

**PG AND RESEARCH DEPARTMENT OF
MATHEMATICS**



HOLY CROSS COLLEGE (AUTONOMOUS)

Tiruchirappalli –620 002

Affiliated to Bharathidasan University

Nationally Accredited (3rd Cycle) with 'A' Grade by NAAC

College with Potential for Excellence.

Tiruchirappalli - 620002.

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

Programme: B.Sc., Mathematics

PO No.	Programme outcomes <i>Upon completion of the B.Sc. Degree Programme, the graduate will be able to</i>
PO – 1	Obtain knowledge in basic concepts in pure and applied Mathematics
PO – 2	Develop aptitude Skills and skill based knowledge
PO – 3	Learn algorithmic approach and statistical analysis in scientific and social problems
PO – 4	Improve logical and reasoning capacity
PO – 5	Receive training for basics of research and methodology

PSO No.	Programme Specific outcomes <i>Upon completion of these Courses the graduate would have</i>
PSO – 1	Become an individual academic excellence to face eligibility exams
PSO – 2	Acquired knowledge for higher studies
PSO – 3	Gained the skills to become an entrepreneur in a tuition center
PSO – 4	Become a management / software professional
PSO – 5	Been capable of executing research and research projects

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 620002

SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

COURSE STRUCTURE (I & II SEMESTER) – CBCS

(For Candidates admitted from June 2020 onwards)

Sem	Part	Component	Title of the course	Code	Hours/Week	Credits	Marks
I	I	Language	Tamil Paper I/ Hindi Paper I/ French Paper I	U20TL1TAM01/ U20HN1HIN01/ U20FR1FRE01	3	3	100
	II	English	English Paper I	U20EL1GEN01	3	3	100
	III	Major Core – 1	Calculus	U20MA1MCT01	4	4	100
		Major Core – 2	Analytical Geometry of Three Dimensions and Vector Calculus	U20MA1MCT02	5	4	100
		Major Core – 3	Algebra and Trigonometry	U20MA1MCT03	4	3	100
		Allied – 1	Properties of Matter, Optics and Sound	U20PH1ALT01	4	2	100
		Allied – 2	Basic Physics Practicals I	U20PH1ALP02	4	2	100
	IV	Environmental Studies	Environmental Studies	U20RE1EST01	2	1	100
		Value Education	Ethics I/ Bible Studies I/ Catechism I	U20VE2LVE01/ U20VE2LVB01/ U20VE2LVC01	1	-	-
			Service Oriented Course	-	-	-	-
			Internship / Field Work / Field Project 30 Hours - Extra Credit	U20SP1ECC01	-	2(Extra Credit)	100
			Total		30	22+2	800+100

Sem	Part	Component	Title of the course	Code	Hours/ Week	Credits	Marks	
II	I	Language	Tamil Paper II/ Hindi Paper II/ French Paper II	U20TL2TAM02/ U20HN2HIN02/ U20FR2FRE02	3	3	100	
	II	English	English Paper II	U20EL2GEN02	3	3	100	
	III	Major Core – 4	Numerical Analysis	U20MA2MCT04	5	4	100	
		Major Core – 5	Statics	U20MA2MCT05	4	3	100	
		Major Core – 6	Programming in C	U20MA2MCT06	5	4	100	
		Allied – 3	Modern Physics, Electricity and Electronics	U20PH2ALT04	4	2	100	
	IV	Skilled Based Course(SBC) – 1	Soft Skills Development	U20RE2SBT01	2	1	100	
		Skilled Based Course(SBC) – 2	Sustainable Rural Development and Student Social Responsibility	U20RE2SBT02	2	1	100	
		Industrial Relation	Industrial Relation	U20MA2IRT01	1	1	100	
		Value Education	Ethics I /Bible Studies I/ Catechism I	U20VE2LVE01/ U20VE2LVB01/ U20VE2LVC01	1	1	100	
			Service Oriented Course	-	-	-		
			Internship / Field Work / Field Project 30 Hours - Extra Credit	U20SP2ECC02		2(Extra Credit)	100	
		Total				30	23+2	1000+ 100

Sem	Part	Component	Title of the course	Code	Hours/Week	Credits	Marks
III	I	Language	Tamil Paper III/ Hindi Paper III/ French Paper III	U15TL3TAM03/ U18HN3HIN03/ U16FR3FRE03	6	3	100
	II	English	English Paper III	U15EL3GEN03	6	3	100
	III	Major Core - 4	Algebra and Trigonometry	U15MA3MCT04	5	5	100
		Major Core – 5	Real Analysis – I	U15MA3MCT05	5	5	100
		Allied – 4 (Optional)	Windows Accessories and MS – Office	U15MA3AOP12	4	3	100
	IV	Skill Based Elective – 3	Aptitude Mathematics	U15MA3SBT03	2	2	100
		Gender Studies	Gender Studies	U15WS3GST01	1	1	100
			Service Oriented Course		-	-	-
		Value Education	Ethics II/Bible Studies II/ Catechism II	U15VE4LVE02 / U15VE4LVB02/ U15VE4LVC02	1	-	-
			Internship/Field Work/Field Project 30 hours- Extra Credit	U18SP3ECC03/ U18SP3ECC02	-	2(Extra Credit)	100
TOTAL					30	22+2	700+100

Sem	Part	Component	Title of the course	Code	Hours/ Week	Credits	Marks
IV	I	Language	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	U15TL4TAM04/ U18HN4HIN04/ U16FR4FRE04	5	3	100
	II	English	English Paper IV	U15EL4GEN04	6	3	100
	III	Major Core – 6	Modern Algebra – I	U15MA4MCT06	5	5	100
		Major Elective – 1	Numerical Methods / Combinatorics / Mathematical Modelling	U15MA4MET01 / U15MA4MET04 / U15MA4MET05	5	5	100
		Allied - 5 (Optional)	Internet and Web Designing	U15MA4AOT16	4	4	100
		Allied – 6(Optional)	Programming in C	U15MA4AOT19	4	3	100
			Service Oriented Course		-	1	100
	IV	Value Education	Ethics II/Bible Studies II/ Catechism II	U15VE4LVE02/ U15VE4LVB02/ U15VE4LVC02	1	1	100
		Internship/Field Work/Field Project 30 hours- Extra Credit	U18SP4ECC04/ U18SP4ECC02	-	2(Extra Credit)	100	
TOTAL					30	25+2	800+100

Sem	Part	Component	Title of the course	Code	Hours/ Week	Credits	Marks
V	III	Major Core – 7	Modern Algebra – II	U15MA5MCT07	5	4	100
		Major Core – 8	Optimization Techniques	U15MA5MCT08	5	4	100
		Major Core – 9	Graph theory	U15MA5MCT09	5	4	100
		Major Core – 10	Real Analysis – II	U15MA5MCT10	5	4	100
		Major Elective -2	Mechanics/ Astronomy	U15MA5MET02 / U15MA5MET06	5	5	100
	IV	Non Major Elective – 1	Quick Mathematics	U15MA5NMT01	2	2	100
		Skill Based Elective -4	Online Course	U19OC5SBT04	2	2	100
		Value education	Ethics III /Bible Studies III / Catechism III	U15VE6LVE03/ U15VE6LVB03/ U15VE6LVC03	1	--	--
		Internship/Field Work/Field Project 30 hours -Extra Credit	U18SP5ECC05/ U18SP5ECC02	-	2(Extra Credit)	100	
TOTAL					30	25+2	700+10 0

Sem	Part	Component	Title of the course	Code	Hours/ Week	Credits	Marks
VI	III	Major Core – 11	Theory of Functions of a Complex Variable.	U15MA6MCT11	6	5	100
		Major Core – 12	Differential Equations , Laplace Transforms and Fourier Series	U15MA6MCT12	6	5	100
		Major Core – 13	Introduction to Fuzzy Mathematics	U15MA6MCT13	6	5	100
		Major Elective 3	Programming in C++/ Number Theory	U15MA6MET03/ U15MA6MET07	5	5	100
	IV	Non Major Elective – 2	Art of Programming	U15MA6NMT02	2	2	100
		Skill Based Elective – 5	Application of Algorithms	U15MA6SBT05	2	2	100
		Skill Based Elective - 6	Research Methodology	U15DS6SBT06	2	2	100
		Value Education	Ethics III /Bible Studies III / Catechism III	U15VE6LVE03 / U15VE6LVB03/ U15VE6LVC03	1	-	-
		Internship/Field Work/Field Project 30 hours -Extra Credit		U18SP6ECC06/ U18SP6ECC02	-	2(Extra Credit)	100
	IV	Extension Activity	RESCAPES -Impact study of project		-	1	100
TOTAL					30	27+2	800+100

LIST OF ALLIED COURSES OFFERED BY THE DEPARTMENT

S.NO	Sem	Part	Component	Title	Code	Hours	Credits	Marks
1	I	III	Allied 1	Algebra , Calculus and Trigonometry (for Physics students)	U20MA1ALT01	4	2	100
2	I	III	Allied 1	Differential Calculus and Trigonometry (For Chemistry students)	U20MA1ALT02	4	2	100
3	I	III	Allied 1	Statistical Methods (for B.C.A and Computer Science students)	U20MA1ALT03	4	2	100
4	I	III	Allied 1	Business Mathematics (for Commerce students)	U20MA1ALT04	4	4	100
5	I	III	Allied 1	Business Mathematics and Statistics (for Commerce Vocational & CA students)	U20MA1ALT05	4	4	100
6	I	III	Allied 2	Analytical Geometry of Three Dimensions and Vector Calculus (for Physics students)	U20MA1ALT06	4	2	100
7	I	III	Allied 2	Algebra and Integral Calculus (For Chemistry students)	U20MA1ALT07	4	2	100
8	II	III	Allied 3	Laplace Transforms, Partial Differential Equations and Fourier Series (for Physics students)	U20MA2ALT08	4	2	100
9	II	III	Allied 3	Analytical Geometry of Three Dimensions, Vector Calculus and Differential Equations (For Chemistry students)	U20MA2ALT09	4	2	100
10	II	III	Allied 3	Numerical Methods (for B.C.A and Computer Science students)	U20MA2ALT10	4	2	100
11	II	III	Allied 3	Business Statistics (for Commerce students)	U20MA2ALT11	4	3	100

12	III	III	Allied 4	Applied Mathematics –III (for B.C.A and Computer Science students)	U15MA3AOT13	4	3	100
13	III	III	Allied 4	Differential Calculus and Trigonometry (For Chemistry students)	U15MA3AOT14	4	3	100
14	III	III	Allied 4	Mathematics for Competitive Examinations (For Commerce students)	U19MA3AOT15	4	3	100
15	IV	III	Allied 5	Algebra and Integral Calculus (For Chemistry students)	U15MA4AOT17	4	4	100
16	IV	III	Allied 5	Decision Making Techniques (For Commerce students)	U19MA4AOT18	4	4	100
17	IV	III	Allied 6	Analytical Geometry of Three Dimensions, Vector Calculus and Differential Equations (For Chemistry students)	U15MA4AOT20	4	3	100
18	IV	III	Allied 6	Numerical Methods and Testing Hypothesis (For Commerce students)	U19MA4AOT21	4	3	100

(For Candidates admitted from the academic year 2020-21 onwards)

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PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
B.Sc. MATHEMATICS
First Year - Semester – I

Course Title	MAJOR CORE - 1 - CALCULUS
Total Hours	60
Hours / Week	4
Code	U20MA1MCT01
Course type	Theory
Credits	4
Marks	100

General Objective:

To make the students become familiar with techniques of differentiation and integration and apply them to solve problems

Course Objectives (CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand the methods of successive differentiation of various functions and formation of equations using derivatives.
CO – 2	Understand partial differentiation and application of Euler's theorem, Jacobian method
CO – 3	Apply differentiation for finding radius, center of curvature, evolute and involute
CO – 4	Understand the properties of definite integrals and applying reduction formula for a specific standard integrals and Bernoulli's formula.
CO – 5	Evaluate Double and triple integral in Cartesian coordinates

DIFFERENTIAL CALCULUS

UNIT I: DIFFERENTIATION

12 HRS

Successive Differentiation: The n^{th} derivatives of Standard result - Trigonometrical transformation of functions - Formation of equations involving derivatives - Leibnitz formula for the n^{th} derivative of a product - Related problems.

Extra Reading/Key words: *Application of Leibnitz formula in practical problems*

UNIT II: PARTIAL DIFFERENTIATION

12 HRS

Partial differentiation – Total differential coefficient – Implicit functions - Homogeneous functions – Euler’s Theorem (with proof) - Partial derivatives of a function of two functions – Jacobians (Problems of finding Jacobians only)

Extra Reading/Key words: *Euler’s equation of motion, change of variables, transformation*

UNIT III: APPLICATION OF DIFFERENTIATION

12 HRS

Curvature: Circle, Radius and Center of Curvature - Cartesian Formula for the Radius of Curvature - Coordinates of the Center of Curvature- Evolute and Involute.

Extra Reading/Key words: *Radius and center of curvature in polar coordinates*

INTEGRAL CALCULUS

UNIT IV: INTEGRATION

12 HRS

Properties of definite integrals - Integration by parts - Reduction formulae for standard integrals - Bernoulli’s formula- Simple problems only.

Extra Reading/Key words: *Integration of irrational trigonometric functions and irrational fractions.*

UNIT V: MULTIPLE INTEGRALS

12 HRS

Double Integrals in Cartesian coordinates - Change the order of Integration - Triple Integrals - Simple problems only.

Extra Reading/ Keywords: *Cylindrical coordinates, Spherical coordinates, Tetrahedron, Order of integration*

Note: Texts given in the Extra Reading /Key Words must be tested only through assignment and seminars.

Course Outcomes (CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recognise and relate successive differentiation of various functions and illustrate how to compose equations.	PSO – 2	R,U
CO – 2	Recognise and sketch partial differentiation, application of Euler's theorem and Jacobians.	PSO -3	Ap, E
CO – 3	Demonstrate and calculate radius and center of curvature, evolute and Involute.	PSO -1	E
CO – 4	Recall the properties of definite integrals and interpret reduction formula.	PSO -4	An
CO – 5	Compute double and triple integral in Cartesian coordinates	PSO - 1	E
CO – 6	Become familiar with techniques of differentiation and integration and apply them to solve problems - Skill Development.	PSO-2	Ap

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:**Treatment and content as in**

1. Narayanan.S and Manicavachagom Pillay .T.K (2013),Calculus (Vol I &II) , S.Viswanathan (Printers and publishers),Chennai.

Calculus (Vol I & II) by S. Narayanan and T.K. Manicavachagom Pillay for Units I, II and III.

Unit I: Chapter III fully

Unit II: Vol I: Chapter VIII fully

Vol II: Chapter VI :Sections 1.1 , 1.2 (Problems of finding Jacobians only)

Unit III: Chapter X: Sections 2.1 – 2.5

Calculus (Vol II) by S. Narayanan and T.K. Manicavachagom Pillay for Units IV and V

Unit IV: Chapter I - Sections 11, 12, 13 & 15.1

Unit V: Chapter V - Sections 1, 2.1, 2.2 & 4

BOOKS FOR REFERENCE:

1. P. Kandasamy and Thilagavathy (2004), Mathematics (Vol. I), S. Chand, New Delhi.
2. Thomas And Finney (2006), Calculus, Pearson Education, 9th Edition.
3. David V. Widder (2003), Advanced Calculus , Prentice Hall Of India, Delhi.
4. Piskunov.N, Differential and Integral Calculus, Mir Publishers, Delhi.
5. Schaums Outline Series (2005) – Theory and problems of Advanced Calculus.

(For Candidates admitted from the academic year 2020-21 onwards)

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B.Sc. MATHEMATICS
First Year - Semester – I

Course Title	MAJOR CORE 2 – ANALYTICAL GEOMETRY OF THREE DIMENSIONS AND VECTOR CALCULUS
Total Hours	75
Hours / Week	5
Code	U20MA1MCT02
Course type	Theory
Credits	4
Marks	100

General Objective:

To enable the students to be familiar with the fundamental concepts of three dimensional geometry and to expose them the vector differential operator, vector differentiation, vector integration and the idea of line, surface and volume integrals.

Course Objectives(CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand the concept of plane, angle between the planes, length of the perpendicular, line intersection of two given planes.
CO – 2	Understand different forms of straight line, coplanar lines, shortest distance between skewlines and the equation of the shortest distance.
CO – 3	Understand the concept of sphere, intersection of two sphere, plane section of a sphere and the equation of the tangent plane to the sphere
CO – 4	Apply vector differentiation to physics concepts.
CO – 5	Evaluate line integral surface integral and volume integral using vector integration and apply Gauss divergence theorem and Stokes theorem.

UNIT I: THE PLANE**15 HRS**

The plane – The general equation of the plane – Several forms of equations of planes – Angle between the planes- Equation of the plane through the line intersection of two given planes - Length of the perpendicular- Planes bisecting the angle between the planes.

Extra Reading/ Keywords: *Hyperbolic plane, Euclidean plane, Stereographic projection, Geometry*

UNIT II: THE STRAIGHT LINE**15 HRS**

Different forms of equations of a straight line – The plane and the straight line – Coplanar line – The shortest distance between two skew lines – Equations of shortest distance.

Extra Reading/ Keywords: *Geodesic, Equation of a line in polar coordinates, Secant lines, Euler line, Regular Tetrahedron*

UNIT III: SPHERE**15 HRS**

Equation of a sphere – Length of the tangent from a point – The plane section of a sphere - Intersection of two spheres - Equation of the tangent planes to the sphere.

Extra Reading/ Keywords: *Pencil of spheres, Hypersphere, Spherical cap, Circle of a sphere*

UNIT IV: VECTOR DIFFERENTIATION**15 HRS**

Derivatives of vector functions – Velocity and acceleration – Differential operators – Directional derivatives, gradient, divergence and curl – Solenoidal and irrotational vectors

Extra Reading/ Keywords: *Vector calculus, Directional derivatives, Closed surface, Infinitesimal balls*

UNIT V: VECTOR INTEGRATION**15 HRS**

Line integrals – Work done by a force – Conservative field – Surface integral and its applications – Volume integral and its applications - Integral theorems (without proof) - Gauss divergence theorem, Stoke's theorem and their applications(simple problems only)

Extra Reading/ Keywords: *Surface, Line integral, Curve, Scalar field, Vector field, Curl theorem, Riemann integral, Contour integration, Lebesgue integral theorem*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars.

Course Outcomes (CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Describe and analyze plane, angle between the plane, length of the perpendicular, Intersection of two given planes.	PSO - 2	K, E
CO – 2	Explain straight line, coplanar lines, shortest distance between skew lines and its equation	PSO - 5	U,E
CO – 3	Recall and summarize sphere, intersection of two sphere, plane section of a sphere and the equation of the tangent plane to the sphere.	PSO – 3	U, E
CO – 4	Apply vector differentiation to physics concepts	PSO - 2	Ap, E

CO – 5	Compute line integral surface integral and volume integral Apply and assess Gauss divergence theorem and Stokes theorem	PSO – 3,4	Ap, E
CO – 6	Enhance the knowledge of three dimensional geometry and to expose them the vector differential operator, vector differentiation , vector integration and the idea of line , surface and volume integrals-Skill Development	PSO-2,3	R, Ap

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. Treatment and content as in T.K. Manicavachagom Pillay, T. Natarajan (2016) , A PRESCRIBED TEXT of Analytical Geometry (Part II – Three Dimensions) , Viswanathan S (Printers and publishers),Chennai, for Units III , IV & V

UNIT I: Chapter II

UNIT II: Chapter III: Sec 1-8 (omit from 8.1)

UNIT III: Chapter IV

2. Treatment and content as in Dr. P. R. Vittal, Dr. V. Malini, (Reprint 2014) Vector Analysis, For Units IV and V

Unit IV: Chapter 1

Unit V: Chapter 2 (excluding Green’s Theorem)

BOOKS FOR REFERENCE:

1. Duraipandian .P, Laxmi Duraipandian & D. Mahilan, Analytical Geometry-Three Dimensional, Emerald Publishers, Chennai.
2. T. K. Manickavasagam Pillay and Others, Vector Calculus, S. Viswanathan Publications.
3. S. Shanti Narayan, A PRESCRIBED TEXT of Vector Calculus, S. Chand and Co., New Delhi, 1966.
4. K. Viswanatham & S. Selvaraj, Vector Analysis, Emerald Publishers, Chennai, Reprint 1999.
5. P. Duraipandian, Laxmi Duraipandian, Vector Analysis, Emerald Publishers, Chennai, Reprint 2003.

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CHOICE BASED CREDIT SYSTEM
B.Sc. MATHEMATICS
First Year - Semester – I

Course Title	MAJOR CORE – 3: ALGEBRA AND TRIGONOMETRY
Total Hours	60
Hours / Week	4
Code	U20MA1MCT03
Course type	Theory
Credits	3
Marks	100

General Objective:

To enable the students to understand the techniques of solving algebraic equations and to expose the basic ideas of summation of series and number theory. To make the students familiar with expansion of trigonometric functions and Hyperbolic functions facilitate ways of separating complex functions.

Course Objectives (CO):

The learner will be able to

CO No.	Course Objectives
CO - 1	Understand about number theory and related theorems.
CO - 2	Understand summation of Binomial, exponential, logarithmic and approximation
CO - 3	Understand the techniques for solving algebraic equations.
CO - 4	Evaluate the expansion of Trigonometric function
CO - 5	Understand hyperbolic function and their properties.

ALGEBRA

UNIT I: THEORY OF NUMBERS

12HRS

Introduction – Divisors of a given number N – Euler’s function $\phi(N)$ – Highest power of a prime p contained in $n!$ – Congruences – Numbers in arithmetical progression – Fermat’s theorem-Wilson’s theorem – Lagranges’ theorem (without proof).

Extra Reading/ Keywords: *Aliquot part of positive divisor, Euler’s totient function, Modular arithmetic*

UNIT II: SUMMATION OF SERIES**12HRS**

Summation of Binomial, Exponential and Logarithmic series and approximation (Problems only).

Extra Reading/ Keywords: *Covariance between two binomials, Bernoulli distribution, Poisson distribution, antilogarithm***UNIT III: THEORY OF EQUATIONS****12HRS**

Relation between roots and coefficients – Symmetric functions of roots in terms of the coefficients – Sum of the powers of the roots of an equation- Newton’s Theorem on the sum of the powers of the roots.

Extra Reading/ Keywords: *Fundamental theorem of algebra, Vieta’s formulas, Newton’s inequality, roots of a Polynomial***TRIGONOMETRY****UNIT IV: EXPANSIONS OF TRIGONOMETRIC FUNCTIONS****12HRS**Expansions of $\cos n\theta$, $\sin n\theta$, $\tan n\theta$ where n is a positive integer (excluding formation of equations); Expansions of $\cos^n\theta$, $\sin^n\theta$ in a series of sines and cosines of multiples of θ , (θ in radians) and expansion of $\cos\theta$, $\sin\theta$, $\tan\theta$ in a series of powers of θ – Approximations and limits.**Extra Reading/ Keywords:** *Taylor series, Inverse trigonometric functions, Asymptotic expansion***UNIT V: HYPERBOLIC FUNCTIONS****12HRS**

Hyperbolic functions – Inverse hyperbolic functions, separation into real and imaginary parts - Logarithm of complex numbers – General value of logarithm.

Extra Reading/ Keywords: *Hyperbolic angle, Inverse hyperbolic Cotangent, Secant, Cosecant***Note:** Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars**Course Outcomes (CO):****The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO - 1	Recognise and relate number theory and its theorems.	PSO - 1	R,U
CO - 2	Recall and find summation of Binomial, exponential, logarithmic series	PSO -3	Ap, E
CO - 3	Explain the techniques for solving algebraic equations	PSO -5	R,U
CO - 4	Formulate the expansion of Trigonometric function	PSO -2	R,U
CO - 5	Summarize hyperbolic function and their properties.	PSO -4	R,U
CO - 6	Become familiar with the expansion of trigonometric functions and Hyperbolic functions facilitate ways of separating complex functions - Skill Development.	PSO – 2,3	R,U

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;**U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create**

PRESCRIBED TEXT:

1. Treatment and content as in Algebra Volume II by T.K. Manicavachagom Pillay, T. Natarajan, K.S. Ganapathy,(2008), S.Viswanathan (Printers and publishers),Chennai,

For Unit I.

UNIT I: Chapter 5 fully

2. Treatment and content as in Algebra Volume I by T.K. Manicavachagom Pillay, T. Natarajan, K.S.Ganapathy, (2013),S.Viswanathan (Printers and publishers),Chennai,

For Units II & III

UNIT II: Chapter 3 – Section 10 & 14 (Problems only)

Chapter 4 – Sections 3 and 7 (Problems only)

UNIT III: Chapter 6– Sections 11 - 14

3. Treatment and Content as in Trigonometry by S. Narayanan and T.K. Manicavachagom Pillay(2015), S.Viswanathan (Printers and publishers),Chennai. for Units IV & V.

UNIT IV: Chapter III (Formation of equations excluded)

UNIT V: Chapter IV, Chapter V - Sections 5, 5.1&5.2

BOOKS FOR REFERENCE:

1. Arumugam, Thangapandi Issac, (2005) Theory of Equations and Trigonometry, New Gamma Publishing House, Delhi.
2. Kandasamy .P.Thilagavathy.K (2006), Mathematics Vol- I, S.Chand & Company, New Delhi.
3. Balasubrahmanyam P., Venkatachary P.R. ,Venkataraman G.R.(1992), Text Book on Trigonometry Published by Roc House & Sons, Chennai.

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PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 1: ALGEBRA, CALCULUS AND TRIGONOMETRY (For Physics Students)
Total Hours	60
Hours / Week	4
Code	U20MA1ALT01
Course type	Theory
Credits	2
Marks	100

General Objective:

To give an in depth knowledge of matrices, trigonometry and calculus and inculcate the habit of problem solving.

Course Objectives(CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Evaluate eigen values and eigen vectors and evaluation of eigen values and eigen vectors using Cayley Hamilton theorem.
CO – 2	Understand about successive differentiation and evaluation using Libenitz methods and jacobians.
CO – 3	Evaluate double and triple integral
CO – 4	Apply reduction formula to different standard integrals.
CO – 5	Evaluate expansion of trigonometric function as multiple of θ and a series of powers of θ
CO – 6	Understand hyperbolic function, inverse hyperbolic function and separation into real and imaginary parts.

UNIT I: ALGEBRA**12HRS**

Characteristic equation of a square matrix – Evaluation of Eigen values and Eigen vectors – Cayley – Hamilton theorem (without proof) - Simple problems.

Extra Reading/ Keywords: *Cayley matrix algebra, Hessenberg method, Algebraic multiplicity*

UNIT II: DIFFERENTIAL CALCULUS**12HRS**

Leibnitz formula for the n^{th} derivative of product - Curvature – circle, radius and center of curvature – Cartesian formula for the radius of curvature - The co-ordinates of the center of curvature - Evolute and involute.

Extra Reading/ Keywords: *Chain rule, Polar co-ordinates, Wronskian, Reynolds transport theorem*

UNIT III: MULTIPLE INTEGRALS**12HRS**

Reduction formulae: $\int_0^{p/2} \sin^n x \, dx$, $\int_0^{p/2} \cos^n x \, dx$, $\int_0^{p/2} \sin^n x \cos^n x \, dx$ (Problems only) -Introduction to evaluation of double and triple (in Cartesian only) integrals (Change of order of integration excluded)

Extra Reading/ Keywords: *Hyper volumes, cylindrical coordinates, Divergence theorem, transcendental functions*

TRIGONOMETRY**UNIT IV: EXPANSIONS OF TRIGONOMETRIC FUNCTIONS****12HRS**

Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ (n being a positive integer) – Expansions of $\sin^n \theta$ and $\cos^n \theta$ in a series of sines and cosines of multiples of θ (n being a positive integer and θ in radians) – Expansions of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in a series of powers of θ (Formation of equations excluded)

Extra Reading /Keywords: *Taylor series, Inverse trigonometric functions, Asymptotic expansion*

UNIT V: HYPERBOLIC FUNCTIONS**12HRS**

Hyperbolic functions - Inverse hyperbolic functions - Separation into real and imaginary parts.

Extra Reading /Keywords: *Hyperbolic angle, Inverse hyperbolic Cotangent, Secant, Cosecant*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars.

Course Outcomes (CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Compute eigen values and eigen vectors using Cayley Hamilton theorem.	PSO - 2	E
CO – 2	Evaluate successive differentiation using Leibnitz methods. Demonstrate and calculate radius and center of curvature, evolute and Involute.	PSO - 1,5	U,Ap
CO - 3	Evaluate double and triple integral.	PSO - 1	E
CO - 4	Demonstrate reduction formula to different standard integrals.	PSO - 3	U, Ap

CO - 5	Compute the expansion of trigonometric function as multiple of θ and a series of powers of θ Recall and evaluate hyperbolic function, inverse hyperbolic function and separation into real and imaginary parts.	PSO - 4	U ,E
CO - 6	Become familiar with matrices, trigonometry and calculus and inculcate the habit of problem solving - Skill Development	PSO- 2,3	Ap

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. Treatment and content as in Narayanan. S, Manicavachagom Pillay.T.K,(2011), Ancillary Mathematics – Volume I , S.Viswanathan (Printers and publishers),Chennai for Units I, IV and V.

UNIT I: Chapter 3: Sec 3.4

UNIT IV: Chapter 5: Sec 5.1 – 5.3 (Excluding Approximations)

UNIT V: Chapter 5: Sec 5.4

2. S. Narayanan and T. K. Manickavasagam Pillay(2013), Calculus Volume I, S. Viswanathan (Printers & Publishers) Pvt. Ltd. Reprint 2011

Unit II Chapter 3: Sec 2.1, 2.2; Chapter 10: Sec 2.1 – 2.5

3. Treatment and content as in Narayanan. S, Manicavachagom Pillay.T.K,(2013), Calculus-Volume II, S.Viswanathan (Printers and publishers),Chennai for Unit III

UNIT III: Chapter 1: Sec 13.1 – 13.5

Chapter 5: Sec 1, 2.1, 2.2 (change of order of integration omitted)(Problems only) Sec 4(change of order of integration omitted)(Problems only)

BOOKS FOR REFERENCE:

1. Aggarwal.S,(2000) Algebra-I, S.Chand & Company(Pvt)Ltd., New Delhi.

2. Balasubrahmanyam P., Venkatachary P.R. ,Venkataraman G.R.(1992), Text Book on Trigonometry Published by Roc House & Sons, Chennai.

3. Narayanan.S, Manicavachagompillay.T.K,(2006), Trigonometry, S.Viswanathan (Printers And Publishers),Chennai.

4. Narayanan.S, Manicavachagompillay.T.K,(2006), Ancillary Mathematics–Volume II , S.Viswanathan (Printers And Publishers),Chennai.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 1: DIFFERENTIAL CALCULUS AND TRIGONOMETRY (For Chemistry Students)
Total Hours	60
Hours / Week	4
Code	U20MA1ALT02
Course type	Theory
Credits	2
Marks	100

General Objective:

To acquire knowledge in differentiation and some of its applications, to understand partial differentiation, to expand trigonometric functions and to learn the relation between hyperbolic functions

Course Objectives (CO):

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand successive differentiation and Leibnitz theorem
CO – 2	Apply differentiation for finding maxima and minima.
CO – 3	Understand PDE and Eulers theorem.
CO – 4	Evaluate the expansion of trigonometry function.
CO – 5	Understand Hyperbolic function and inverse hyperbolic functions

UNIT I: DIFFERENTIAL CALCULUS

12HRS

Logarithmic Differentiation- Differentiation of implicit functions- Successive differentiation – n^{th} derivative of standard functions – Leibnitz theorem (without proof) - Application to simple problems

Extra Reading/ Keywords: *Application of Leibnitz formula in practical problems*

UNIT II: APPLICATIONS OF DIFFERENTIATION**12HRS**

Conditions for maxima and minima (for single variable) - Increasing and decreasing functions (only conditions and simple problems).

Extra Reading/ Keywords: *Use of increasing and decreasing functions in marketing, Velocity and acceleration*

UNIT III :PARTIAL DIFFERENTIATION**12HRS**

Introduction to Partial Differentiation - Partial Differentiation – Euler’s Theorem - Partial derivatives of a function of two functions

Extra Reading/ Keywords: *Euler’s equation of motion, Heat equation, Wave equation*

TRIGONOMETRY:**UNIT IV : EXPANSIONS****12HRS**

Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ (n being a positive integer) (formation of equations is excluded)– Expansions of $\sin^n\theta$ and $\cos^n\theta$ in a series of sines and cosines of multiples of θ (n being a positive integer and θ in radians) (only problems involving the above expansions)

Extra Reading/ Keywords: *Taylor series, Inverse trigonometric functions, Asymptotic expansion*

UNIT V: HYPERBOLIC FUNCTIONS**12HRS**

Hyperbolic functions - Inverse hyperbolic functions - Separation into real and imaginary parts.

Extra Reading/ Keywords: *Hyperbolic angle, Inverse hyperbolic Cotangent, Secant, Cosecant*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars

Course outcomes (CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recall successive differentiation and Leibnitz theorem	PSO –1	R,U
CO – 2	Compute maxima and minima applying Derivatives	PSO -3	Ap, E
CO – 3	Explain and Discuss PDE and Eulers theorem	PSO – 5	R,U
CO - 4	Evaluate the expansion of trigonometry function	PSO -2	E
CO - 5	Recognise and Compute Hyperbolic function and inverse hyperbolic functions	PSO -4	U,E
CO - 6	Become familiar in differentiation and some of its applications , to understand partial differentiation, to expand trigonometric functions and to learn the relation between hyperbolic functions - Skill Development.	PSO- 2,3	Ap, E

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

Units I , II & III

1. Treatment and Content as in

S. Narayanan and T. K. Manicavachagom Pillay,(2013) Calculus – Volume I, S. Viswanathan Printers & Publishers Pvt. Ltd.,

UNIT I: Chapter II: Sections 4.1, 4.2, 5; Chapter III Sections 1.1-1.3, 2.1 &2.2

UNIT II: Chapter V: Section 1.1, 1.2, 1.3 (statement only with simple problems)

Chapter IV: Section 2.1,2.2

UNIT III: Chapter VIII

Units IV &V

2. Treatment and Content as in

S. Narayanan and T. K. Manicavachagom Pillay (2004) Trigonometry, S. Viswanathan Printers & Publishers Pvt. Ltd.,

UNIT IV: Chapter III: Sections 1-4.

UNIT V:Chapter IV :Sections 1 & 2.

BOOKS FOR REFERENCE:

1. Kandasamy .P, Thilagavathy. K (2006) , Mathematics Volume I, S.Chand & Company, New Delhi.
2. Arumugam ,Thangapandi Issac,(2005) Theory of Equations and Trigonometry , New Gamma Publishing House, Delhi.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 1: STATISTICAL METHODS (For B.C.A and Computer Science students)
Total Hours	60
Hours / Week	4
Code	U20MA1ALT03
Course type	Theory
Credits	2
Marks	100

General Objective:

To understand the various methods of collection of data and representing them through diagrams and graphs. To analyze the characteristics of data by using relevant statistical tools.

Course Objectives (CO):

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand various methods of collection of data and representing them through graphs
CO – 2	Analyze various measures of central tendency.
CO – 3	Understand to correlate data and fit into a linear regression curve.
CO – 4	Evaluate index number using Laspeyre's, Fisher's methods, Aggregate expenditure method and family Budget method.
CO – 5	Analyze time series with respect to different variation.

UNIT I: COLLECTION, PRESENTATION OF DATA AND MEASURES OF CENTRAL TENDENCY **12HRS**

Definition of Statistics – Statistical data – primary and secondary – collection, classification and tabulation of data. Diagrammatic and graphical representation. Measures of Central Tendency – Mean, Median, Mode.

Extra Reading/ Keywords: *Business statistics, Descriptive statistics, Economics*

UNIT II: DISPERSION, SKEWNESS AND KURTOSIS **12HRS**

Dispersion – calculation of Mean Deviation, Quartile deviation, standard deviation, coefficient of variation and moments for frequency distributions- concept of skewness and kurtosis and their measures.

Extra Reading/ Keywords: *Grouped data, Gaussian Distribution, Laplace distribution*

UNIT III : CORRELATION AND REGRESSION **12HRS**

Simple Correlation – rank correlation - Concurrent Deviation – Linear regression. (Error analysis in chapter 12 omitted)

Extra Reading/ Keywords: *Least squares method, Multiple regression, Karl Pearson’s method, Spearman’s ranking method, Scatter diagram*

UNIT IV : INDEX NUMBERS **12HRS**

Index Numbers- Uses – Types – Laspeyre’s-Paasche’s-Fisher’s and Bowley’s index(other methods in weighted aggregate type omitted) -Tests of Consistency(Unit and Circular tests omitted)-Chain and fixed base index-Base shifting(Splicing and deflating indexes omitted) –Cost of Living Index – Aggregate Expenditure Method – Family Budget Method .

Extra Reading/ Keywords: *Policonomics, Order reversal test, Time and factor test, Weighted index numbers, Zero-based budget, Cash-Only budgeting*

UNIT V : ANALYSIS OF TIME SERIES **12HRS**

Analysis of time series- Uses- Mathematical model- Secular Trend (all types)-Seasonal Variation(Ratio to trend and ratio to moving averages methods omitted)-Cyclical Variation – Irregular Variation.

Extra Reading/ Keywords: *Forecasting, Analysis of economic and industrial time series, Measuring Seasonality*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars.

Course Outcomes(CO):

The learners

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO - 1	Recall various methods of collection of data and describes graphs.	PSO - 2	R,U
CO – 2	Categorize and evaluate various measures of central tendency.	PSO - 3	E
CO – 3	Calculate correlation and regression.	PSO - 1	E,An
CO – 4	Compute index number by Laspeyre’s, Fisher’s methods, expenditure method and family Budget method.	PSO - 5	Ap
CO – 5	Examine time series with respect to different variation.	PSO - 4	E,An

CO – 6	Analyse various measures of central tendency. Understand to correlate data and fit into a linear regression curve- Skill Development.	PSO-1,2	An,Ap
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PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

Treatment and content as in Pillai R.S.N , Bagavathi .V (2007) STATISTICS S.Chand and Company , New Delhi

UNIT I: Chapter 1,2,4,6,7,8 & 9

UNIT II: Chapters 10 and 11

UNIT III: Chapter 12 and 13 (Omit “Error analysis” in Chapter 12)

UNIT IV: Chapter 14

UNIT V: Chapter 15

BOOKS FOR REFERENCE:

1.Arora.S, Sumeet Arora (2002),COMPREHENSIVE STATISTICAL METHODS, S.Chand and Company Ltd ,New Delhi.

2.Douglas A.Lind ,William G.Marchall ,Samuel A. Wathen (2003) ,BASIC STATISTICS FOR BUSINESSAND ECONOMICS, Mc Graw Hill, Delhi.

3.Gupta.S.C, Indra Gupta (2004), BUSINESS STATISTICS,Himalaya Publishing House , New Delhi.

4.Gupta.S.P (2006) , STATISTICAL METHODS, Sultan Chand & Sons ,New Delhi.

5.Sharma J.K, (2006),BUSINESS STATISTICS, Dorling Kindersley, (India) Pvt Ltd, Licensees of Pearson Education in South Asia.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 1: BUSINESS MATHEMATICS (For Commerce Students)
Total Hours	60
Hours / Week	4
Code	U20MA1ALT04
Course type	Theory
Credits	4
Marks	100

General Objective:

This course introduces the basic concepts of mathematics relevant to business and managerial skills

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand mathematical finance, simple and compound interests, Depreciation and Discounting
CO – 2	Understand of matrices and test for consistency of equation using matrices
CO – 3	Apply differentiation for finding marginal functions, elasticity, maxima and minima
CO – 4	Evaluate of initial basic feasible solution to transportation problem
CO – 5	Evaluate assignment problem using Hungarian algorithm.

UNIT I: MATHEMATICS OF FINANCE

12HRS

Mathematics of finance – Simple interest – Compound interest – Depreciation – discounting (Excluding Effective and nominal rate of interest in section 5, Annuities , Sinking Fund and Amortisation Table).

Extra Reading/ Keywords: *Financial modeling, Black-Scholes model, Fundamental theorem of asset pricing*

UNIT II: MATRICES

12HRS

Matrices - inverse of a matrix - rank of a matrix –Test for Consistency of equations.
(Excluding Algebra of Matrices, Determinants and also Input – Output Analysis)

Extra Reading/ Keywords: *Eigen values, Eigen vectors, Matrix inversion method*

UNIT III: APPLICATIONS OF DIFFERENTIATION

12HRS

Application of derivatives –marginal functions –elasticity –increasing and decreasing functions –maxima and minima

Extra Reading/ Keywords: *Rolle’s Theorem, Arc elasticity, Critical number, Newton’s method*

UNIT IV: TRANSPORTATION PROBLEM

12HRS

Transportation problem – Initial basic feasible solution – North West Corner rule – Vogel’s Approximation method – Matrix minima method (optimal solution excluded)

Extra Reading/ Keywords: *Modified Distribution, Sequencing problem, Job sequencing problem, Game theory*

UNIT V: ASSIGNMENT PROBLEM

12HRS

Assignment problem (Travelling salesman problem excluded)

Extra Reading/ Keywords: *Travelling Salesman problem, Quadratic assignment problem, Secretary problem, Hungarian method*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars.

Course Outcomes (CO):

The learners

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Record and assess mathematical finance, simple and compound interests, depreciation and discounting.	PSO - 1	R,U,
CO – 2	Recall matrices and test for consistency of system of equations	PSO - 3	U,Ap
CO – 3	Apply differentiation to estimate marginal functions, elasticity, maxima and minima	PSO - 2	U,E
CO – 4	Evaluate initial basic feasible solution of the transportation problem	PSO - 5	Ap,E
CO – 5	Evaluate assignment problem using Hungarian algorithm.	PSO - 4	E
CO -6	Become familiar with the basic concepts of mathematics relevant to business and managerial skills - Skill Development.	PSO-1,4	R, Ap

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

Treatment and content as in

1. Navaneetham P.A.(2007) , Business Mathematics and Statistics ,Jai Publishers, Trichy, for Units I , II and III.

UNIT I : Chapter 2 –Section -1 to 8 and 10

UNIT II: Chapter 4 –Section 9,10,11

UNIT III : Chapter 7-Section 1 to 4

2. KantiSwarup, Gupta P.K, Man Mohan (2018), Operations Research, Sultan Chand & Sons, New Delhi, for Units IV and V.

UNIT IV: Chapter 10 (Omit Sec 10.4,10.6,10.7,10.10 to 10.17)

UNIT V : Chapter 11 (Omit Sec 11.5 to 11.7)

BOOKS FOR REFERENCE:

1. Vittal .P.R,(2004), Business Mathematics ,Margham Publishers,Chennai.

2. Aggarwal.D.R(2005), Business Mathematics, Mrinda Publications, New Delhi.

3. Gupta P.K,.Hira D.S, Problems in Operations Research, S.Chand& Co, New Delhi.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 1: BUSINESS MATHEMATICS AND STATISTICS (For Commerce Vocational and CA Students)
Total Hours	60
Hours / Week	4
Code	U20MA1ALT05
Course type	Theory
Credits	4
Marks	100

General Objective:

To provide sufficient knowledge of statistics which enables them to compute various statistical measures.
To solve socially relevant allocation problems.

Course Objectives (CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Apply of differentiation for finding marginal function, elasticity, maxima and minima
CO – 2	Evaluate of initial basic feasible solution to transportation and assignment problem
CO – 3	Understand various method of collection of data and its representation through graphs.
CO – 4	Understand measures of dispersion and correlation
CO – 5	Understand of index numbers and its types and uses.

UNIT I: APPLICATIONS OF DIFFERENTIATION

12HRS

Application of derivatives –marginal functions –elasticity –increasing and decreasing functions –maxima and minima

Extra Reading/ Keywords: *Rolle's Theorem, Arc elasticity, Critical number, Newton's method*

UNIT II: TRANSPORTATION AND ASSIGNMENT PROBLEM**12HRS**

Transportation Problem –North-West Corner Rule –Matrix minima method-Vogels approximation method (only initial basic feasible solution) –Assignment Problem –Hungarian method.

Extra Reading/ Keywords: *Modified Distribution, Sequencing problem, Job sequencing problem, Game theory*

UNIT III: COLLECTION AND PRESENTATION OF DATA**12HRS**

Statistics –meaning and scope –collection of data –classification and tabulation –diagrams and graphs –histogram-polygon –cumulative frequency curves.

Extra Reading/ Keywords: *Ogive curve, Glaciology, Pareto chart, Ethnography*

UNIT IV : MEASURES OF DISPERSION AND CORRELATION**12HRS**

Measures of dispersion –range, quartile deviation, mean deviation, standard deviation, coefficient of variation-merits demerits –Karl Pearsons coefficient of correlation, Rank correlation

Extra Reading/ Keywords: *Lorenz curve, Skewness, Kurtosis, Method of moments, Bowley's co-efficient*

UNIT V: INDEX NUMBERS**12HRS**

Index Numbers – Laspeyer's, fisher's and Paasche's index numbers- tests for Index Numbers - cost of living Index Number - uses of Index Numbers.

Extra Reading/ Keywords: *Order reversal test, Time and factor test, Weighted index numbers, Zero-based budget, Cash-Only budgeting, Splicing*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and Seminars.

Course Outcomes(CO) :**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Compute marginal function, elasticity, maxima and minima.	PSO - 1	R,U
CO – 2	Evaluate initial basic feasible solution to transportation and assignment problem	PSO - 3	U,Ap
CO – 3	Recognise various method of collection of data and demonstrates through graphs.	PSO - 2	U,E
CO – 4	Assess and compare measures of dispersion and correlation.	PSO - 5	Ap,E
CO – 5	Recall index numbers and categorize its types and uses.	PSO - 4	E
CO – 6	Become familiar to compute various statistical measures. To solve socially relevant allocation problems - Skill Development.	PSO -2,4	U, Ap

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

Treatment and content as in

1. Navanitham PA. Business Mathematics and Statistics (2009), for Unit I.
2. KantiSwarup,Gupta P.K , Manmohan, Operations Research ,Sultan Chand, New Delhi for Unit II.
3. Pillai R.S.N , Bagavathi .V (2007) Statistics, S.Chand and Company, New Delhi for Units III , IV and V

BOOKS FOR REFERENCE:

1. Hamdy Taha (2005), Operations Research, Prentice Hall of India, New Delhi.
2. Gupta, Hira(1989), Operations Research, S.Chand Publishers, New Delhi.
3. Arora .S, Sumeet Arora (2002), Comprehensive Statistical Methods, S.Chand and Company Ltd, New Delhi.
4. Douglas A. Lind ,Williamg Marchall , Samuel A. Wathen (2003), Basic Statistics for Businessand Economics, Mcgraw Hill, Delhi.
5. Gupta .S.C, Indra Gupta (2004), Business Statistics, Himalaya Publishing House, New Delhi.
6. Gupta .S.P (2006), Statistical Methods, Sultan Chand & Sons, New Delhi.
7. Sharma J.K, (2006), Business Statistics, Dorling Kindersley, (India) Pvt ltd, Licenses of Pearson Education .

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 2: ANALYTICAL GEOMETRY OF THREE DIMENSIONS AND VECTOR CALCULUS(For Physics Students)
Total Hours	60
Hours / Week	4
Code	U20MA1ALT06
Course type	Theory
Credits	2
Marks	100

General Objective:

To make the students familiar with the basic concepts of three dimensional geometry, line surface and volume integrals.

Course Objectives(CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand direction cosines and direction ratios, the plane and its standard forms
CO – 2	Understand equation of line, co planarity of lines, skew lines and shortest distance between them
CO – 3	Understand sphere and section of sphere by a plane.
CO – 4	Evaluate the application of differentiation of vectors to physics concepts
CO – 5	Evaluate line integral, surface integral and volume integrals and application of Gauss and Stoke's theorem.

UNIT I: PLANE

12HRS

Direction Cosines – Direction ratios – Angle between two lines - The Plane – The general equation of the plane – Standard forms of equations of planes.

Extra Reading/ Keywords: *Hyperbolic plane, Euclidean plane, Stereographic projection, Geometry*

UNIT II: STRAIGHT LINES**12HRS**

Equation of a line - Equation of the line of shortest distance (Cartesian only) – Coplanarity of Straight lines - Skewlines – Shortest distance between two skewlines

Extra Reading/ Keywords: *Geodesic, Equation of a line in polar coordinates, Secant lines, Euler line, Regular Tetrahedron*

UNIT III: SPHERE**12HRS**

Sphere - General equation – Tangent planes – Section of a sphere by a plane - Sphere through a given circle.

Extra Reading/ Keywords: *Pencil of spheres, Hypersphere, Spherical cap, Circle of a sphere*

UNIT IV: DIFFERENTIATION OF VECTORS**12HRS**

Velocity – Acceleration – Scalar and vector fields – Gradient, Divergence and curl – applications.

Extra Reading/ Keywords: *Relative velocity, Group velocity, Escape velocity, Curl in three dimensions, Covector, Tensor field*

UNIT V: VECTOR INTEGRATION**12HRS**

Line integral – Surface integral – Volume integral – Application of Gauss and Stoke's theorems (Statement only) simple problems.

Extra Reading/ Keywords: *Path independence, Manifold, Inverse square law, Gauss's law for gravity*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars.

Course Outcomes(CO) :**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recognise and compute direction cosines and direction ratios, the plane and its standard forms.	PSO - 1	R,U
CO – 2	Recall and relate equation of line, co planarity of lines, skew lines and shortest distance between them.	PSO - 5	U,Ap
CO – 3	Explain and describe sphere and section of sphere by a plane.	PSO - 2	E
CO – 4	Evaluate the application of differentiation of vectors to physics phenomena	PSO - 3	U, Ap,E
CO – 5	Evaluate line integral, surface integral and volume integrals and Interpretation of Gauss and Stoke's theorem.	PSO - 4	E
CO – 6	Become familiar with the basic concepts of three dimensional geometry, line surface and volume integrals- Skill Development	PSO – 1,2	R, Ap

**PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;
U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create**

PRESCRIBED TEXT:

Treatment and content as in

1. Manicavachagom Pillay. T.K, Natarajan T (2016) , A PRESCRIBED TEXT of Analytical Geometry (Part II – Three Dimensions), S.Viswanathan (Printers and publishers),Chennai

for Unit I , II & III

UNIT I : Chapter 1 & 2

UNIT II : Chapter 3 (Section 1 to 8)

UNIT III: Chapter 4

2. P.R. Vittal , V.Malini (2014), Vector Calculus, Fourier Series and Fourier Transforms, Margham Publications, Chennai for Unit IV & V.

UNIT IV: Chapter 1

UNIT V: Chapter 2

BOOKS FOR REFERENCE:

1.Duraipandian .P, Laxmi Duraipandian & D.Mahilan(1990) , Analytical Geometry, Emerald Publishers, Chennai.

2.Duraipandian.P, Laxmi Duraipandian, (1998) , Vector Analysis , Emerald Publishers Chennai.

3. Engineering Mathematics (Third year – Part B) by Dr. M.K. Venkatraman.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 2: ALGEBRA AND INTEGRAL CALCULUS (For Chemistry Students)
Total Hours	60
Hours / Week	4
Code	U20MA1ALT07
Course type	Theory
Credits	2
Marks	100

General Objective:

To make the students understand matrices, some methods of solving equations, the methods of integration and reduction formulae

Course Objectives (CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand about matrices and its operations
CO – 2	Evaluate rank of the matrices and consistency in system of equations applying rank
CO – 3	Evaluate Eigen values and eigen vectors and evaluation of eigen values and eigen vectors using Cayley Hamilton theorem.
CO – 4	Evaluate integration of irrational functions
CO – 5	Evaluate special type of integrals using reduction formula and knowledge about properties of definite integrals

UNIT I : MATRICES

12 HRS

Types of matrices - Operations between matrices - Matrix inversion method of solving equations.

Extra Reading/ Keywords: *Linear transformation, trace of a matrix*

UNIT II : RANK OF A MATRIX**12HRS**

Rank of a matrix - Consistency in system of equations and solution using rank. (only statement of conditions and simple problems)

Extra Reading/ Keywords: *Gauss Elimination, Gauss Jordan*

UNIT III : EIGEN VALUES AND EIGEN VECTORS**12HRS**

Eigen values and Eigen vectors – properties– problems - Cayley – Hamilton theorem (statement only) and its applications – Diagonalisation of Matrices – Orthogonal Transformation – problems.

Extra Reading/ Keywords: *Cayley matrix algebra, Hessenberg method, Algebraic multiplicity*

UNIT IV: INTEGRATION**12HRS**

Introduction - Integration of irrational functions - Methods of integration of the following types only:

$$\int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \frac{(px + q)}{\sqrt{ax^2 + bx + c}} dx, \int \sqrt{ax^2 + bx + c} dx, \int (px + q)\sqrt{ax^2 + bx + c} dx$$

integration by parts, Bernoulli's formula.

Extra Reading/ Keywords: *symbolic integration, integration by substitution*

UNIT V: REDUCTION FORMULAE**12HRS**

$$\int_0^{\frac{\pi}{2}} \sin^n x dx, \int_0^{\frac{\pi}{2}} \cos^n x dx, \int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$$

Formulae to evaluate - Properties of definite integrals

Extra Reading/ Keywords: *differentiation integration formulas, reduction formula for tan*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars

Course Outcomes (CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recall matrices and its operations	PSO –4	R,U
CO – 2	Compute rank of the matrices and solve the system of equations	PSO -2	E
CO – 3	Compute eigen values and eigen vectors using Cayley Hamilton theorem.	PSO - 2	E
CO – 4	Evaluate integration of irrational functions	PSO -1	E
CO – 5	Examine reduction formula and the properties of definite integrals	PSO -5	Ap,E
CO – 6	Become familiar with arithmetic facts related to numbers, ratios, percentages, etc. and to train them in problem solving techniques- Skill Development	PSO - 1	Ap,E

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

For UNITS I ,II & III

Treatment and content as in

1. T.K. Manicavachagom Pillay, T.Natarajan & K S Ganapathy (2008), Algebra, Volume II, Viswanathan Publishers, Chennai

UNIT I: Chapter 2: Sections 1-8 &10

UNIT II: Chapter 2: Sections 11 -15

UNIT III: Chapter 2: Section 16

For UNITS IV AND V

2. S. Narayanan and T. K. Manicavachagom Pillay, (2009) Calculus – Volume II, S. Viswanathan Printers & Publishers Pvt. Ltd.

UNIT IV : Chapter 1: Section 8 Cases (i)-(iii), Section 12, 15.1

UNIT V: Chapter 1: Sections 13.3-13.5, 11

BOOKS FOR REFERENCE:

1. Aggarwal.S,(2000) Algebra-I, S.Chand & Company(Pvt)Ltd., New Delhi.

2. H.S.Hall and S.R. Knight, Higher Algebra, Prentice Hall of India, New Delhi.

3. Kandasamy .P.Thilagavathy.K (2006) ,Mathematics Vol- I, S.Chand& Company, New Delhi.

4. Thomas and Finney(2006),Calculus, Pearson Education, 9th Edition.

5. David V. Widder (2003),Advanced Calculus , Prentice Hall of India Delhi.

6. Piskunov.N , Differential And Integral Calculus, Mir Publishers, Delhi

7.Schaums Outline series (2005) – Theory And Problems Of Advanced Calculus.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
B.Sc. MATHEMATICS
First Year - Semester – II

Course Title	MAJOR CORE 4: NUMERICAL ANALYSIS
Total Hours	75
Hours / Week	5
Code	U20MA2MCT04
Course type	Theory
Credits	4
Marks	100

General Objective:

To make the students know about different methods of solving numerical equations and differential equations, methods of interpolation and numerical differentiation and integration.

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand various methods for solving algebraic and transcendental equations
CO – 2	Understand the system of simultaneous equations and finding the solution of a system of simultaneous equations using numerical methods
CO – 3	Analyse numerical solution to ordinary differential equations using direct method
CO – 4	Apply finite difference to evaluate polynomial using interpolation for equal and unequal intervals.
CO – 5	Evaluate finite integrals using Trapezoidal and Simpson's rule.
CO – 6	Understand numerical differentiation and evaluation of maxima and minima

UNIT I : SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS**15 HRS**

Introduction - Bisection Method - The Method of False Position -Iteration Method - Newton - Raphson Method.

Extra Reading/ Keywords:*Rolle's theorem ,Taylor's series for a function of one variable***UNIT II: SOLUTION OF LINEAR SYSTEMS OF EQUATIONS:****15 HRS**

Solution of simultaneous linear algebraic equations – Direct methods – Gauss elimination method –Gauss- Jordan method – Iterative methods – Jacobi method – Gauss-Seidal method.

Extra Reading/ Keywords:*LU Decomposition of matrices, Matrix Norms.***UNIT III: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS****15 HRS**

Introduction – Boundary Value Problems, Finite – Difference Method, Solution by Taylor's series , Euler's method , Modified Euler's method , Runge-Kutta method.

Extra Reading/ Keywords:*Picard,smethod,Adams – Bashforth method.***UNIT IV: INTERPOLATION****15 HRS**

Introduction -Finite Differences , Forward and Backward differences only, Newton's formula for interpolation ,Interpolation formulae , Interpolation with unevenly spaced points , Lagrange's interpolation formula.

Extra Reading/ Keywords:*Stirling's formula, Bessel's formula.***UNIT V: NUMERICAL DIFFERENTIATION AND INTEGRATION****15 HRS**

Introduction - Numerical differentiation , Maximum and minimum values of a tabulated function, Numerical integration – Trapezoidal rule , Simpson's 1/3-rule.

Extra Reading/ Keywords:*Simpson,s 3/8 rule , Boole's and Weddle's rule.***Note: Texts given in the Extra Reading /Key Words must be tested only through assignment and seminars.****Course Outcomes (CO):****The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO - 1	Explain various methods for solving algebraic and transcendental equations.	PSO -1	U,E
CO - 2	Solve the system of simultaneous equations using numerical methods	PSO -2	Ap, E
CO - 3	Compute numerical solution to ordinary differential equations using direct method.	PSO -5	E
CO - 4	Formulate polynomial using interpolation for equal and unequal intervals.	PSO -3	E
CO - 5	Evaluate finite integrals using Trapezoidal and Simpson's rule. Explain numerical differentiation and evaluation of maxima and minima.	PSO -4	U,E

CO - 6	Become familiar about different methods of solving numerical equations and differential equations, methods of interpolation and numerical differentiation and integration-Skill Development.	PSO -2	Ap, E
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PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

S.S.Sastry, Introductory Methods of Numerical Analysis, New Age Publishing Company, Fourth Edition, April 1995.

UNIT I : Chapter 2 - Sec. 2.1 to 2.5

UNIT II : Chapter 6 - Sec.6.1, 6.3, 6.3.1, 6.3.2, 6.3.3, 6.4

UNIT III : Chapter 7 - Sec 7.1, 7.2, 7.4, 7.4.2, 7.5, 7.10, 7.10.1

UNIT IV : Chapter 3 - Sec. 3.1, 3.3, 3.3.1, 3.3.2, 3.6, 3.7, 3.7.1 , 3.9, 3.9.1

UNIT V : Chapter 5 - Sec. 5.1 ,5.2, 5.3, 5.4, 5.4.1 and 5.4.2

BOOKS FOR REFERENCE:

1.A.Singaravelu (2008), Engineering Mathematics -Numerical Methods, Meenakshi Publishers,Chennai

2.S. Arumugam, A. Thangapandi Isaac & A. Somasundaram, Numerical Methods, Scitech Publishers ,Chennai

3.Dr. M.K. Venkataraman, Numerical Methods in Science and Engineering, National Publishing House, Chennai

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
B.Sc. MATHEMATICS
First Year - Semester – II

Course Title	MAJOR CORE 5: STATICS
Total Hours	60
Hours / Week	4
Code	U20MA2MCT05
Course type	Theory
Credits	3
Marks	100

General Objective:

To enable the students to know about the concepts of types of forces, moments, couples, Equilibrium of strings and to solve problems under friction and equilibrium of strings

Course Objectives (CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand the concept of equilibrium of forces and related theorem.
CO – 2	Understand parallel forces ,couple, resultant of couple and a force
CO – 3	Enable the knowledge on the basics of coplanar forces and equilibrium of forces acting on a rigid body
CO – 4	Understand the notions of Friction
CO – 5	Understand equilibrium of strings and its application to centenary

UNIT I: EQUILIBRIUM OF FORCES

12 HRS

Force – Types of Forces – Equilibrium – Forces acting at a point Parallelogram of forces – Triangle of forces Polygon of forces - Lami's theorem – Resolution of a force – Composition of forces – Resultant – Conditions of equilibrium.

Extra Reading/ Keywords: *Laws of friction , angle of friction , equilibrium of a body*

UNIT II: PARALLEL FORCES**12 HRS**

Parallel Forces – Like and Unlike parallel forces – Resultants – Moment of a force about a point - Varignon's Theorem on Moments – Principle of Moments – Moment of a force about an axis.

Extra Reading/ Keywords: *Center of gravity of simple uniform bodies*

UNIT III: THREE FORCES ACTING ON A RIGID BODY**12 HRS**

Three forces acting on a rigid body: Rigid body subjected to any three forces – Three coplanar forces – Two triangle theorems (statements only) – Coplanar forces: Reduction of any number of coplanar forces – Analytical representation – Conditions for a system of forces to reduce to a single force.

Extra Reading/ Keywords: *Virtual Work*

UNIT IV: FRICTION**12 HRS**

Introduction – Statical, Dynamical and limiting friction – Friction – Coefficient of friction – Angle of friction – Cone of friction – Equilibrium of a particle on a rough inclined plane.

Extra Reading/ Keywords: *Centre of gravity*

UNIT V: EQUILIBRIUM OF STRINGS**12 HRS**

Equilibrium of strings – Common catenary – equations – tension at any point – geometrical properties – Parabolic catenary – Suspension Bridge.

Extra Reading/ Keywords: *Equilibrium of uniform homogeneous strings*

Note: Texts given in the Extra Reading /Key Word must be tested only through assignment and seminars

Course Outcomes (CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recall equilibrium of forces and related theorem.	PSO –5	R,U
CO – 2	Recognise and list parallel forces ,couple, resultant of couple and a force	PSO -2	R,U
CO – 3	Analyse the basics of coplanar forces and equilibrium of forces acting on a rigid body and solving the problems.	PSO -1	U
CO – 4	Analyse systems that include frictional forces	PSO -3	U,E
CO – 5	Discuss equilibrium of strings and its application to catenary	PSO -4	U,E
CO – 6	Become familiar about the concepts of types of forces, moments, couples, forces acting at a point, rigid body, friction and Equilibrium of strings - Skill Development	PSO-2,3	R,U

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

Treatment and content as in

Dr. M.K. Venkataraman, Statics, Agasthiar Publications, Trichy (2013).

Unit: I - Chapters 1 & 2

Unit: II – Chapters 3 & 4

Unit III- Chapter 5 Sections 1, 2 and 5

Chapter 6 Sections 2 to 7

Unit IV -Chapter 7 Sections 3, 5 to 8, 10

Unit: V – Chapter 11

BOOKS FOR REFERENCE:

1. A.V.Dharmapadam, Statics , S.Viswanathan Printers and Publishing Pvt., Ltd,1993.
2. P.Duraipandian and Laxmi Duraipandian, Mechanics , S.Chand and Company Ltd, Ram Nagar, New Delhi -55, 1985.
3. Dr.P.P.Gupta, Statics, Kedal Nath Ram Nath, Meerut, 1983-84.
4. K.Viswanatha Naik& M.S.Kasi, Statics, Emerald Publishers, 1992
5. N.P. Bali, Statics, Golden Mathematics Series, Laxmi publications,1992

(For Candidates admitted from the academic year 2020-21 onwards)

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TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
B.Sc. MATHEMATICS
First Year - Semester – II**

Course Title	MAJOR CORE 6: PROGRAMMING IN C
Total Hours	75
Hours / Week	5
Code	U20MA2MCT06
Course type	Theory & Practical
Credits	4
Marks	100

General Objective:

To introduce the concepts of C language which will enable them to write programmes for numerical methods

Course Objectives(CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand basic concepts of C language.
CO – 2	Understand decision making and control statements
CO – 3	Understand Arrays and its types.
CO – 4	Understand user defined function and Recursion
CO – 5	Understand file management and I/O operations on file

UNIT - I:INTRODUCTION

15 HRS

Constants, variables, data types, symbolic constants - operators and expressions - evaluation of expressions - reading and writing a character - formatted input and output - handling of character strings - operations on strings - string handling functions.

Extra Reading/ Keywords: *Basic structures of C*

UNIT - II: DECISION MAKING AND CONTROL STATEMENTS 15 HRS

Decision making and branching - Using IF, IF-ELSE, Nesting of IF-ELSE statements - ELSE-IF ladder - Switch statement - the conditional operator - GOTO statement - Decision making and looping - the WHILE, DO, FOR statements.

Extra Reading/ Keywords: *Concise test expressions*

UNIT - III: ARRAYS 15 HRS

Arrays - one dimensional, two dimensional, multi dimensional arrays

Extra Reading/ Keywords: *Character arrays, strings*

UNIT - IV: USER DEFINED FUNCTIONS 15 HRS

User defined functions - the form of C functions - Return values and their types - calling a function - category of functions - no arguments and no return values - Arguments but no return values - Arguments with return values - Nesting of functions - Recursion - Function and arrays - the scope and life time of variables in functions.

Extra Reading/ Keywords: *Structures, Unions*

UNIT - V: FILE MANAGEMENT 15 HRS

File management - Defining and opening a file - Closing a file - I/O operations on files

Extra Reading/ Keywords: *Pointers , Array of Pointers*

Note: Texts given in the Extra Reading /Key Word: must be tested only through assignment and seminars

Course Outcomes (CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recall the concepts of C language.	PSO - 5	R,U
CO – 2	Recognise decision making and control statements.	PSO -3	U
CO – 3	State Arrays and its types.	PSO -2	U
CO - 4	List user defined function and Recursion.	PSO -1	U
CO - 5	Describe file management and I/O operations on file.	PSO -4	U
CO - 6	Language needed for further computer courses- Employability	PSO -4	U

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

E. Balagurusamy. Programming In Ansi C Fifth Edition Mcgraw Hill Publishing company , New Delhi

UNIT - I: Chapters 2,3,4 and 8

UNIT - II: Chapters 5 and 6

UNIT - III: Chapters 7

UNIT - IV: Chapter 9

UNIT - V: Chapter 12

BOOKS FOR REFERENCE:

C - V.Rajaraman , Programming In C - Schaum's Series

ANNEXURE:

1. Solution of Quadratic Equation
2. Sum of Natural numbers, Squares of natural numbers , even and odd numbers.
3. Finding the sum of odd numbers and even numbers from the given list of numbers.
4. Finding the biggest and smallest element in an array.
5. Arranging the numbers in ascending and descending order
6. Arranging names in alphabetical order.
7. Addition, subtraction and multiplication of matrices.
8. Payroll Processing
9. Finding factorial of a given number and nPr and nCr .
10. Students result processing using files.

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PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
B.Sc. MATHEMATICS
First Year - Semester – II

Course Title	Part – IV: INDUSTRIAL RELATION
Total Hours	11
Hours/Week	1 Hrs Wk
Code	U20MA2IRT01
Course Type	Theory
Credits	1
Marks	50

General Objective:

To enable the students to understand the concepts and the basic issues involved in industrial relation.

Course Objectives (CO):

The Students will be able to

CO No.	Course Objectives
CO-1	Remember and understand the concept of industrial relation
CO-2	Understand the methods of settling industrial disputes.
CO-3	Understand the characteristics of Indian labour and conditions of labour.
CO-4	Understand the factors influencing collective bargaining units and levels.
CO-5	Remember the Problems of trade unions and trade union movement in India.

UNIT – I INTRODUCTION TO INDUSTRIAL RELATIONS

Industrial relations – concepts- importance of industrial relations – Scope and aspects of industrial relations – Factors affecting Industrial Relations – Dunlop’s industrial Relation system – Characteristics of the Indian IR system – Industrial Relations in India.

Extra Reading/Key words: Industrial Relation in other countries

UNIT – II INDUSTRIAL DISPUTES

Industrial disputes – meaning – methods of settling industrial disputes – settlement under the influence of the state – Different methods of disputes settlements in India – procedure for the settlement of industrial disputes.

Extra Reading/Key words: Dispute settlement: case study

UNIT – III EMPLOYMENT AND INDIAN LABOUR

Introduction – industrialization – post independence industrialization – post –liberalization trends – characteristics of Indian labour conditions of labour – recent employment trends.

Extra Reading/Key words: Success stories of countries with industrialization

UNIT – IV COLLECTIVE BARGAINING

Meaning - importance - factors influencing bargaining units and levels – subject matters of collective bargaining – Collective Agreements – Hurdles to collective bargaining in India.

Extra Reading/Key words: Case study of success stories

UNIT –V TRADE UNION

Trade Union – definition – concept – features – types and structure of trade unions – Problems of trade unions – Trade union movement in India.

Extra Reading/Key words: Case study of successful Trade Unions

Note: Texts given in the Extra Reading /Key Words must be tested only through assignment and seminars.

Course Outcomes:

The learners

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the concepts industrial relation.	PSO - 4	U
CO-2	List out the methods of settling industrial disputes.	PSO - 4	R
CO-3	Describe the characteristics of Indian labour and conditions of labour.	PSO - 4	U
CO-4	Explain the factors influencing collective bargaining units and levels.	PSO - 4	U

CO-5	Discuss the Problems of trade unions and trade union movement in India.	PSO - 4	U

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

BOOKS FOR REFERENCE:

1. Ratna sen, “Industrial Relation Macmillan publishers India Ltd., 2011.
2. P.R.N. Sinha, India Balasinha, seema priyadarshini shekhar, “Industrial Relations , Trade unions, and labour legislation”, Pearson Education (Singapore) pvt. Ltd., 2004.
3. D.K. Lal Das, “Industrial Relations in India”, S. Chand and company Ltd, 1983.
4. Mamoria, Gankar, “Dynamics of industrial Relations”, Himalaya publishing house, 2003.

(For Candidates admitted from the academic year 2020-21 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – II**

Course Title	ALLIED 3 :LAPLACE TRANSFORMS, PARTIAL DIFFERENTIAL EQUATIONS AND FOURIER SERIES (For Physics Students)
	60
Hours / Week	4
Code	U20MA2ALT08
Course type	Theory
Credits	2
Marks	100

General Objective:

To expose the students to Laplace and inverse Laplace transforms, standard forms of partial differential equations, second order linear partial differential equations with constant coefficients and Fourier series and enable them to inculcate the habit of problem solving.

Course Objectives (CO):

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand the concept of Laplace transform.
CO – 2	Apply inverse Laplace transform for solving ordinary differential equation with constant coefficient
CO – 3	Understand partial differential equation and finding General, Particular, Complete and Singular integral of partial differential equation
CO – 4	Understand second order partial differential equation and its application to Heat and wave equation.
CO – 5	Evaluate Full range Fourier series, half range Fourier series

UNIT I : LAPLACE TRANSFORMS**12 HRS**

Laplace transforms of the functions e^{at} , e^{-at} , $\cos at$, $\sin at$, t^n , $e^{-at}\cos bt$, $e^{-at}\sin bt$, $e^{-at}t^n$, $f'(t)$, $f''(t)$, $f^n(t)$ (where n is a positive integer)

Extra Reading/Key words: Laplace transform of Bessel function and error function, Mellin transform, Borel transform.

UNIT II: INVERSE LAPLACE TRANSFORMS**12 HRS**

Inverse transforms relating to the above standard functions – Application to solution of ordinary differential equations with constant coefficients.

Extra Reading/Key words: Inverse laplace transform of heaviside function and dirac delta function, Mellin's inverse formula, Post's inversion formula.

UNIT III : PARTIAL DIFFERENTIAL EQUATIONS**12 HRS**

Formation of equations by eliminating arbitrary constants and arbitrary functions- Definition of General, Particular, Complete and Singular integrals – Solutions of first order equations in their standard forms – $F(p,q) = 0$, $F(x,p,q) = 0$, $F(y,p,q) = 0$, $F(z,p,q) = 0$, $F(x,p) = F(y,q)$, $z = px + qy + F(p,q)$, Lagrange's equations $Pp + Qq = R$

Extra Reading/Key words: Quasi linear equations, Linear heat equation and wave equation.

UNIT IV: SECOND ORDER PARTIAL DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS**12 HRS**

Second order linear partial differential equations with constant coefficients - Application of second order linear partial differential equations with constant coefficients .

Extra Reading/Key words: Canonical form of parabolic, hyperbolic and elliptic functions.

UNIT V: FOURIER SERIES**12 HRS**

Full Range Fourier series [In the range $(0, 2\pi)$ and $(-\pi, \pi)$] – Half range cosine and sine series (Excluding change of intervals)

Extra Reading/Key words: Fourier series on a square, Least squares property, Fast fourier transform.

Note: Texts given in the Extra Reading /Key Word: must be tested only through assignment and seminars.

Course Outcomes(CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recognise and express Laplace transform	PSO - 5	R,E
CO – 2	Apply inverse Laplace transform for solving ordinary differential equation with constant coefficient.	PSO - 3	Ap, E
CO - 3	Recall partial differential equation and finding its solution	PSO - 4	R, E
CO - 4	Explain second order partial differential equation and apply to Heat and wave equation.	PSO - 2	Ap,E
CO - 5	Compute Full range Fourier series, half range Fourier series	PSO - 1	E

CO - 6	Become familiar about Laplace and inverse Laplace transforms, standard forms of partial differential equations, second order linear partial differential equations with constant coefficients and Fourier series and enable them to inculcate the habit of problem solving-Skill Development.	PSO -1,2	R,E
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PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. For Units I, II and III

Treatment and content as in Narayanan.S, ManicavachagomPillay.T.K,(2006), Calculus –Volume III, S.Viswanathan (Printers and publishers),Chennai.

Unit I: Chapter 5: sec 1-5

Unit II: Chapter 5: sec 6-8

Unit III: Chapter 4: 1-5.4, 6

2. For Unit IV:

Treatment and content as in Venkataraman M.K, Engineering Mathematics (Vol III),(2006) National publishing company Chennai

3. For Unit V:

Treatment and content as in Narayanan.S,ManicavachagomPillay.T.K,(2006), Calculus –Volume III, S.Viswanathan (Printers and publishers),Chennai.

Chapter 6 : Sec 1-5.2

BOOKS FOR REFERENCE:

1. Arumugam. S, Thangapandi Issac. A, Somasundaram. A, (2002) Engineering Mathematics Vol III ,Scitech Publishers, Chennai

2. Zafar Ahsan (2006) Differential Equations and their Applications, Prentice Hall of India Ltd, New Delhi.

3. Narayanan. S, Manicavachagom Pillay.T.K, (2006), Differential Equations, S.Viswanathan (Printers and publishers), Chennai.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – II

Course Title	ALLIED 3: ANALYTICAL GEOMETRY OF THREE DIMENSIONS, VECTOR CALCULUS AND DIFFERENTIAL EQUATIONS (For Chemistry Students)
Total Hours	60
Hours / Week	4
Code	U20MA2ALT09
Course type	Theory
Credits	2
Marks	100

General Objective:

To make the students understand the concepts of three dimensional geometry, linear ordinary differential equations and vector differentiation and integration.

Course Objectives (CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand plane and its standard forms of equations.
CO – 2	Understand coplanar lines, skewlines and evaluating shortest distance between two lines
CO – 3	Evaluate differential equation of using variable separable method.
CO – 4	Apply vector differentiation in physics
CO – 5	Evaluate line, surface integral and volume integral

UNIT I: PLANES

12 HRS

The Plane – the general equation of the plane – Standard forms of equations of planes

Extra Reading/ Keywords: *planes bisecting the angles between planes*

UNIT II: COPLANAR LINES

12 HRS

The condition that two different straight lines should be coplanar – The shortest distance between two given lines – The equation of two skew lines in a simplified form.

Extra Reading/ Keywords: *angle between the planes , symmetrical form of equation of line*

UNIT III:DIFFERENTIAL EQUATIONS

12 HRS

Equations of first order and first degree-Variable separable method - Homogeneous and non-homogeneous equations-Linear differential equation of second order with constant coefficients - Particular integrals for e^{ax} , $\sin ax$ & $\cos ax$.

Extra Reading/ Keywords: *non linear differential equation , separable equations, IVP*

UNIT IV: VECTOR DIFFERENTIATION

12 HRS

Velocity – acceleration – scalar and vector fields – Gradient, Divergence and curl – Applications.

Extra Reading/ Keywords : *Partial differentiation*

UNIT V: VECTOR INTEGRATION

12 HRS

Line integral – Surface integral – Volume integral.

Extra Reading/ Keywords: *Stokes theorem, Greens theorem*

Note: Texts given in the Extra Reading /Key Word: must be tested only through assignment and seminars

Course Outcomes(CO):

The learners

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO - 1	Recall plane and its standard forms of equations.	PSO - 4	R,U
CO - 2	Recognise coplanar lines, skewlines and evaluating shortest distance between two lines.	PSO -3	U,E
CO - 3	Evaluate differential equation of using variable separable method.	PSO -2	E
CO - 4	Apply vector differentiation in physics.	PSO -1	Ap,E
CO - 5	Compute line, surface integral and volume integral	PSO -5	E
CO - 6	Become familiar about the concepts of three dimensional geometry , linear ordinary differential equations and vector differentiation and integration- Skill development	PSO - 2	E

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

For UNITS I & II:

Treatment and content as in

T.K. Manicavachagom Pillay & T Natarajan (2010), "A PRESCRIBED TEXT of Analytical Geometry , Part II – Three Dimensions", Viswanathan Publishers ,Chennai.

Unit I : Chapter II :Sections 1-10,10.1&10.2

Unit II: Chapter III: Sections 7, 8,8.1&8.2

For UNIT III : Treatment and content as in

Narayanan and T.K. Manicavachagom Pillay(2004), Calculus Volume III –Viswanathan publishers.

Unit III: Chapter 1:Sections 2.1 – 2.3,Chapter 2:Sections 1 – 4,4(a) &4(b)(only simple problems)

For UNITS IV & V:Treatment and content as in

Dr.P.R.Vittal, Dr.V.Malini, (2009)Vector Calculus, Fourier Series and Fourier Transforms

Unit IV: Chapter 1

Unit V: Chapter 2(only vector integrals – excluding integral theorems)

BOOKS FOR REFERENCE:

1. Duraipandian .P, Laxmi Duraipandian & D. Mahilan, Analytical Geometry-Three Dimensional, Emerald Publishers, Chennai.
2. Zafar Ahsan (2006), Differential Equations and their Applications, Prentice Hall of India Ltd, New Delhi.
3. K. Viswanatham & S. Selvaraj, Vector Analysis, Emerald Publishers, Chennai, Reprint 1999.
4. P. Duraipandian, Laxmi Duraipandian, Vector Analysis, Emerald Publishers, Chennai, Reprint 2003.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – II

Course Title	ALLIED 3: NUMERICAL METHODS (for BCA and B.Sc. Computer Science students)
Total Hours	60
Hours / Week	4
Code	U20MA2ALT10
Course type	Theory
Credits	2
Marks	100

General Objective:

To make the students know about different methods of solving numerical equations and differential equations, methods of interpolation and numerical differentiation and integration.

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand various methods for solving algebraic and transcendental equations
CO – 2	Understand the system of simultaneous equations and finding the solution of a system of simultaneous equations using numerical methods
CO – 3	Analyse numerical solution to ordinary differential equations using direct method
CO – 4	Apply finite difference to evaluate polynomial using interpolation for equal and unequal intervals.
CO – 5	Evaluate finite integrals using Trapezoidal and Simpson's rule.
CO – 6	Understand numerical differentiation

UNIT I :SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS**12 HRS**

Introduction - Bisection Method - The Method of False Position -Iteration Method - Newton - Raphson Method.

Extra Reading/ Keywords:*Rolle 'stheorem,,Taylor 's series for a function of one variable***UNIT II: SOLUTION OF LINEAR SYSTEMS OF EQUATIONS:****12 HRS**

Introduction – Gaussian elimination,Gauss – Jordan, Gauss -Seidel and Gauss Jacobi methods.

Extra Reading/ Keywords:*LU Decomposition of matrices, Matrix Norms.***UNIT III: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS****12 HRS**

Introduction – Solution by Taylor's series , Euler's method , Modified Euler's method , Runge-Kutta method.

Extra Reading/ Keywords: *Picard,smethod,Adams – Bashforth method.***UNIT IV: INTERPOLATION****12 HRS**

Introduction -Finite Differences , Forward and Backward differences only , Newton's formula for interpolation ,Interpolation formulae , Interpolation with unevenly spaced points , Lagrange's interpolation formula.

Extra Reading/ Keywords:*Stirling 'sformula,Bessel 's formula.***UNIT V: NUMERICAL DIFFERENTIATION AND INTEGRATION****12 HRS**

Introduction - Numerical differentiation , Numerical integration – Trapezoidal rule , Simpson's 1/3-rule.

Extra Reading/ Keywords: *Simpson,s 3/8 rule ,Boole 's and Weddle 's rule.***Note: Texts given in the Extra Reading /Key Words must be tested only through assignment and seminars.****Course Outcomes (CO):****The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO - 1	Explain various methods for solving algebraic and transcendental equations.	PSO -1	U,E
CO - 2	Solve the system of simultaneous equations using numerical methods	PSO -2	Ap, E
CO - 3	Compute numerical solution to ordinary differential equations using direct method.	PSO -5	E
CO - 4	Formulate polynomial using interpolation for equal and unequal intervals.	PSO -3	E
CO - 5	Evaluate finite integrals using Trapezoidal and Simpson's rule. Explain numerical differentiation	PSO -4	U,E

CO - 6	Become familiar about different methods of solving numerical equations and differential equations, methods of interpolation and numerical differentiation and integration- Skill Development	PSO -2	Ap, E
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PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

S.S.Sastry, Introductory Methods of Numerical Analysis , New Age Publishing Company, Fourth Edition, April 1995.

UNIT I : Chapter 2 - Sec. 2.1 to 2.5

UNIT II : Chapter 6 - Sec.6.1, 6.3 ,6.3.1,6.3.2,6.3.3,6.4

UNIT III : Chapter 7 - Sec 7.1, 7.2. 7.4, 7.4.2, 7.5.

UNIT IV : Chapter 3 - Sec. 3.1, 3.3, 3.3.1, 3.3.2, 3.6, 3.7, 3.7.1 , 3.9, 3.9.1

UNIT V : Chapter 5 - Sec. 5.1 ,5.2, 5.4, 5.4.1 and 5.4.2

BOOKS FOR REFERENCE:

1. A.Singaravelu (2008), Engineering Mathematics - Numerical Methods, Meenakshi Publishers, Chennai
2. S. Arumugam, A. Thangapandi Isaac & A. Somasundaram, Numerical Methods, Scitech Publishers ,Chennai
3. Dr. M.K. Venkataraman, Numerical Methods in Science and Engineering, National Publishing House, Chennai.

(For Candidates admitted from the academic year 2020-21 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG & RESEARCH DEPARTMENT OF MATHEMATICS
CHOICE BASED CREDIT SYSTEM
First Year - Semester – I

Course Title	ALLIED 3: BUSINESS STATISTICS (For Commerce Students)
Total Hours	60
Hours / Week	4
Code	U20MA2ALT11
Course type	Theory
Credits	3
Marks	100

General Objective:

To understand the various methods of collection of data and representing them through diagrams and graphs. To calculate various statistical parameters

Course Objectives(CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	Understand various method of collection of data and its diagrammatic representation
CO – 2	Evaluate measures of averages and dispersion
CO – 3	Understand the concepts of Correlation and Regression and its properties, Evaluation of Correlation and Regression.
CO – 4	Analyse of Time series using measures of trend, measure of seasonal variation
CO – 5	Evaluate index number using Laspeyre's, Fishers, Paasche's methods and lot of living index numbers.

UNIT I: COLLECTION AND PRESENTATION OF DATA

12 HRS

Meaning – Scope – Importance and Limitations of Statistics - Collection of Data - Classification and Tabulation - Diagrammatic representation.

Extra Reading/Key words: *Benefits of charts, Online tutoring, Heterogeneous data*

UNIT II: MEASURES OF AVERAGES AND DISPERSION**12 HRS**

Arithmetic Mean, Weighted – Geometric Mean – Harmonic Mean – Merits and demerits – Median – Quartiles and Deciles – Mode - Measures of Dispersion - Range - Quartile Deviation - Mean Deviation - Standard Deviation - Relative measures

Extra Reading/Key words: *Estimates of scale, Measurement uncertainty, Interquartile range*

UNIT III : CORRELATION AND REGRESSION**12 HRS**

Correlation - Scatter Diagram - Karl Pearson's Coefficient of Correlation - Rank Correlation - (Correlation of a bivariate frequency distribution and Coefficient of concurrent Deviation to be excluded) Regression - Properties, Regression lines and problems.

Extra reading words: *Index number, Time reversal test and factor reversal test, Least square method, Concurrent deviation method*

UNIT IV : ANALYSIS OF TIME SERIES**12 HRS**

Time Series - components of Time Series - measurement of trend - measures of seasonal variation (Methods of simple averages and Link relatives only) - problems (Deseasonalization is excluded)

Extra Reading/ Keywords: *Forecasting, Analysis of economic and industrial time series, Measuring Seasonality*

UNIT V : INDEX NUMBERS**12 HRS**

Index Numbers – Laspeyer's, Fisher's and Paasche's index numbers- tests for Index Numbers - cost of living Index Number - uses of Index Numbers.

Extra Reading/ Keywords: *Policonomics, Order reversal test, Time and factor test, Weighted index numbers, Zero-based budget, Cash-Only budgeting*

Note: Texts given in the Extra Reading /Key Word: must be tested only through assignment and seminars.

Course Outcomes(CO):**The learners**

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO -1	Recall and relate various method of collection of data and its diagrammatic representation	PSO - 2	R,U
CO - 2	Explain and Compute measures of averages and dispersion.	PSO - 1	U,E
CO - 3	Recognise and calculate Correlation and Regression	PSO - 3	R, E
CO - 4	Discuss and evaluates time series using measures of trend, measure of seasonal variation	PSO - 5	U,E
CO - 5	Evaluate index number by applying the Laspeyre's, Fishers, Paasche's methods	PSO - 4	E
CO - 6	Understand the various methods of collection of data and representing them through diagrams and graphs. To calculate various statistical parameters- Skill Development	PSO - 3,5	U,E

PSO – Programme Specific Outcome; CO – Course Outcome; R- Remember;

U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

Treatment and content as in Vittal .P.R (2004) , BUSINESS Statistics Margham Publishers, Chennai.

UNIT I - Chapters 1 to 4

UNIT II - Chapters 5,6

UNIT III - Chapters 8, 9

UNIT IV - Chapter 12

UNIT V - Chapter 13

BOOKS FOR REFERENCE:

1. R.S.N.Pillai, V.Bagavathi (2007), Statistics, S.Chand and Company Ltd. New Delhi.
2. Arora .S, Sumeet Arora (2002), Comprehensive Statistical Methods, S.Chand and Company Ltd ,New Delhi.
3. Douglas A.Lind ,William G. Marchall, Samuel A. Wathen (2003), Basic Statistics For Business and Economics, Mc Graw Hill, Delhi.
4. Gupta .S.C, Indra Gupta (2004) , Business Statistics, Himalaya Publishing House, New Delhi.
5. Gupta .S.P (2006), Statistical Methods, Sultan Chand & Sons, New Delhi.
- 6.Sharma J.K, (2006), Business Statistics, Dorling Kindersley, (India) Pvt Ltd, Licensees of Pearson Education in South Asia.