	Chapter 10	Section 10.1 to 10.3, 10.6
<b>UNIT V</b>	Chapter 10	Section 10.7

**Books for Reference:**

1. Murray R. Spiegel, John Jschiller, R. Alu Srinivasan, Probability and Statistics, Third Edition, Shaum’s Outline Series (2010).

2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons Publication, Eleventh Edition (2013).

**Prepared by:**

Dr. A. Prasanna

Mr. H. Sheik Mujibur Rahman



**SEMESTER III: ALLIED-V**  
**ALGEBRA and TRIGONOMETRY**  
**(For Physics)**

**Course Code : 17UMA3A5:2**

**Hours/Week : 4**

**Credits : 3**

**Max. Marks : 100**

**Internal Marks: 25**

**External Marks: 75**

**Objective:**

To enhance the power of ideas for solving the problems in Algebra, Theory of equations, Matrices and Trigonometry.

**Prerequisite:**

This course requires the basic knowledge in matrices, inequalities, algebraic and trigonometric formulae.

**UNIT I 12 hours**

Algebra: Binomial Series – Exponential Series – The Logarithmic Series

**UNIT II 12 hours**

Theory of equations: #Nature of roots# – Relation between the coefficients and the roots of an algebraic equation – Transformation of equations – Reciprocal equations.

**UNIT III 12 hours**

Matrices: #Various types of Matrices# - Rank of a Matrix - Eigen values and Eigen vectors- Verification of Cayley-Hamilton theorem.

**UNIT IV 12 hours**

Trigonometry: Expansions of  $\cos n\theta$  and  $\sin n\theta$  – Powers of sines and cosines of  $\theta$  in terms of functions of multiple of  $\theta$  .

**UNIT V 12 hours**

Hyperbolic functions – Logarithm of complex numbers.

# **# Self-study portion.**

**Text Book:**

S.Narayanan, R.Hanumantha Rao and T.K. Manicachagom Pillay, P. Kandaswamy, Ancillary Mathematics, Volume I, S. Viswanathan Publishers Pvt. Ltd. Revised Edition (2007).

<b>UNIT I</b>	Chapter 1	Sections 1.2 – 1.4
<b>UNIT II</b>	Chapter 2	Sections 2.1– 2.4
<b>UNIT III</b>	Chapter 3	Sections 3.1, 3.2, 3.4.
<b>UNIT IV</b>	Chapter 5	Sections 5.1, 5.2
<b>UNIT V</b>	Chapter 5	Section 5.4, 5.5

**Books for Reference:**

1. A. Abdul Rashid, Allied Mathematics, Vijay Nicole Publishing Company (2008).
2. S. Arumugam and A. Thangapandi Isaac, Ancillary Mathematics, New Gamma Publishing house (2002).

**Prepared by:**

Dr. P. Muruganantham  
Mr. N. Mohamed Thoiyab

**SEMESTER III: ALLIED –VI**  
**CALCULUS**  
(For Physics)

**Course Code : 17UMA3A6:2**  
**Hours/Week : 3**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To get the knowledge about Differentiation and Integration and to acquire the knowledge of problem solving ability.

**Prerequisite:**

This course requires the basic knowledge in differentiation, integration and trigonometric functions.

**UNIT I**

**9 hours**

Higher Derivatives: The  $n^{\text{th}}$  derivative - Standard results - Trigonometrical transformations - Formation of equations involving derivatives - Leibnitz formula for the  $n^{\text{th}}$  derivative of a product (Statement only)- Related problems.

**UNIT II**

**9 hours**

Jacobian – Curvature: Circle, radius and centre of curvature – Cartesian formula for the Radius of Curvature – The Coordinates of the Center of Curvature.

**UNIT III**

**9 hours**

Properties of definite integrals – Integration by parts - Reduction formulae  $\int x^n e^{ax}$ ,  $\int \sin^n x$ ,  $\int \cos^n x$  and  $\int \sin^m x \cos^n x$  – Related problems.

**UNIT IV**

**9 hours**

Multiple Integral: Definition of the double integral – Evaluation of the double integral – Areas of curved surface.

**UNIT V**

**9 hours**

Application of multiple integrals – Volume of solids of revolution – volumes of solids as double integrals – Volume as a triple integral.

**Text Books:**

**T.B.1.** S.Narayanan, R.Hanumantha Rao and T.K.Manicavachagom Pillay, Ancillary Mathematics Volume - I, S.Viswanathan Publishers Pvt. Ltd, Revised Edition (2007).

**T.B.2.** S.Narayanan, R.Hanumantha Rao and T.K.Manicavachagom Pillay, Ancillary Mathematics Volume - II, S.Viswanathan Publishers Pvt. Ltd, Revised Edition (2007).

**UNIT I** Chapter VI Sections 6.1

**T.B.1**

**UNIT II** Chapter VI Sections 6.2,6.4

**T.B.1**

<b>UNIT III</b>	Chapter I	Sections 11,12,13.1-13.5	<b>T.B.2</b>
<b>UNIT IV</b>	Chapter III	Sections 1-3	<b>T.B.2</b>
<b>UNIT V</b>	Chapter III	Sections 4.1 – 5.2, 5.4	<b>T.B.2</b>

**Books for Reference:**

1. T.K.Manicavachagom Pillay and Others, Calculus Volume-I, S. Viswanathan Publishers Pvt. Ltd. (2004).
2. T.K.Manicavachagom Pillay and Others, Calculus Volume-II, S. Viswanathan Publishers Pvt. Ltd. (2004).

**Prepared by:**

Dr. A. Mohamed Ismayil  
Ms. A. Thagasin Banu

**SEMESTER-IV : Allied VII**  
**DIFFERENTIAL EQUATIONS**  
**(For Physics)**

**Course Code : 17UMA4A7:2**  
**Hours/Week : 4**  
**Credits : 3**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To get knowledge of Laplace Transform and to solve Differential Equations.

**Prerequisite:**

This course requires the basic knowledge of differentiation, integration and its properties.

**UNIT I**

**12 hours**

Differential Equations of the first order: Definitions – Solution of Differential Equations – Formation of differential equations – Equations of the first order and the first degree – variable separable – Homogenous equations – Non homogenous equations of the first degree in  $x$  and  $y$  – linear equation – Bernoulli equation – Exact differential Equations.

**UNIT II**

**12 hours**

Linear Differential Equations with Constant Coefficients: The operator  $D$  and  $D^{-1}$  – particular integral – Special methods of finding P.I. – Application to Damped oscillation – Forced Vibration – Equations reducible to the linear homogeneous equation..

**UNIT III**

**12 hours**

Partial Differential Equations: Derivation of partial differential equations – Different integrals of partial differential equations – Solution of partial differential equation in some simple cases – Some standard types of first order equations – Lagrange's Equations.

**UNIT IV**

**12 hours**

Laplace Transforms: Definitions – Laplace transform of periodic functions – Some General Theorems.

**UNIT V**

**12 hours**

The inverse transforms: Results under inverse transforms of functions – Solving ordinary differential equations with constant coefficients using Laplace transforms.

**Text Book:**

S.Narayanan and T.K.Manicavachagom pillay, Calculus, Volume – III, S.Viswanathan publishers Pvt. Ltd., Revised Edition (2008).

<b>UNIT I</b>	Chapter-1	Sections 1, 2, 3
<b>UNIT II</b>	Chapter-2	Sections 1 to 9
<b>UNIT III</b>	Chapter-4	Sections 1 to 6
<b>UNIT IV</b>	Chapter-5	Sections 1 to 5

**Books for Reference**

1. S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).
2. A. Abdul Rashid, Allied Mathematics, Vijay Nicole Publication Company.

**Prepared by:**

Mr. S. Mohamed Yusuff Ansari

Ms. K. Jenofer

**SEMESTER-IV: Allied VIII**  
**VECTOR CALCULUS AND FOURIER SERIES**  
**(For Physics)**

**Course Code : 17UMA4A8:2**  
**Hours/Week : 4**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To get knowledge of vector calculus and Fourier series and to solve differential equations.

**Prerequisite:**

This course requires the basic knowledge about vectors, differentiation and integration.

**UNIT I** **12 hours**

Vector Analysis: Level Surfaces – The vector differential operator – Gradient – Direction and Magnitude of gradient – Divergence and curl – operators involving  $\nabla$  twice.

**UNIT II** **12 hours**

Line integral – Theorem under line integral – volume integral – surface integral.

**UNIT III** **12 hours**

Gauss Divergence Theorem (Statement only) – Stokes Theorem (Statement only) - Simple problems.

**UNIT IV** **12 hours**

Fourier Series: Even and Odd Functions – Half Range Fourier Series – Development in Cosine series.

**UNIT V** **12 hours**

Development in Sine Series – change of interval – combination of series.

**Text Book:**

S.Narayanan, R. Hanumantha Rao and T.K.Manikavachagom pillay, P. Kandasamy, Ancillary Mathematics, Volume – II, S.Viswanathan publishers Pvt. Ltd., Revised Edition (2007).

<b>UNIT I</b>	Chapter-8	Sections 15 to 20, 22
<b>UNIT II</b>	Chapter-8	Sections 1 to 5
<b>UNIT III</b>	Chapter-8	Sections 6, 9
<b>UNIT IV</b>	Chapter-2	Sections 1 to 4, 5.1
<b>UNIT V</b>	Chapter-2	Sections 5.2, 6, 7

**Books for Reference:**

1. S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).

2. A. H. Siddiqi & P.H. Manchanda, A first course in Differential Equations with applications, Macmillan Publishers India Limited, 2006.

**Prepared by:**

Mr. S. Mohamed Yusuff Ansari

Ms. K. Jenifer



**SEMESTER III: ALLIED-V**  
**ALGEBRA and TRIGONOMETRY**  
**(For Chemistry)**

**Course Code : 17UMA3A5:3**

**Hours/Week : 4**

**Credits : 3**

**Max. Marks : 100**

**Internal Marks: 25**

**External Marks: 75**

**Objective:**

To enhance the power of ideas for solving the problems in Algebra, Theory of equations, Matrices and Trigonometry.

**Prerequisite:**

This course requires the basic knowledge in matrix, inequalities, algebraic and trigonometric formulae.

**UNIT I** **12 hours**

Algebra: Binomial Series – Exponential Series – The Logarithmic Series

**UNIT II** **12 hours**

Theory of equations: #Nature of roots# – Relation between the coefficients and the roots of an algebraic equation – Transformation of equations – Reciprocal equations.

**UNIT III** **12 hours**

Matrices: #Various types of Matrices# - Rank of a Matrix - Eigen values and Eigen vectors- Verification of Cayley-Hamilton theorem.

**UNIT IV** **12 hours**

Trigonometry: Expansions of  $\cos n\theta$  and  $\sin n\theta$  – Powers of sines and cosines of  $\theta$  in terms of functions of multiple of  $\theta$ .

**UNIT V** **12 hours**

Hyperbolic functions – Logarithm of complex numbers.

**# # Self-study portion.**

**Text Book:**

S.Narayanan, R.Hanumantha Rao and T.K. Manicachagom Pillay, P. Kandaswamy, Ancillary Mathematics, Volume I, S. Viswanathan Publishers Pvt. Ltd. Revised Edition (2007).

<b>UNIT I</b>	Chapter 1	Sections 1.2 – 1.4
<b>UNIT II</b>	Chapter 2	Sections 2.1– 2.4
<b>UNIT III</b>	Chapter 3	Sections 3.1, 3.2, 3.4.
<b>UNIT IV</b>	Chapter 5	Sections 5.1, 5.2
<b>UNIT V</b>	Chapter 5	Section 5.4, 5.5

**Books for Reference:**

1. A. Abdul Rashid, Allied Mathematics, Vijay Nicole Publishing Company (2008).
2. S. Arumugam and A. Thangapandi Isaac, Ancillary Mathematics, New Gamma Publishing house (2002).

**Prepared by:**

Dr. P. Muruganantham  
Mr. N. Mohamed Thoiyab

**SEMESTER III: ALLIED –VI**  
**CALCULUS and FINITE DIFFERENCES**  
(For Chemistry)

**Course Code : 17UMA3A6:3**  
**Hours/Week : 3**  
**Credits : 2**

**Max. Marks : 100**  
**Internal Marks : 25**  
**External Marks : 75**

**Objective:**

To get the knowledge about Interpolation, Differentiation and Integration to acquire the knowledge of problem solving ability.

**Prerequisite:**

This course requires the basic knowledge in differentiation, integration and trigonometric functions.

**UNIT I**

**9 hours**

Interpolation: Newton's forward interpolation formula – Newton's backward interpolation formula.

**UNIT II**

**9 hours**

Higher Derivatives: The  $n^{\text{th}}$  derivative - Standard results - Trigonometrical transformations - Formation of equations involving derivatives - Leibnitz formula for the  $n^{\text{th}}$  derivative of a product (Statement only)- Related problems.

**UNIT III**

**9 hours**

Jacobian – Curvature: Circle, radius and centre of curvature – Cartesian formula for the Radius of Curvature – The Coordinates of the Center of Curvature.

**UNIT IV**

**9 hours**

Properties of definite integrals – Integration by parts - Reduction formulae  $\int x^n e^{ax}$ ,  $\int \sin^n x$ ,  $\int \cos^n x$  and  $\int \sin^m x \cos^n x$  – Related problems.

**UNIT V**

**9 hours**

Multiple Integral: Definition of the double integral – Evaluation of the double integral – Areas of curved surface.

**Text Books:**

**T.B.1.** S.Narayanan, R.Hanumantha Rao and T.K.Manicavachagom Pillay, Ancillary Mathematics Volume - I, S.Viswanathan Publishers Pvt. Ltd, Revised Edition (2007).

**T.B.2.** S.Narayanan, R.Hanumantha Rao and T.K.Manicavachagom Pillay, Ancillary Mathematics Volume - II, S.Viswanathan Publishers Pvt. Ltd, Revised Edition (2007).

**UNIT I** Chapter IV Sections 4.1

**T.B.1**

**UNIT II** Chapter VI Sections 6.1

**T.B.1**

<b>UNIT III</b>	Chapter VI	Sections 6.2,6.4	<b>T.B.1</b>
<b>UNIT IV</b>	Chapter I	Sections 11,12,13.1-13.5	<b>T.B.2</b>
<b>UNIT V</b>	Chapter III	Sections 1-3	<b>T.B.2</b>

**Books for Reference:**

1. T.K.Manicavachagom Pillay and Others, Calculus Volume-I, S. Viswanathan Publishers Pvt. Ltd. (2004).
2. T.K.Manicavachagom Pillay and Others, Calculus Volume-II, S. Viswanathan Publishers Pvt. Ltd. (2004).

**Prepared by:**

Mr.U. Abuthahir  
Mr. N. Sathik Jaseen

**SEMESTER-IV: Allied VII**  
**DIFFERENTIAL EQUATIONS**  
**(For Chemistry)**

**Course Code : 17UMA4A7:3**  
**Hours/Week : 4**  
**Credits : 3**

**Max. Marks : 100**  
**Internal Marks: 25**  
**External Marks: 75**

**Objective:**

To get knowledge of Laplace Transform and to solve Differential Equations.

**Prerequisite:**

This course requires the basic knowledge of differentiation, integration and its properties.

**UNIT I**

**12 hours**

Differential Equations of the first order: Definitions – Solution of Differential Equations – Formation of differential equations – Equations of the first order and the first degree – variable separable – Homogenous equations – Non homogenous equations of the first degree in  $x$  and  $y$  – linear equation – Bernoulli equation – Exact differential Equations.

**UNIT II**

**12 hours**

Linear Differential Equations with Constant Coefficients: The operator  $D$  and  $D^{-1}$  – particular integral – Special methods of finding P.I. – Application to Damped oscillation – Forced Vibration – Equations reducible to the linear homogeneous equation..

**UNIT III**

**12 hours**

Partial Differential Equations: Derivation of partial differential equations – Different integrals of partial differential equations – Solution of partial differential equation in some simple cases – Some standard types of first order equations – Lagrange's Equations.

**UNIT IV**

**12 hours**

Laplace Transforms: Definitions – Laplace transform of periodic functions – Some General Theorems.

**UNIT V**

**12 hours**

The inverse transforms: Results under inverse transforms of functions – Solving ordinary differential equations with constant coefficients using Laplace transforms.

**Text Book:**

S.Narayanan and T.K.Manicavachagom pillay, Calculus, Volume – III, S.Viswanathan publishers Pvt. Ltd., Revised Edition (2008).

<b>UNIT I</b>	Chapter-1	Sections 1, 2, 3
<b>UNIT II</b>	Chapter-2	Sections 1 to 9
<b>UNIT III</b>	Chapter-4	Sections 1 to 6
<b>UNIT IV</b>	Chapter-5	Sections 1 to 5

**Books for Reference**

1. S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).
2. A. Abdul Rashid, Allied Mathematics, Vijay Nicole Publication Company.

**Prepared by:**

Mr. S. Mohamed Yusuff Ansari

Ms. K. Jenifer

**SEMESTER IV: ALLIED-VIII**  
**STATISTICS AND VECTOR CALCULUS**  
**(For Chemistry)**

**Course Code : 17UMA4A8:3**  
**Hours/Week : 4**  
**Credits : 2**

**Max.Marks : 100**  
**Internal Marks : 25**  
**External Marks: 75**

**Objective:**

To enhance the power of ideas for solving the problems in Statistics and Vector analysis.

**Prerequisite:**

This course requires the basic knowledge of data classification and random variable.

**UNIT I** **12 hours**

Measures of central tendency- Arithmetic Mean - Properties of Arithmetic Mean - Weighted mean – Median- #Merits and Demerits of Mean, Median#.

**UNIT II** **12 hours**

Mode - Geometric mean - Harmonic mean. Graphical Location of the Partition values. #Merits and Demerits of Mode, Geometric Mean and Harmonic Mean#.

**UNIT III** **12 hours**

Dispersion-characteristics for ideal measure of dispersion - Measures of Dispersion - Range - Q.D - M.D - S.D, coefficient of dispersion - #Coefficient of variation# - Simple problems.

**UNIT IV** **12 hours**

Correlation – Bivariate distribution, correlation – scatter diagram – Karl- Pearson's coefficient of correlation – Rank correlation- Regression - Properties of correlation and regression coefficients. (Numerical Problems only)

**UNIT V** **12 hours**

Vector Calculus: The vector differential operator-Gradient- Direction and Magnitude of gradient- Divergence and curl- Related problems.

**# Self-study portion.**

**Text Books:**

**T.B-1** S.C.Gupta & V.K.Kapoor, Elements of Mathematical Statistics, Sultan Chand and Sons, Third Edition, Reprint 2010.

**T.B-2** S.Narayanan, R.Hanumantha Rao , T.K. Manicachagom Pillay and P. Kandasamy, Ancillary Mathematics, Volume II, S. Viswanathan Publishers Pvt. Ltd. Revised Edition (2008).

<b>UNIT I</b>	Chapter 2 Sections 2.3 - 2.6	<b>TB-1</b>
<b>UNIT II</b>	Chapter 2 Sections 2.7-2.9.1, 2.11.1	<b>TB-1</b>
<b>UNIT III</b>	Chapter 3 Sections 3.1-3.7, 3.7.3,3.8	<b>TB-1</b>
<b>UNIT IV</b>	Chapter 10 Sections 10.1 to 10.3, 10.6 ,10.7	<b>TB-1</b>
<b>UNIT V</b>	Chapter 8 Sections 16-20	<b>TB-2</b>

**Books for Reference:**

1. Murray R. Spiegel, John Jschiller, R. Alu Srinivasan, Probability and Statistics, Third Edition, Shaum's Outline Series (2010).
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons Publication, Eleventh Edition (2013).
3. M.L. Khanna, Vector calculus, Jai Prakash Nath and Co., Eighth Edition (1986).

**Prepared by:**

Mr. U. Abuthahir

Mr. N. Sathik Jaseen