KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

Programme Name: **B.Sc Mathematics**

Curriculum and Scheme of Examination under CBCS

(Applicable to the students admitted during the Academic Year 2024 - 2025 and onwards)

Semester	Part	Subject Code	Title of the Paper	Instruction hours/cycle	Exam. Marks			Duration of Exam (hours)	Credits
					CIA	ESE	TOTAL		
I	I	24TML101@	Language I@	6	25	75	100	3	3
	II	24ENG101	English -I	6	25	75	100	3	3
	III	24UMA101	Core Paper 1 - Classical Algebra	4	25	75	100	3	4
	III	24UMA102	Core Paper 2 - Calculus	5	25	75	100	3	4
	III	24UMA1I1	Allied Paper 1 - Statistics I	7	25	75	100	3	5
	IV	24EVS101	Environmental Studies **	2	-	50	50	3	2
			Total	**30**	-	-	550	-	21
II	I	24TML202@	Language II@	6	25	75	100	3	3
	II	24ENG202	English –II	6	25	75	100	3	3
	III	24UMA203	Core Paper 3 - Differential Equations and Laplace Transforms	4	25	75	100	3	4
	III	24UMA204	Core Paper 4 - Trigonometry, Vector Calculus and Fourier Series	5	25	75	100	3	4
	III	24UMA2I2	Allied Paper 2 - Statistics II	7	25	75	100	3	5
	IV	24VED201	Value Education- Moral and Ethics**	2	-	50	50	3	2
	-	-	**Total**	**30**	-	-	550	-	21
				-	-	-		-	
III	I	24TML303@	Language III@	6	25	75	100	3	3

	II	24ENG303	English –III	6	25	75	100	3	3
	III	24UMA305	Core Paper 5 - Analytical Geometry	4	25	75	100	3	4
	III	24UMA306	Core Paper 6 - Statics	3	25	75	100	3	3
	III	24UPH3A3	Allied Paper 3 - Physics I Theory	5	20	55	75	3	4
	III	-	Allied Practical 1- Physics I Practical	2	-	-	-	-	-
	IV	24UGC3S1	Skill Based Subject 1- Cyber Security	2	100	-	100	3	3
	IV	24TBT301/ 24TAT301/ 24UHR3N1	Basic Tamil* / Advanced Tamil**/ Non-major elective- I**	2	-	75	75	3	2
			Total	**30**	-	-	650	-	**22**
IV	I	24TML404 @	Language IV@	6	25	75	100	3	3
	II	24ENG404	English –IV	6	25	75	100	3	3
	III	24UMA407	Core Paper 7 –Number Theory	3	25	75	100	3	3
	III	24UMA408	Core Paper 8 - Dynamics	4	25	75	100	3	4
	III	24UPH4A4	Allied Paper 4 - Physics II – Theory	5	20	55	75	3	4
	III	22UPH4AL	Allied Practical 1- Physics I Practical	2	20	30	50	3	2
	IV	24UMA4SL	**Skill Based Subject 2-** Fundamentals of LaTeX- Practical	2	40	60	100	3	3
	IV	24TBT402/ 24TAT402/ 24USG4N2	Basic Tamil* / Advanced Tamil**/ Non-major elective- II**	2	-	75	75	3	2
			Total	**30**	-	-	700	-	**24**
V	III	24UMA509	Core Paper 9 - Real Analysis I	5	25	75	100	3	4
	III	24UMA510	Core Paper 10 - Complex Analysis I	6	25	75	100	3	4

	III	24UMA511	Core Paper 11 - Modern Algebra I	6	25	75	100	3	4
	III	24UMA512	Core Paper 12 - Programming in C-Theory	4	25	75	100	3	4
	III	24UMA5CL	Core Practical - Programming in C- Practical	2	40	60	100	3	2
	III	22UMA5E1	Major Elective Paper 1	5	25	75	100	3	5
	IV	-	**EDC**	2	100	-	100	3	3
	-	**24UMA5IT**	**Internship Training ******	Grade					
			Total	**30**	-	-	700	-	26
VI	III	24UMA613	Core Paper 13 - Real Analysis II	6	25	75	100	3	4
	III	24UMA614	Core Paper 14 -Complex Analysis II	6	25	75	100	3	4
	III	24UMA615	Core Paper 15 - Modern Algebra II	6	25	75	100	3	4
	III	24UMA 6E2	Major Elective Paper 2	6	25	75	100		5
	III	24UMA6Z1	Project and Viva-voce***	4	20	80	100	-	5
	IV	**24UBI6S3**	**Skill Based Subject 3- Basics of IPR**	2	100	-	100	3	3
			Total	**30**	-	-	600	-	25
	V	24NCC **$**/NSS/YRC /PYE/ECC/ RRC/ WEC101#	Cocurricular Activities*	-	50	-	50	-	1
Grand Total				**-**	**-**	**-**	**3800**	**-**	**140**

Note :

CBCS – Choice Based Credit system, CIA– Continuous Internal Assessment,

ESE– End of Semester Examinations

$ For those students who opt NCC under Cocurricular activities will be studying the prescribed syllabi of the UGC which will include Theory, Practical & Camp components. Such students who qualify the prescribed requirements will earn an additional 24 credits.

@ Hindi/Malayalam/ French/ Sanskrit – 24HIN/MLM/FRN/SAN101 - 404

* - No End-of-Semester Examinations. Only Continuous Internal Assessment (CIA)

**- No Continuous Internal Assessment (CIA). Only End-of-Semester Examinations (ESE)

*** Project Report – 60 marks; Viva voce – 20 marks; Internal-20 marks

**** The students shall undergo Internship training / field work for a minimum period of 14 working days at the end of the fourth semester during summer vacation and submit the report in the fifth semester which will be evaluated for 100 marks by the concerned guide and followed by an Internal Viva voce by the respective faculty or HOD as decided by the department. According to their marks, the grades will be awarded as given below.

Marks %	**Grade**
85 – 100	O
70 – 84	D
60 – 69	A
50 – 59	B
40 – 49	C
< 40	U (Reappear)

Major Elective Papers (2 papers are to be chosen from the following 6 papers)

1. Operations Research
2. Numerical Methods with MATLAB
3. Linear Algebra
4. Astronomy
5. Fuzzy Mathematics
6. Combinatorics

Non-Major Elective Papers

1. Human Rights
2. Women's Rights
3. Consumer Affairs

Sub. Code & Title of the Extra Departmental Course (EDC) :

24UMA5X1 - Fundamentals of Mathematics

 # List of Cocurricular Activities:

1. National Cadet Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

Note: In core/ allied subjects, no. of papers both theory and practical are included wherever applicable. However, the total credits and marks for core/allied subjects remain the same as stated below.

Tally Table:

S.No.	Part	Subject	Marks	Credits
1.	I	Language – Tamil/Hindi/Malayalam/ French/ Sanskrit	400	12
2.	II	English	400	12
3.	III	Core – Theory/Practical	1600	60
	III	Allied	400	20
		Electives/Project	300	15
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major electives	150	4

		Skill Based subject	300	9
		EDC	100	3
		Environmental Studies	50	2
		Value Education	50	2
5.	V	Co-curricular Activities	50	1
		Total	**3800**	**140**

- 25 % CIA is applicable to all subjects except JOC, COP and SWAYAM courses which are considered as extra credit courses.
- 100 % CIA for Cyber Security and EDC paper.
- The students who complete any **MOOC On learning platforms like SWAYAM, NPTEL, Course era, IIT Bombay Spoken Tutorial etc.,** before the completion of the 5th semester and the course completion certificate should be submitted through the HOD to the Controller of Examinations. Extra credits will be given to the candidates who have successfully completed.
- An **Onsite Training** preferably relevant to the course may be undertaken as per the discretion of the HOD.
- Students who successfully complete **Naan Mudhalvan** courses in 3rd and 5th semester will be given 2 extra credits for each course. They are asked to submit the marks to Controller of Examinations through and undersigned by the HOD.

Semester	Naan Mudhalvan Course Title
III	Office Fundamentals :Digital Skills for Employability http://kb.naanmudhalvan.in/Special:Filepath/Microsoft_Course_Details.xlsx
V	Project Based Learning: Advanced Platform Technology / Data Analytics & Visualization http://kb.naanmudhalvan.in/BharathiarUniversity_(BU)

Components of Continuous Internal Assessment

Components		**Marks**	**Total**
Theory			
CIA I	75	(75+75 = 150/10)	25
CIA II	75	15	
Assignment/Seminar		5	

Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	
Project			
Review		15	20
Regularity		5	
Components		Marks	
Theory (Allied) (External : 55 marks)			
CIA I	55	(55+55)	20
CIA II	55	Converted to 10	
Assignment/Seminar		5	
Attendance		5	
Practical (Allied) (External : 30 marks)			
CIA Practical		10	20
Observation Notebook		5	
Attendance		5	

UMA 8

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remembering;**K2**-Understanding;**K3**-Applying;**K4**-Analyzing;**K5**-Evaluating

1. ESE Theory Examination:

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K1 – K5 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K2 – K5 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

(ii) CIA I & II and ESE: 55 Marks (Allied)

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K1 – K5 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K2 – K5 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. ESE Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments	50	60
K4	Record Work	10	
K5			

(For Allied papers)			
Knowledge Level	Section	Marks	Total
K3	Experiments	20	30
K4	Record Work	05	
K5			

3. ESE Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report	60	80
K4	Viva voce	20	
K5			

24UMA101

Programme Code: 02	**B.Sc Mathematics**			
Title of the paper	Core Paper 1 - Classical Algebra			
Batch 2024-2027	**Hours / Week** 4	**Total Hours** 60	**Credits** 4	Skill development

Course Objectives

1. To get the knowledge of convergence and divergence of a series.
2. To find the summation of series.
3. To understand the nature of the roots of an algebraic equation.

Course Outcomes (CO)

K1 to K5	CO1	Finding the roots of a polynomial function.
	CO2	Classifying convergence and divergence of a series.
	CO3	Applying the Binomial theorem, Exponential theorem, logarithmic theorem to find summation of series.
	CO4	Analyzing the nature of the roots of the equation.
	CO5	Evaluating the problem by using Horner's method.

Syllabus

UNIT I **(12 Hours)**

Convergency and Divergency of series: **Definitions – Elementary results*** –Some general theorems connecting infinite series – Series of positive terms - - Comparison tests - De Alembert's ratio test - Raabe's test.

UNIT II **(12 Hours)**

Cauchy's condensation test- Cauchy's root tests. - Absolute Convergent series .

UNIT III **(12 Hours)**

Binomial, Exponential and Logarithmic series theorems. Their application to Summation only.

UNIT IV **(12 Hours)**

Theory of equations: **Roots of an equation*** – Relations between the roots and coefficients- Symmetric function of the roots -Transformations of equations –Character and position of roots – Reciprocal equation.

UNIT V **(12 Hours)**

Descarte's rule of signs - Rolle's theorem - Multiple roots – Nature of the roots of f(x)= 0 - Horner's method.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

T. Natarajan and others, Algebra, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 2012.

Reference Books

1. P.N.Chatterji, Algebra, Rajhans Prakasham Mandir, Meerut (U.P), 1994.
2. M.L.Khanna, Algebra, Jai Prakash Nath & Co, Meerut (U.P), 1991.
3. A.R.Vasishtha and R.K.Gupta, Krishna Prakasham Mandir, Meerut (U.P), 1990-91.

MAPPING

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

S- Strong; H-High; M-Medium; L-Low

24UMA102

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 2 –CALCULUS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Employability
2024-2027	5	75	4	

Course Objectives

1. To give basic knowledge about Mathematical concepts in calculus.
2. To evaluate double and triple integrals.
3. To learn different methods of integration, Beta and Gamma integrals which form the basis for higher studies.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the formulas in differentiation and integration.
	CO2	Interpret the definite integral geometrically as the area under a curve.
	CO3	Apply the concept of definite integral to solve various kinds of problems.
	CO4	Analyze the values of the derivative at a point algebraically.
	CO5	Evaluating the integrals using the computational tool MATLAB.

Syllabus

UNIT I **(15 Hours)**

Curvature –Radius of curvature in Cartesian and Polar forms –Evolutes and Envelopes - Pedal equations –**Total differentiation*** –Euler's theorem on homogeneous functions – Maxima and minima for two variable functions using MATLAB.

UNIT II **(15 Hours)**

Integration of $f^{1}(x)/f(x)$, $f(x)f^{1}(x)$, $(px + q) / \sqrt{(ax^2 + bx + c)}$, $\sqrt{(x-\alpha)}/(\beta-x)$, $\sqrt{(x-\alpha)}(\beta-x)$, $1/\sqrt{(x-\alpha)}/(\beta-x)$, $1/(a\cos x + b\sin x + c)$, $1/(a\cos^2 x + b\sin^2 x + c)$ - **Definite integrals***- Integration by parts – Reduction formulae-Bernoulli's Formula.

UNIT III **(15 Hours)**

Double integrals – Evaluation - Change of order of integration in double Integral – Applications to calculate areas – Areas in polar coordinates - Evaluating the integral by changing the order of integration and Area of the region bounded by the curve using MATLAB.

UNIT IV **(15 Hours)**

Triple integrals – Evaluation – Jacobian - Change of variables in double and triple integrals using Jacobian – Volume as a triple integrals – Volume of the region using MATLAB.

24UMA102

UNIT V **(15 Hours)**

Notion of improper integrals and their convergence - Simple tests for convergence, Simple problems. Beta and Gamma functions - Properties - Relation between them – Applications of Gamma functions to multiple integrals.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S. Narayanan and T.K.M.Pillai, Calculus Vol. I (Differential Calculus), S.Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 2018 (For Unit I)
2. S. Narayanan and T.K.M.Pillai, Calculus Vol. II (Integral Calculus) S.Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 2011. (For Units II, III, IV and V).
3. Brain R. Hunt, Ronald L.Lipsman, Rosenberg, " A Guide to MATLAB for Beginners and Experienced users, Cambridge University Press-UK, Edition-I, 2008.

Reference Books

1. N.P.Bali, Integral Calculus , Laxmi Publications, 4th Edition , 1980.
2. A.R.Vasishtha and S.K.Sharma, Integral Calculus , Krishna Prakashan Mandir, Meerut,1990.
3. Shanthi Narayan, Differential Calculus, Shyam Lal Charitable Trust, New Delhi, 1993.
4. T. Veerarajan, Integral Calculus and Vector Calculus, Yesdee Publishing Private Ltd., 2020.

MAPPING

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

S-Strong **H-**High **M-**Medium **L-**Low

24UMA1I1

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Allied Paper 1-STATISTICS – I		
Batch 2024-2027	**Hours / Week** 7	**Total Hours** 105	**Credits** 5	**Skill development / Employability**

Course Objectives

1. To enable the students to acquire the knowledge of statistics.
2. To remember the properties of various statistical functions.
3. To understand the concepts of some statistical distributions.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the concepts of probability and random variables
	CO2	Understanding the properties of some distributions.
	CO3	Solving mean, median, mode, moments and moment generating functions of Binomial, Poisson and Normal distributions.
	CO4	Analyzing how correlation is used to identify the relationships between variables and how regression analysis is used to predict outcomes.
	CO5	Determining the relationship between Binomial, Poisson and Normal distributions.

Syllabus

UNIT I **(21 Hours)**

Probability: Axiomatic Approach to Probability – Random experiment, Sample space and elementary events – Algebra of events - Some Theorems on Probability –Multiplicative Theorem of Probability - Independent Events - Multiplicative Theorem of Probability for independent Events – Baye's Theorem.

UNIT II **(21 Hours)**

Mathematical Expectations : Introduction – Mathematical Expectation or expected value of a random variable – Expected value of functions of a random variables – Properties of expectation – properties of variance – Moment generating function – Cumulants – Properties of Cumulants – Properties of Characteristics of functions – Tchebechev's inequality – Covariance.

UNIT III **(21 Hours)**

Correlation: Introduction – Types of correlation – Methods of studying correlation – Karl Pearson's coefficient of correlation - Rank Correlation. Regression**:** Introduction – Regression lines – Regression Equations.

UNIT IV **(21 Hours)**

Binomial Distribution: Moments of Binomial Distribution – Recurrance Relation for the Moments of Binomial Distribution – Mean Deivation about Mean of Binomial Distribution – Mode of Binomial Distribution – MGF of Binomial Distribution – Additive Property – Characteristic Function – Cumulants of the Binomial Distribution – Fitting of Binomial distribution using MATLAB.

Poisson Distribution: The Poisson Process – Moments – Mode – Recurrance Relation – MGF – Characterisitc Function – Cumulants -*__Additive property__ – Fitting of Poisson distribution using MATLAB.

UNIT V **(21 Hours)**

Normal Distribution: Introduction – Mode – Median – MGF – Cumulant generating function – Moments – Points of inflexion – Mean deviation about mean.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statisitics, Sultan Chand and Sons, New Delhi -2, 2011 (For Units I,II,IV,V)
2. S.P.Gupta, Statistical Methods, Sultan Chand and Sons, New Delhi -2, 2018. (For Unit III)
3. Brain R. Hunt, Ronald L.Lipsman, Rosenberg, " A Guide to MATLAB for Beginners and Experienced users, Cambridge University Press-UK, Edition-I, 2008.

UNIT I	Chapter 3	Sections 3.8 (3.8.1, 3.8.2, 3.8.5, 3.8.6)
		Sections 3.9 (3.9.1, 3.9.2, 3.9.3(Omit Problems))
		Sections 3.10 -3.13
	Chapter 4	Sections 4.2

UNIT II	Chapter 6	Sections 6.1-6.6
	Chapter 7	Sections 7.1, 7.2, 7.3(7.3.1), 7.5
UNIT III	Chapter 10	Page 390-405,416-422,452-467.
UNIT IV	Chapter 8	Sections 8.4(8.4.1, 8.4.2, 8.4.4 - 8.4.9) 8.5(8.5.1 – 8.5.8)
UNIT V	Chapter 9	Sections 9.1, 9.2 (9.2.3 – 9.2.7, 9.2.9 – 9.2.10)

Reference Books

1. R.S.N. Pillai and V.Bagavathi,, "Statistics", Sultan Chand, New Delhi, 2008.
2. Gupta S.P, Statistical Methods, Sultan Chand, New Delhi, 33rd Edition, 2005.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA203

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 3 - Differential Equations and Laplace Transforms		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development /Entrepreneurship**
2024-2027	4	60	4	

Course Objectives

1. To solve second-order linear differential equations with constant and variable coefficient.
2. To get the ability of solving first and second order ordinary differential equations and first order partial differential equations.
3. To get the knowledge about Laplace and inverse Laplace transforms.

Course Outcomes (CO)

K1 to K5	CO1	Recalling the concept of first order linear differential equations.
	CO2	Understanding the concept of first order higher degree ordinary differential equations
	CO3	Solving Linear partial differential equations by using the Lagrange's method.
	CO4	Analyzing the concepts of Laplace transforms and inverse Laplace transforms to solve ODE with constant coefficients.
	CO5	Evaluating the general and complete solutions of first order PDE's

Syllabus

UNIT I **(12 Hours)**

Linear equations with Constant Coefficients : Complementary function of a linear equation with constant coefficients – Particular integral of $f(X)= e^{mx}$, sin mx, cosmx , x^m, $X.e^{mx}$ – Linear equations with variable coefficients- Equations reducible to linear equations

UNIT II **(12 Hours)**

Ordinary differential equations : Equations of the First order but of higher degree : Equations solvable for p – Equations solvable for x – Equations solvable for y – Clairaut's form – Methods for solving dx/P = dy/Q = dz/R conditions of integrability – Simultaneous linear differential equations of the form $f_1(D)x + \phi_1(D)y = T_1$, $f_2(D)x + \phi_2(D)y = T_2$
where f_1, f_2 , ϕ_1 and ϕ_2 are rational integral functions of D=d/dt with constant coefficients and T_1 and T_2 are explicit functions of t – Solving system of linear differential equations using MATLAB.

24UMA203

UNIT III **(12 Hours)**

Partial differential equations of the first order : **Eliminating arbitrary constants and arbitrary functions*** –Definition of general, particular and complete solutions – Singular and general solutions of first order equations in the standard form f(p, q)=0,f(z, p,q) =0, f(x,p,q)=0, f(y,p,q)=0, $f_1(x, p) = f_2(y, q)$, z = p(x) + q(y) +f(p, q) - Lagrange's method of solving the linear partial differential equation Pp + Qq =R.

UNIT IV **(12 Hours)**

Laplace Transforms: **Definition –Transforms of e^{at} *,** cos at, sin at and t^n where n is an integer. First shifting theorem – Laplace transforms of e^{at} sin bt, e^{at} cos bt, and e^{at} t^n. Theorems of $L\{f^1(t)\}$, $L\{f^n(t)\}$- Laplace Transform of periodic functions – Laplace transform of the various mathematical functions using MATLAB.

UNIT V **(12 Hours)**

Inverse Laplace transformation – Application of Laplace transform to solution of differential equations with constant coefficients. Inverse Laplace Transform using MATLAB.

*** denotesSelf study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S. Narayanan and T. K. Manickavachagam Pillay, "Differential Equations and its Applications", S. Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 2014.
2. Brain R. Hunt, Ronald L.Lipsman, Rosenberg, " A Guide to MATLAB for Beginners and Experienced users, Cambridge University Press-UK, Edition-I, 2008.

Unit I	Chapter V	Sections 1 - 6
Unit II	Chapter IV	Sections 1 to 3
	Chapter VI	Sections 4 to 6
Unit III	Chapter XII	Sections 1 to 4,
		Sections 5.1 to 5.4
Unit IV	Chapter IX	Sections 1 to 5
Unit V	Chapter IX	Sections 6 to 9

Reference Books

1.S.Narayanan and T.K.M.Pillai, Calculus, S.Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 1996.

2. N.P.Bali, Differential Equations, Laxmi Publications (P) Ltd., New Delhi, 2004.

3. Dr.J.K.Goyal and K.P.Gupta , Laplace and Fourier Transforms, Pragati Prakashan Publishers, Meerut, 2000.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA204

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 4 - Trigonometry, Vector Calculus and Fourier Series		
Batch 2024-2027	**Hours / Week** 5	**Total Hours** 75	**Credits** 4	**Skill development/ Employability**

Course Objectives

1. To enable the students to get basic knowledge of trigonometry
2. To bring in the knowledge of vector calculus and its applications in theorems
3. To understand the expansions of Fourier series.

Course Outcomes (CO)

K1 to K5	CO1	Defining the expansion of trigonometric, hyperbolic and inverse hyperbolic functions.
	CO2	Illustrating the Fourier co-efficient for Periodic functions.
	CO3	Applying the differential operator to find Gradient, Divergence and Curl
	CO4	Examining the multiple integrals by applying Gauss divergence theorem, Stoke's theorem and Green's theorem.
	CO5	Evaluating the double and triple integral.

Syllabus

UNIT I **(15 Hours)**

Expansions of cosnϕ, sinnϕ,* $\cos^n\phi$, $\sin^n\phi$-Hyperbolic functions –Separation of real and imaginary parts of $\sin(\alpha+i\beta)$, $\cos(\alpha+i\beta)$, $\tan(\alpha+i\beta)$, $\sinh(\alpha+i\beta)$, $\cosh(\alpha+i\beta)$, $\tanh(\alpha+i\beta)$, $\tan^{-1}(\alpha+i\beta)$, Logarithm of a complex number.

UNIT II **(15 Hours)**

Gradient of a scalar point function and Divergence and curl of a vector point function.

UNIT III **(15 Hours)**

Integration of point functions - Integral theorems – Gauss divergence theorem – Examples.

UNIT IV **(15 Hours)**

Green's and Stoke's theorems - Examples. – Constructing three dimensional vector field for the given vector using MATLAB .

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UNIT V **(15Hours)**

Fourier series –Definition. Finding Fourier co-efficients for a given periodic function with period 2π-odd and even functions –Half range series with period π * .

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S. Narayanan, Trigonometry, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 1997.(For Units I)
2. P.Duraipandian and Laxmi Duraipandian , Vector Analysis, Emerald Publishers, 2008.(For Units II, III and IV).
3. S.Narayanan and T.K.M.Pillai, Calculus Vol. III (Major), S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 1997. (For Unit V).
4. Brain R. Hunt, Ronald L.Lipsman, Rosenberg, " A Guide to MATLAB for Beginners and Experienced users, Cambridge University Press-UK, Edition-I, 2008.

Unit I	Chapter III	Sections 1 and 4
	Chapter IV	Sections 1 and 2
	Chapter V	Sections 5
Unit II	Chapter II	Section 2.1 and 2.3 to 2.9
Unit III	Chapter III	Sections 3.1 and 3.8
	Chapter IV	Sections 4.2 and 4.8 (Relevant examples)
Unit IV	Chapter V	Section 4.4, 4.5 and 4.8 (Relevant examples)
Unit V	Chapter VI	Sections 1 to 5

Reference Books

1. P.Kandasamy and K.Thilagavathi, Mathematics, S.Chand's and Company Ltd., Ram Nagar, New Delhi - 55, 2004.
2. S.Narayanan and T.K.Manicavasagampillay, Vector Algebra and Analysis, S.Viswanathan Printers and Publishers Pvt., Ltd, 1995.
3. K.Viswanathan and S.Selvaraj, Vector Analysis, Emerald Publishers, Chennai – 2, 1998.

24UMA204

MAPPING

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

S- Strong **H**-High **M**-Medium **L**-Low

24UMA2I2

Programme Code : 02		B.Sc Mathematics		
Title of the paper		Allied Paper 2-STATISTICS – II		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	7	105	5	

Course Objectives

1. To enable the students to give inference on statistical population based on sample statistics.
2. To Understand the concepts of various estimators.
3. To study the concepts of analysis of variance.

Course Outcomes (CO)

K1 to K5	CO1	Finding the derivations of t, χ^2 and F distributions.
	CO2	Explaining the procedure for Testing of hypothesis and sampling of attributes.
	CO3	Applying the concepts of various distributions in real time situations.
	CO4	Analyzing one - way and two – way Classifications and design of experiments.
	CO5	Interpreting the analysis of data using various test using MATLAB.

Syllabus

UNIT I **(21 Hours)**

Chi Square Distribution: Introduction-Derivation of χ^2 Distribution – Moment Generating Function of χ^2 - t Distribution-F distribution.

UNIT II **(21 Hours)**

Theory of Estimation: Introduction – Characteristics of Estimators – Unbiasedness – Consistency – Efficient Estimators – Sufficiency – Cramer-Rao inequality – MVU and Blackwellisation Theorem.

UNIT III **(21 Hours)**

Large Samples: Introduction-Types of Sampling- **Parameter and statistic***– Test of Significance- Procedure for Testing of Hypothesis- Test of Significance –Sampling of Attributes.

UNIT IV **(21 Hours)**

Applications of χ^2-distribution- Applications of t-distribution - Applications of F-distribution – Relation between t and F distributions - Relation between F and χ^2 distributions - χ^2 test and t-test using MATLAB.

24UMA2I2

UNIT V **(21 Hours)**

Analysis of Variance - One - Way Classification – ANOVA table – Two – Way Classification. Design of Experiments: Introduction – Experimental Units – **Basic Principles in the Design of Experiments*** – Complete Block Designs – Completely Randomized Design – Randomized Block Design – Latin Square Design – Analysis of Latin Square Design –Merits and Demerits of Completely Randomised Design – Merits and Demerits of Random Block Design and Latin Square Design.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi- 2, 2011.(For Units I, II, III, IV)

2. P.R.Vittal, Mathematical Statistics, Margham Publications, Chennai 2004.(For unit V)

3. Brain R. Hunt, Ronald L.Lipsman, Rosenberg, " A Guide to MATLAB for Beginners and Experienced users, Cambridge University Press-UK, Edition-I, 2008.

Unit I	Chapter 15	Sections 15.1 to 15.3
	Chapter 16	Sections 16.1, 16.2(16.2.1, 16.2.2, 16.2.3), 16.5(16.5.1, 16.5.2, 16.5.3)
Unit II	Chapter 17	Sections 17.1, 17.2, 17.3, 17.5
Unit III	Chapter 14	Sections 14.1 to 14.7
Unit IV	Chapter 15	Sections 15.6 (15.6.1, 15.6.2)
	Chapter 16	Sections 16.3 (16.3.1, 16.3.2, 16.3.3), 16.6, 16.7, 16.8.
Unit V	Chapter 26	Pages 26.14 to 26.27
	Chapter 28	Pages 28.1 to 28.17

Reference Books

1. B.L.Agarwal, Basic Statistics, New Age International Publishers, Chennai, 2009.

2. S.P.Gupta, Statistical Methods, Sultan Chand and Sons, New Delhi- 2, 2011.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA305

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 5 - Analytical Geometry		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	4	60	4	

Course Objectives

1. To gain knowledge about coordinate geometry and also about geometrical aspects.
2. To know the concepts of cone and cylinder.
3. To determine coordinate axes and coordinate planes in the dimensional space.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the equation of a line that passes through a given point which is parallel or perpendicular to a given line.
	CO2	Understanding the results based on the properties of a sphere.
	CO3	Identifying conic sections.
	CO4	Analyzing the concepts of geometry.
	CO5	Evaluating geometric problems using MATLAB.

Syllabus

UNIT I **(10 Hours)**

Analytical geometry of two dimensions: **Polar equation of a conic*** –directrix –Chord – Tangent –Normal.

UNIT II **(16 Hours)**

Analytical geometry of three dimensions: - Straight lines - Co-planarity of Straight lines – Shortest distance (S.D) and Equations of S.D between two lines. Shortest distance between two lines using MATLAB.

UNIT III **(12 Hours)**

Sphere: - **Standard equation of a sphere*** – results based on the properties of a sphere – Tangent plane to a Sphere –Equations of a circle – Visualizing sphere using MATLAB.

UNIT IV **(12 Hours)**

Cone and Cylinder: Cone whose vertex is at the origin-enveloping cone of a sphere – right circular Cone – equation of a cylinder – right circular cylinder - Visualizing cylinder using MATLAB.

24UMA305

UNIT V **(10 Hours)**

Conicoids: - Nature of conicoid –Standard equation of a central conicoids –Enveloping cone –Tangent Plane –conditions for tangency –Director sphere and director plane – Plotting 3D curves and surfaces using MATLAB.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. T.K.M.Pillai & T.Natarajan, Analytical Geometry 2D, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 2012.
   Unit I Chapter 9 Sections 9, 10 and 12

2. P.Duraipandian & Others, Analytical Geometry 3D, Emerald Publishers, Chennai – 2, 1998.
   Unit II Chapter 4 Sections 4.1 to 4.8
   Unit III Chapter 5 Sections 5.1 to 5.8
   Unit IV Chapter 6 Sections 6.1 to 6.7
   Unit V Chapter 6 Sections 6.9 to 6.13

3. Brain R. Hunt, Ronald L.Lipsman, Rosenberg, " A Guide to MATLAB for Beginners and Experienced users, Cambridge University Press-UK, Edition-I, 2008.

Reference Books

1. A.R.Vasistha and J.N.Sharma , Analytical Geometry 3D, Krishna Prakashan Media (P) Ltd, Meerut, 1997.
2. P. Duraipandian and Kayalal Pachaiyappa, Analytical Geometry (2-D), Muhil Publishers, 2010.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA306

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 6 –Statics		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	3	45	3	

Course Objectives

1. To enable the knowledge of Forces and Moments.
2. To understand the notions of Friction.
3. To solve problems under friction and equilibrium of strings**.**

Course Outcomes (CO)

K1 to K5	CO1	Remembering the notions of friction and equilibrium of strings and deploy them in solving the problems.
	CO2	Understanding the concepts of forces and moments.
	CO3	Applying the concepts of forces in finding the resultant of any number of forces and the resultant of force and moments.
	CO4	Analyzing the basics of coplanar forces and equilibrium of forces acting on a rigid body and solving the problems.
	CO5	Estimating the coefficient of friction and normal reaction of a body on a rough inclined plane under equilibrium condition.

Syllabus

UNIT I **(9 Hours)**

Forces acting at a point: **Resultant and Component*** - Parallelogram of Forces – Analytical expressions – Triangle of Forces – Perpendicular triangle of forces and its converse – Polygon of forces – Lami's theorem – $(\lambda - \mu)$ theorem – Resolution and components of forces – Theorem on resolved parts, Resultant of any number of forces (Analytical and graphical methods).

UNIT II **(9 Hours)**

Parallel forces, moments: Resultant of two like and unlike parallel forces – condition of equilibrium of three coplanar parallel forces – Centre of two parallel forces – moment of a force – geometrical representation – Varigon's theorem – generalized theorems – moment of force about an axis – Couples: Definition – Equilibrium of two couples – Equivalence of two couples – Couples in parallel planes.

UNIT III **(9 Hours)**

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.

24UMA306

UNIT IV **(9 Hours)**

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.

UNIT V **(9 Hours)**

Equilibrium of Strings: Definition – Equation of common catenary – Tension at any point.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

M.K.Venkataraman, Statics, Agasthiar Publications, Trichy, 1999.

Unit I	Chapter 2	Sections 1, 3 to 16
Unit II	Chapter 3	Sections 2, 3, 5, 7, 9, 12, 13
	Chapter 4	Sections 1 to 4, 6 and 7
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 9	Sections 1, 2 and 4

Reference Books

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.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA407

Programme Code : 02		B.Sc Mathematics		
Title of the paper		Core Paper 7 - Number Theory		
Batch 2024-2027	**Hours / Week** 3	**Total Hours** 45	**Credits** 3	**Skill Development / Employability**

Course Objectives

1. To expose the basics of number theory to the students.
2. To enable the students to learn the usage of prime numbers and factors.
3. To solve linear congruences.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the concepts of divisibility, congruence, GCD and prime numbers.
	CO2	Explaining various divisibility tests.
	CO3	Identifying the Euler number and solving the linear congruence.
	CO4	Analyzing the nature of numbers.
	CO5	Evaluating the greatest integer function, Euler function and the solution of the congruence equations.

Syllabus

UNIT-I **(9 Hours)**

Divisibility : Associates – Division algorithm – G.C.D (H.C.F) – Euclidean algorithm – L.C.M. Prime and Composite Numbers :**Co-primes* – the Sieve of Eratosthenes***– Euclid's theorem.

UNIT-II **(9 Hours)**

Unique factorization theorem – Fundamental theorem of Arithmetic – Positional representation of an integer – Euler function Φ (n) -Greatest integer function.

UNIT-III **(9 Hours)**

Congruences : Definition – residue classes – complete and least residue systems – Reduced residue systems - Casting out 9 – **Magic number *.**

UNIT-IV **(9 Hours)**

Divisibility tests – Linear congruences – solution of congruences – Chinese remainder theorem.

UNIT-V **(9 Hours)**

Theorems of Fermat and Wilson : Little Fermat's theorem – Euler's extension – inverse modulo – Wilson's theorem and its converse – Lagrange's theorem.

24UMA407

***Self Study (Questions for Examination may be taken from the Self Study Portion also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

Professor S. Kumaravelu and Professor Susheela Kumaravelu, Elements of Number Theory, Raja Sankar Offset Printers, Sivakasi, 1st Edition, January 2002.

Unit I	Chapter III	Page No 45 to 59
	Chapter IV	Page No 60 to 65
Unit II	Chapter IV	Page No 65 to 69, 93 to 106, 109 to 117
Unit III	Chapter VI	Page No 163 to 184
Unit IV	Chapter VI	Page No 184 to 206
Unit V	Chapter VII	Page No 208 to 241

Reference Books

1. Ivan Niven and Herbert S Zuckerman, An Introduction to the theory of numbers, 3rd Edition, Wiley Eastern Ltd., New Delhi, 2000.
2. Martin Erickson, Anthony Vazzana, Introduction to Number theory, Chapman and Hall – CRC, Taylor and Francis Group, New York, 1st Indian Reprint, 2009.
3. David M. Burton, Elementary Number Theory, 7th Edition, McGraw Hill Education (India) Pvt Ltd, New Delhi, 2012

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA408

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 8 –Dynamics		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill**
2024-2027	4	60	4	**Development**

Course Objectives

1. To enable the students to know the laws, principles and understand the concepts of motion of a particle and projectiles.
2. To provide the knowledge about the field of kinematics and impact between spheres.
3. To gain knowledge about simple harmonic motion and central orbits.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the concepts of motion of a particle and projectile in different angles.
	CO2	Understanding the notions of impact between two smooth spheres in different ways.
	CO3	Applying the concept of simple harmonic motions in composition of two bodies in different directions.
	CO4	Distinguishing between the pedal equations of well known curves.
	CO5	Determining the force and the central orbits of the curves in two fold problems.

Syllabus

UNIT I **(12 Hours)**

Motion in a straight line under uniform accelaration: Equations of motion* - acceleration of falling bodies -vertical motion under gravity –bodies freely falling downward-motion of a particle down a smooth inclined plane.

Laws of motion:* Momentum - Newton's laws of motion-composition of forces-weight-conservation of Linear momentum – motion of a connected particle- work-tension in an elastic string-work done in stretching an elastic string – power - energy – kinetic energy and potential energy–principles of conservation of energy-verification of principle of energy in the case of freely falling body.

UNIT II **(12 Hours)**

Introduction – Definitions – two fudamental principles- path of a projectile – characteristics of the motion of the projectile - proving the path is a parabola - finding the velocity of the projectile in magnitude and direction at the end of time t – Given the magnitude of the velocity of projection to show that there are two directions of projection for the particle so as to reach a given point.

UNIT III **(12 Hours)**

Introduction –Definitions- Fundamental laws of Impact – Newton's experimental law-Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – loss of kinetic energy due to direct impact of two smooth spheres – Oblique impact of two smooth spheres - loss of kinetic energy due to oblique impact of two smooth spheres-Dissipation of energy due to impact.

UNIT IV **(12 Hours)**

Introduction – simple harmonic motion in a straight line – general solution of the SHM equation –geometrical representation of a simple harmonic motion –Change of origin– composition of two simple harmonic motions of the same period and in the same straight line – composition of two simple harmonic motions of the same period in two perpendicular directions.

UNIT V **(12 Hours)**

Introduction - Radial and transverse component of velocity and acceleration – Differential equation of central orbits –Perpendicular from the pole on the tangent formulae in polar coordinates-Pedal equation of the central orbit- Pedal equation of some of the well known curves-Velocities in a central orbit – Two fold problems in central orbits – Apses and apsidal distances – Given the law of force to the pole to find the orbit.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

M.K.Venkataraman, Dynamics, 15th edition. Agasthiar Publications, Trichy, July 2012.

Unit I	Chapter 3	Sections 3.22, 3.29 to 3.32
	Chapter 4	Sections 4.1 to 4.12,4.17, 4.18, 4.24, 4.26 to 4.28, 4.30 to 4.36
Unit II	Chapter 6	Sections 6.1 to 6.9, 6.11
Unit III	Chapter 8	Sections 8.1 to 8.9
Unit IV	Chapter 10	Sections 10.1 to 10.7
Unit V	Chapter 11	Sections 11.1 to 11.2, 11.6 to 11.13

Reference Books

1. A.V.Dharamapadam , Dynamics, S.Viswanathan Printers and Publishers Pvt., Ltd., Chennai, 1998.
2. K.Viswanatha Naik and M.S.Kasi, Dynamics, Emerald Publishers, 1992.
3. Naryanamurthi, Dynamics, National Publishers, New Delhi, 1991.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA509

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core paper 9 - Real Analysis-I		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	5	75	4	

Course Objectives

1. To know about the basic notions of the real numbers system, set theory, relations and functions .
2. To enable to have knowledge about the basic topological properties and theorems based on point set topology.
3. To Study about the covering theorems, compactness, metric spaces and continuity of a function.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic properties in the field of real numbers.
	CO2	Understanding the concepts of continuity, convergent sequences and metric spaces.
	CO3	Applying the concept of point set topology in related theorems
	CO4	Analyzing the compactness and to classify the continuity of a function with its limits.
	CO5	Evaluating the limit of the function and limit of the sequences.

Syllabus

UNIT I **(15 Hours)**

The Real and Complex number systems :Introduction - The field axiom- The order axioms – Geometric representation of Real numbers- Intervals–Integers –The unique Factorization theorem for integers –Rational numbers –Irrational numbers –Upper bounds, maximum Elements, least upper bound –The completeness axiom –Some properties of the supremum –Properties of the integers deduced from the completeness axiom- The Archimedian property of the real number system –Rational numbers with finite decimal representation- Finite decimal approximations to Real numbers- Infinite decimal representation of Real numbers –Absolute values and the Triangle inequality –The Cauchy-Schwarz inequality –**Plus and minus infinity and the extended real number system R***.

UNIT II **(15 Hours)**

Basic notions of a set theory. Notations –ordered pairs –cartesian product of two sets – Relations and functions – further terminology concerning functions –one –one functions and inverse –composite functions –sequences –similar sets-finite and infinite sets –countable and uncountable sets –uncountability of the real number system –set algebra –countable collection of countable sets.

UNIT III **(15 Hours)**

Elements of point set topology: Euclidean space R^n –open balls and open sets in R^n. The structure of open Sets in R^n –closed sets and adherent points –The Bolzano –Weierstrass theorem –the Cantor intersection Theorem.

24UMA509

UNIT IV **(15 Hours)**

Covering –Lindelof covering theorem –the Heine Borel covering theorem –Compactness in R^n –Metric Spaces –point set topology in metric spaces –**compact subsets of a metric space*** – Boundary of a set.

UNIT V **(15Hours)**

Convergent sequences in a metric space –Cauchy sequences –complete metric Spaces. Limit of a function –Continuous functions –continuity of composite functions.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

T.M. Apostol, Mathematical Analysis, 2nd ed., Narosa Publishing Company, Chennai, 2002.

Unit I	Chapter 1	Sections 1.1 to 1.20
Unit II	Chapter 2	Sections 2.2 to 2.15
Unit III	Chapter 3	Sections 3.2 to 3.9
Unit IV	Chapter 3	Sections 3.10 to 3.16
Unit V	Chapter 4	Sections 4.2 to 4.5, 4.8 and 4.9

Reference Books:

1. R.R. Goldberg, Methods of Real Analysis, Oxford and IBH publishing, New Delhi, 2020.
2. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw – Hill, New York, 2017.
3. G. Birkhoff and MacLane, A survey of Modern Algebra, 1stEdition,A K Peters / CRC Press, 2017.
4. J.N. Sharma and A.R. Vasistha, Real Analysis, Krishna Prakashan Media (P) Ltd, Meerut, UP,India,2014.

24UMA509

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA510

Programme Code: 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 10 - Complex Analysis – I		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	4	

Course Objectives

1. To recognize complex analysis as an essential part of mathematical background for engineers, physists and other scientists.
2. To introduce the students about the complex number system.
3. To Justify the need for a complex number system and explain how it is related to other existing number systems.

Course Outcomes (CO)

K1 to K5	CO1	Defining continuity, differentiability and analyticity of a complex valued function which helps the students to acquire deeper knowledge.
	CO2	Showing the condition(s) for a complex valued function to be analytic and/or harmonic.
	CO3	Developing the concept of sequences and series with respect to the complex numbers system.
	CO4	Analyzing complex integration, Cauchy's integral formulae and Cauchy's fundamental theorem and evaluation of complex integration.
	CO5	Determining the functions of complex variable in terms of continuity, differentiability and analyticity.

Syllabus

UNIT I **(18 Hours)**

Complex number system : Absolute value of a complex number –Argument* – Inequalities in terms of moduli – Relevant examples. Complex plane: Elementary transformation. i) $w = z + \alpha$ ii) $w = az$ iii) $w = 1/z$ – Definition of extended complex plane – Stereographic projection. Elementary and conformal mappings: Bilinear transformation.

UNIT II **(18 Hours)**

Analytic functions : Complex functions: Limit of a function* – Continuity of a function – Differentiability and Analyticity of a function. Necessary conditions for differentiability – Sufficient conditions for differentiability –Cauchy-Riemann equations in polar coordinates – Definition of entire function.

24UMA510

UNIT III **(18 Hours)**

Power Series and Elementary functions: Power Series - Absolute convergence of a Power Series –Circle of convergence –Analyticity of the sum of power series in the Circle of convergence (term by term differentiation of a series) Elementary functions : Exponential, Trigonometric and Hyperbolic functions.

UNIT IV **(18 Hours)**

Conjugate Harmonic functions: Definition and determination, Conformal Mapping: Isogonal mapping – Conformal mapping-Mapping $z \rightarrow f(z)$, where f is analytic, particularly the mappings $w = e^z$; $w = \sin z$; $w = 1/2(z + 1/z)$.

UNIT V **(18 Hours)**

Complex Integration: Simple rectifiable oriented curves- Integration of complex functions- Definite integral – Simply connected region - Proof of Cauchy's Theorem (using Goursat's lemma for a simply connected region). Cauchy's integral formula, Cauchy's integral formula for first derivatives - Cauchy's integral formula for higher derivatives -Morera's theorem.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

P. Duraipandian, Laxmi Duraipandian and D. Muhilan Complex Analysis, Emerald Publishers, Chennai –8, 2008.

Unit I	Chapter 1	Sections 1.7, 1.8, Relevant Examples in 1.9
	Chapter 2	Sections 2.6, 2.7, 2.8
	Chapter 7	Section 7.1
Unit II	Chapter 4	Sections 4.1 to 4.8 Relevant Examples in 4.10
Unit III	Chapter 6	Sections 6.1 to 6.7, 6.10, 6.11 Relevant Examples in 6.13
Unit IV	Chapter 6	Sections 6.12, 6.13
	Chapter 7	Sections 7.6 to 7.8 Relevant Examples in 7.9
Unit V	Chapter 8	Sections 8.1 to 8.9

Reference Books

1. Santhinarayan , Theory of functions of Complex Variable, S. Chand and Company Meerut, 1995.
2. Tyagi B.S. Functions of Complex Variable, 17th Edition, Pragati Prakasham Publishing Company Ltd, Meerut, 1992-93.
3. Arumugam. S., Thangapandi Issac.A, Somasundaram. A., Complex Analysis, M.R. Purusothaman Scitech Publishing Pvt. Ltd., 2017.

Mapping

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

S-Strong; **H**-High; **M**-Medium; **L**-Low

24UMA511

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 11 - Modern Algebra I		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	4	

Course Objectives

1.To know the concepts of group theory and ring theory
2.To understand the concepts of Ideals and Quotient Rings
3.To enable the concepts of Cauchy's theorem for Abelian groups , Sylow's theorem for Abelian groups , Automorphisms , Inner automorphism and Cayley's theorem.

Course Outcomes (CO)

K1 to K5	CO1	Finding whether a given abstract structure is a group or a ring.
	CO2	Understanding the elementary concepts of rings and fields and compare the similarities and differences between these concepts and those of group theory.
	CO3	Applying the concepts of homomorphism and isomorphism for comparing the algebraic features of mathematical systems in groups, rings and fields
	CO4	Examining the results from group theory to study the properties of rings and fields and to possess the ability to work within their algebraic structures.
	CO5	Assessing the finite groups through sylow's theorem.

Syllabus

UNIT I **(16 Hours)**

Sets – mappings* – Relations and binary operations – Groups: Abelian group, Symmetric group Definitions and Examples.

UNIT II **(18 Hours)**

Subgroups* – Cyclic subgroup - Index of a group – Order of an element – Fermat theorem - A Counting Principle - Normal Subgroups and Quotient Groups.

UNIT III **(19 Hours)**

Homomorphisms – Cauchy's theorem for Abelian groups – Sylow's theorem for Abelian groups Automorphisms – Inner automorphism - Cayley's theorem.

UNIT IV **(18 Hours)**

Rings: Definition and Examples –Some Special Classes of Rings – Commutative ring – Field – Integral domain - Homomorphisms of Rings.

UNIT V **(19 Hours)**

Ideals and Quotient Rings – More Ideals and Quotient Rings – Maximal ideal - The field of Quotients of an Integral Domain.

*** denotes Self study (Questions may be taken from the self study portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

I.N. Herstein, Topics in Algebra, John Wiley & Sons, New York, 2017.

Unit I	Chapter 1	Sections 1.1 to 1.3,
	Chapter 2	Sections 2.1 to 2.3
Unit II	Chapter 2	Sections 2.4 to 2.6
Unit III	Chapter 2	Sections 2.7 to 2.9
Unit IV	Chapter 3	Sections 3.1 to 3.3
Unit V	Chapter 3	Sections 3.4 to 3.6.

Reference Books

1. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Vikas Publishing house, 1992.
2. A.R.Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut, 1994 – 95

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA512

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core paper 12 - Programming in C Theory		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	4	60	4	

Course Objectives

1. To understand the C programming language.
2. To learn the concept of control statements, one dimensional, two dimensional and multi-dimensional arrays.
3. To solve the mathematical problems using C programs.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the importance and functioning of C programming.
	CO2	Understanding the use of decision making statement and loop structures.
	CO3	Applying the operators and functions to solve mathematical problems.
	CO4	Distinguishing different types of arrays.
	CO5	Evaluating the solution for Mathematical problems using programs

Syllabus

UNIT I **(12 Hours)**

Overview of C : History of C -Importance of C - **Sample C Programs***- Basic structure of C programs- Programming style - Executing a C Program.

Constants, Variables and Data types : Character set – C tokens – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – 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.

UNIT II **(12 Hours)**

Expression : Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Some computational problems – Type conversions in expressions – **Operator precedence and associativity*** – Mathematical functions.

Managing Input and Output Operations : Reading a character – Writing a character Formatted Input – Formatted Output

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UNIT III **(12 Hours)**

Decision Making and Branching : Decision making with IF statement – Simple IF statement – The IF … ELSE statement – Nesting of IF … ELSE statements – The ELSE IF ladder – The Switch statement – The ? : operator- The GOTO statement.

UNIT IV **(12 Hours)**

Decision Making and Looping : The WHILE statement – The DO statement – The FOR statement – Jumps in loops.

Array: Introduction-One-dimensional arrays-Declaration of one-dimensional arrays-Initialization of one-dimensional arrays-Two dimensional arrays- Initializing two dimensional arrays- Multi-dimensional arrays.

UNIT V **(12 Hours)**

Character Arrays and Strings: Introduction – Declaring and initializing string variables – Reading strings – Writing strings – Arithmetic operations on characters – Putting strings together – comparison of two strings- String-handling functions – Table of Strings.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. E. Balagurusamy, Programming in ANSI C , 8th edition, Tata McGraw- Hill Publishing Company Ltd., New Delhi, 2019.

Unit I	Chapter 2	Page No 17 – 31
	Chapter 3	Page No 39 – 59
	Chapter 4	Page No 68 –78
Unit II	Chapter 4	Page No 79 – 89
	Chapter 5	Page No 100 – 120
Unit III	Chapter 6	Page No 131 – 155
Unit IV	Chapter 7	Page No 171 – 194
	Chapter 8	Page No 212 – 246
Unit V	Chapter 9	Page No 257 – 280

24UMA512

Reference Books

1. Kris A. Jamsa, Programming in C, Gazlgotia Publication, New Delhi 1990.
2. V. Rajaraman, Computer Programming in C, Prentice Hall of India, New Delhi, 1994.
3. Stephen .G Kochan, Programming in C, CBS Publishers, New Delhi, 1991.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA5CL

Programme Code : 02		B.Sc Mathematics		
Course Code: 24UMA5CL		Core Practical 1 - Programming in C Practical		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	2	30	2	

Course Objectives

1. To provide practical experience for the students to understand the structure of a C program.
2. To enrich the knowledge in solving mathematical problems using C programs.
3. To train the students to construct C programs on their own.

Course Outcomes (CO)

K3 to K5	CO1	Remembering the basic concepts of C language to solve Mathematical problems.
	CO2	Understanding the usage of strings and arrays.
	CO3	Applying the concepts of loops and control statements in C programs.
	CO4	Classify the various operators used to develop a solution for a mathematical problem.
	CO5	Evaluating the mathematical and statistical problems using C programs.

List of Practical

1. Program to identify Prime numbers.
2. Program to find Simple Interest.
3. Program to find the Solution of the quadratic equation.
4. Program to calculate value of ${}^{n}C_{r}$ using recursion.
5. Program to frame Fibonacci series.
6. Program to find the Geometric mean of n numbers.
7. Program to find the Harmonic mean of n numbers.
8. Program to find the multiplication of two matrices.
9. Program to find the inverse of trigonometric functions.
10. Program to find whether a given word is a palindrome or not.
11. Program to find the correlation and regression.
12. Program to find the transpose and trace of the matrix.
13. Program to find the standard deviation.
14. Program to find the roots using Bisection Method.
15. Program to find the roots using Newton Raphson Method.
16. Program to find the determinant value of a matrix.

24UMA5CL

Distribution of Marks in ESE

Experiment	:	50
Record	:	10
Total		**60**

CIA

CIA Practical Exam	:	25
Attendance	:	5
Observation Note book	:	10
Total		**40**

To be awarded jointly by the internal and external examiners.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA613

Programme Code : 02		B.Sc Mathematics		
Title of the Paper		Core Paper 13 - Real Analysis-II		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	4	

Course Objectives

1. To understand the concept of functions, Connectedness, uniform continuity, fixed point and related theorems.
2. To find the Derivatives and related theorems and Functions of bounded variations and related theorems.
3. To enable to know about the Reimann- Stieltjes integrals and its properties.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the concept of derivatives, bounded variation.
	CO2	Understanding the concepts of connectedness
	CO3	Applying the differentiability of real functions in related theorems.
	CO4	Analyzing the Riemann Integrals.
	CO5	Determining the continuous function in terms of bounded variation.

Syllabus

UNIT I **(18 Hours)**

Examples of continuous functions –Continuity and inverse images of open or closed sets – functions continuous on compact sets –Topological mappings –Bolzano's theorem.

UNIT II **(18 Hours)**

Connectedness –components of a metric space – Uniform continuity : Uniform continuity and compact sets –fixed point theorem for contractions –monotonic functions.

UNIT III **(18 Hours)**

Definition of derivative –Derivative and continuity –**Algebra of derivatives*** – the chain rule –one sided derivatives and infinite derivatives –functions with non-zero derivatives –zero derivatives and local extrema –Roll's theorem –The mean value theorem for derivatives –Taylor's formula with remainder.

UNIT IV **(18 Hours)**

Properties of monotonic functions –**functions of bounded variation*** –total Variation – additive properties of total variation on (a, x) as a function of x – functions of bounded variation expressed as the difference of increasing functions –continuous functions of bounded variation.

24UMA613

UNIT V **(18 Hours)**

The Riemann – Stieltjes integral : Introduction –Notation –The definition of Riemann – Stieltjes integral –linear properties –Integration by parts –change of variable in a Riemann – stieltjes integral –Reduction to a Riemann integral.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

Tom. M. APOSTOL, Mathematical Analysis, 2nd ed., Addison-Wisely, Narosa Publishing Company, Chennai, 2002.

Unit I	Chapter 4	Sections 4.11 to 4.15
Unit II	Chapter 4	Sections 4.16, 4.17, 4.19, 4.20, 4.21, 4.24
Unit III	Chapter 5	Sections 5.2 to 5.10 and 5.12
Unit IV	Chapter 6	Sections 6.2 to 6.8
Unit V	Chapter 7	Sections 7.1 to 7.7

Reference Books

1. R.R. Goldberg, Methods of Real Analysis, Oxford and IBH publishing, New Delhi, 2020.
2. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw – Hill, New York, 2017.
3. G. Birkhoff and MacLane, A survey of Modern Algebra, 1st Edition,A K Peters / CRC Press, 2017.
1. J.N. Sharma and A.R. Vasistha, Real Analysis, Krishna Prakashan Media (P) Ltd, Meerut, UP,India,2014.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA614

Programme Code : 02		B.Sc Mathematics		
Title of the Paper		Core paper 14 - Complex Analysis – II		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	4	

Course Objectives

1. To learn about Taylor's Series and Laurent's series.
2. To understand the concept of singularities and residues.
3. To study the concept of definite integrals.

Course Outcomes (CO)

K1 to K5	CO1	Recalling the fundamental theorem of algebra in complex number system.
	CO2	Illustrating the Taylor's and Laurent's expansions of simple functions.
	CO3	Applying Laurent's series for isolated singularities and determine residues.
	CO4	Analyzing the concepts of residues and residue theorem to compute real definite integrals using contours.
	CO5	Interpreting integrals along a path in the complex plane using Cauchy's theorem.

Syllabus

UNIT I **(18 Hours)**

Zeros of a function – **Cauchy's Inequality*** – Liouville's theorem –Fundamental theorem of algebra –Maximum modulus theorem –Gauss mean value theorem – Mean value theorem of a harmonic function on a circle.

UNIT II **(18 Hours)**

Taylor's and Laurent's series – Taylor series – Laurent series.

UNIT III **(18 Hours)**

Singularities and Residues: **Singularities*** - Isolated singularities – Removable Singularity-Pole – Essential singularity–Behaviour of a function at an isolated singularity. Residues: Residue – Calculus of residues- Residue theorem.

UNIT IV **(18 Hours)**

Real definite integrals: Evaluation using the calculus of residues :

(i) Integrals of the form $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ where f is a rational function in cosθ and sinθ – Integral with $-\infty$ and $+\infty$ as lower and upper limits with the following integrals:

ii) P(x) /Q(x) where the degree of Q(x) exceeds that of P(x) at least 2.

iii) (sin ax).f(x), (cos ax).f(x), where a>0 and f(z) → 0 as z→∞ and f(z) does not have a pole on the real axis.

24UMA614

UNIT V **(18 Hours)**

Meromorphic functions: Meromorphic functions – Theorem on number of zeros minus number of poles – Principle of argument – Rouche's theorem – Fundamental theorem of algebra – Problems (Examples) related to these theorems.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

P. Duraipandian, Laxmi Duraipandian and D. Muhilan Complex analysis, Emerald Publishers, Chennai –2, 2008.

Unit I	Chapter 8	Sections 8.10 , 8.11 (Excluding theorem 8.19)
Unit II	Chapter 9	Sections 9.1 , 9.3, Relevant examples in 9.13
Unit III	Chapter 9	Sections 9.5 to 9.10, Simple examples in 9.13
	Chapter 10	Sections 10.1, 10.2 Simple examples in 10.4
Unit IV	Chapter 10	Sections 10.3 Type I, II, III, (Excluding type IV) Relevant Problems in 10.4.
Unit V	Chapter 11	Sections 11.1 Theorems 11.1,11.2,11.3 and 11.4 (Omitting theorems 11.5 and 11.6), 11.2, Relevant examples in 11.3

Reference Books

1. Santhinarayan , Theory of functions of Complex Variable, S.Chand and Company, Meerut, 1995.
2. Tyagi B.S , Functions of Complex Variable, 17th Edition, Pragati Prakasham Publishing Company Ltd, Meerut, 1992-93.
3. Arumugam. S., Thangapandi Issac.A, Somasundaram. A., Complex Analysis, M.R. Purusothaman Scitech Publishing Pvt. Ltd., 2017.

24UMA614

Mapping

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

S-Strong; **H**-High; **M**-Medium; **L**-Low

24UMA615

Programme Code : 02		B.Sc Mathematics		
Title of the Paper		Core Paper 15 - Modern Algebra II		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	4	

Course Objectives

1. To know the concepts of Hermitian and Skew-Hermitian Matrices , Orthogonal and Unitary Matrices ,Characteristic Roots and Characteristic Vectors of a Square Matrix.
2.To enable the concepts of linear independence, basis and dimension of a vector spaces.
3. To understand the concept of linear transformation and matrices which will enrich the knowledge of logical thinking.

Course Outcomes (CO)

K1 to K5	CO1	Recalling the basic concepts of matrices, rank of a Matrix
	CO2	Understanding the basic ideas of vector spaces and the concepts of linear span, linear independence, basis, dimension and to apply these concepts to vector spaces, subspaces and inner product spaces.
	CO3	Applying the principles of matrix algebra to linear transformations and compute their rank.
	CO4	Examining whether the given set of vector is linearly independent or linearly dependent .
	CO5	Evaluating the Eigen values and Eigen vectors of a matrix.

Syllabus

UNIT I **(16 Hours)**

Matrices: Introduction – **Addition and Scalar Multiplication of Matrices*** – **Product of Matrices*** –Transpose of a Matrix – Matrix Inverse – Symmetric and Skew – Symmetric Matrices.

UNIT II **(16 Hours)**

Hermitian and Skew-Hermitian Matrices – Orthogonal and Unitary Matrices – Rank of a Matrix –Characteristic Roots and Characteristic Vectors of a Square Matrix.

UNIT III **(20 Hours)**

Vector space: Elementary Basic Concepts – Subspace of a Vector space – Homomorphism – Isomorphism – Internal and External direct sums – Linear span – Linear Independence and Bases.

24UMA615

UNIT IV **(20 Hours)**

Dual Spaces – Annihilator of a subspace – Inner Product Spaces – Norm of a Vector – Orthogonal Vectors - Orthogonal Complement of a subspace – Orthonormal set.

UNIT V **(18 Hours)**

Linear Transformations: Algebra of Linear Transformations – Regular, Singular Transformations – Range of T – Rank of T – Characteristic Roots – Characteristic Vectors - Matrices.

*** Self Study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. R.Balakrishnan and M. Ramabadran, Modern Algebra, Vikas Publishing House Pvt.Ltd, New Delhi, (Second Revised Edition 1994) (For Units I & II)

Unit I	Chapter 1	Sections 1.1 to 1.3, 1.5 to 1.7
Unit II	Chapter 1	Sections 1.8 and 1.9
	Chapter 2	Section 2.9
	Chapter 3	Section 3.9

2. I.N. Herstein, Topics in Algebra, John Wiley & Sons, New York, 2017.

(For Units III, IV & V)

Unit III	Chapter 4	Sections 4.1 and 4.2
Unit IV	Chapter 4	Sections 4.3 and 4.4
Unit V	Chapter 6	Sections 6.1 , 6.2 and 6.3

Reference Books

1. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Vikas Publishing house, 1992.
2. A.R.Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut, 1994 – 95.
3. Seymour Lipschutz and Marc Lipson, Linear Algebra, 3rd Edition, McGraw Hill, 2001.

24UMA615

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UMA6Z1

Programme Code : 02	**B. Sc Mathematics**
Course code: 24UMA6Z1	Project
Batch 2024-2027	**Credits** :5

Course Objectives

1. To study the basic concepts related to the Project work.
2. To identify the field of research.
3. To know the concept of writing a dissertation in an effective way.

Course Outcomes (CO)

K1 ↕ K5	CO1	Choosing the area of research
	CO2	Classifying their findings or the data collected
	CO3	Applying the relative notions in the respective areas and finding the results.
	CO4	Analyzing results with the existing results.
	CO5	Interpreting the results with suitable examples.

Distribution of Marks in ESE

Dissertation	:	60
Viva voce	:	20
Total		**80**

Internal

Project Review	:	15
Attendance	:	5
Total		**20**

To be awarded jointly by the internal and external examiners

Mapping

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

S - Strong; H-High; M-Medium; L-Low

24UMA1A1

Programme Code: 03		B.Sc Physics		
Title of the paper		Allied Paper 1 - Mathematics I		
Batch	**Hrs/Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	7	105	5	

Course Objectives

1. To provide the basic knowledge of Trigonometry and Matrices.
2. To get the ability of solving first and second order ordinary differential equations and first order partial differential equations
3. To give basic knowledge about Mathematical concepts in Calculus.

Course Outcomes (CO)

K1 to K5	CO1	Defining hyperbolic and inverse hyperbolic functions.
	CO2	Understanding the concept of Characteristic equations to find Eigen Values and Eigen Vector.
	CO3	Applying finite difference methods for interpolation.
	CO4	Analyzing the Laplace and inverse Laplace transforms and solve Ordinary differential equations.
	CO5	Evaluating the Eigen Values and Eigen Vectors of a Matrix

SYLLABUS

UNIT I **(21 hrs)**

Matrices : Eigen values and Eigen vectors – **Properties of the Eigen vectors*** – Cayley – Hamilton theorem – Use of this theorem to find the inverse of a matrix - Unitary and Orthogonal matrix. (No proof is needed for properties and theorem).

UNIT II **(21 hrs)**

Calculus : Curvature and radius of Curvature in Cartesian and polar form – Evaluation of double and triple integral – Change of variables in double and triple integral – Beta and Gamma function – Relations – Problems.

24UMA1A1

UNIT III **(21 hrs)**

Numerical methods : Solutions of algebraic and transcendental equations by bisection method, iteration method and Newton – Raphson method – **Solution of simultaneous linear algebraic equations by Gauss elimination method***, Gauss Jordan method, Gauss Jacobi method, Gauss Seidal method.

UNIT IV **(21 hrs)**

Trigonometry : Applications of De Moivre's theorem – cos nθ, sin nθ, tan nθ - Expansions of cos nθ, sin nθ - Expressions of cos nθ, sin nθ and tan nθ in powers of θ - Simple limit problems like $\theta \to 0$ and $\theta \to \pi/2$ – Hyperbolic functions – Relations between circular and hyperbolic functions – Inverse hyperbolic functions – Real and imaginary parts of sin $(\alpha+i\beta)$, cos$(\alpha+i\beta)$, tan$(\alpha+i\beta)$, $\tan^{-1}(\alpha+i\beta)$.

UNIT V **(21 hrs)**

Laplace Transforms : Definition – Laplace Transform of t^n, e^{at}, sin at, cos at, sinh at, cosh at, n, a positive integer - $e^{at}f(t)$, $t^nf(t)$, f ' (t), f ''(t) – Inverse Laplace Transform of standard functions – Solving differential equations of Second order with constant coefficients using Laplace Transform.

*** Self Study(Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S. Narayanan and T. K. Manickavasagam Pillai, Algebra Vol. II S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit I)
2. S.Narayanan and T.K. Manickavasagam Pillai, Calculus Vol. I, Vol. II, S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1999. (For Unit II)
3. M.K.Venkataraman , Numerical methods in Science and Engineering , NPC, Chennai , 1999. (For Unit III)
4. S. Narayanan and T. K. Manickavasagam Pillai, Trigonometry S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit IV)
5. S. Narayanan and T. K. Manickavasagam Pillai, Calculus Vol. III S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit V)

References

1. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd., 2003.
2. Dr.J.K.Goyal and G.P.Gupta, Laplace and Fourier Transforms, 16th Edition, Pragati Prakashan, Meerut, 2003.
3. Dr.S.Arumugam, A.Thangapandi Isaac and A.Somasundaram, Numerical Methods, 2nd reprint, Scitech Publication India Pvt, Ltd., 2004.
4. P.Kandsamy, K.Thilagavathi and K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, New Delhi,2003

Mapping

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

S- Strong; H-High; M-Medium; L-Low

24UMA2A2

Programme Code:03		B.Sc Physics		
Title of the paper		Allied Paper 2 - Mathematics II		
Batch 2024-2027	**Hrs/Week** 7	**Total Hours** 105	**Credits** 5	**Skill development**

Course Objectives

1. To provide the basic knowledge of Probability.
2. To get the ability to solve Partial differential equations.
3. To Understand basic knowledge in Vector Calculus.

Course Outcomes (CO)

K1 to K5	CO1	Defining the multiple integrals using Green's Theorem.
	CO2	Illustrating the Fourier Coefficient for periodic Functions.
	CO3	Solving Partial Differential Equation by using the Lagrange's Method.
	CO4	Examining the concept of probability.
	CO5	Evaluating the General solution of Bessel's equations

SYLLABUS

UNIT I **(21 hrs)**

Formation of Partial differential equations – **Elimination of arbitrary constants*** – elimination of arbitrary functions – solutions of partial differential equations by direct integration – Methods to solve the first order partial differential equations – $F(p,q) = 0$, $z=px+qy+f(p,q)$, $F(z,p,q)=0$, $F(x,p,q)=0$, $F(y,p,q)=0$ – Separable equations – equations reducible to standard forms – Lagrange's linear equations – Charpit's method.

UNIT II **(21 hrs)**

Vector Calculus – Gradient, Divergence and curl (problems only). Integration of vectors: Integration of vector functions, Line integrals – Surface integrals – Green's theorem in the plane (statement only) – Gauss Divergence theorem (statement only) – Problems – Stoke's theorem (statement only) – Problems.

UNIT III **(21 hrs)**

Fourier series – Periodic function – Fourier series – **Dirichlet's conditions*** – even and odd functions – Half-range sine series – Half-range cosine series.

UNIT IV **(21 hrs)**

Probability : Introduction – Random experiment – Addition law – Multiplication law – Bayes theorem (problems only)

UNIT V **(21 hrs)**

Bessel's equations : Bessel's equations – Solutions of Bessel's general differential equations (derivations not included) – General solution of Bessel's equations - Recurrence formulae (derivations not included) – Simple problems using Recurrence relation.

*** Self Study(Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. P. Kandasamy and K. Thilagavathy, Mathematics for B. Sc., Br. -I, Volume-III, S. Chand & Company Ltd, First edition, 2004. (For Unit-I, IV)
2. S. Sankarappan and G. Arulmozhi, Vijay Nicole Imprints Private Limited, 2006. (For Unit-II, III)
3. J. N. Sharma and R. K. Gupta, Special Functions, Krishna Prakashan Mandir, Fifteenth edition, 1992.(For Unit- V).

Reference Books

1. Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi, 2004.
2. B.M.Aggarwal, Integral Calculus, 1st Edition, Satya Prakashan Publishers, New Delhi, 1992.
3. P.N.Chatterji, Vector Calculus, 1st Edition, Rajhans Prakahan Publishers, Chennai, 1998.

Mapping

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

S- Strong; H-High; M-Medium; L-Low

24UMA1AA

Programme Code:04		B.Sc Chemistry		
Title of the paper		Allied Paper 1 - Mathematics I		
Batch 2024-2027	**Hrs/Week** **7**	**Total Hours** 105	**Credits** 5	**Skill development**

Course Objectives

1. To provide the basic knowledge of Trigonometry.
2. To get the ability of solving first and second order ordinary differential equations and first order partial differential equations
3. To know about finite differences and its uses to interpolate the values for equal and unequal intervals.

Course Outcomes (CO)

K1 to K5	CO1	Defining hyperbolic and inverse hyperbolic functions.
	CO2	Understanding the concept of first order higher degree ordinary differential equations.
	CO3	Applying finite difference methods for interpolation.
	CO4	Analyzing the Laplace and inverse Laplace transforms to solve the Ordinary differential equations.
	CO5	Evaluating the characteristic roots and characteristic vectors of a matrix.

SYLLABUS

UNIT I **(21hrs)**

Second order linear differential equations with constant coefficients- $f(x)=e^{mx}$, sin mx, cosmx , x, x^2- First order higher degree differential equations- Solvable for x, y, p- Clairaut's form

UNIT II **(21hrs)**

Numerical methods – Solution of algebraic equations by Newton- Raphson method – Solution of simultaneous linear algebraic equations by Gauss elimination method, Gauss Jacobi and Gauss Seidel method of iteration

UNIT III **(21hrs)**

Matrices: Introduction, Product of matrices, **Transpose of a matrix***, matrix inverse- Characteristic roots and Characteristic vectors - Cayley - Hamilton theorem (without proof) – Verification.

24UMA1AA

UNIT IV **(21hrs)**

Trigonometry: **Expansions of cos nθ , sin nθ*** - Expressions of sin θ, cos θ and tan θ in powers of θ - Hyperbolic functions – Relations between circular and hyperbolic functions- Inverse hyperbolic functions – Real and imaginary parts of sin $(\alpha+i\beta)$, cos $(\alpha+i\beta)$, tan $(\alpha+i\beta)$

UNIT V **(21hrs)**

Laplace Transforms: Definition – Laplace Transform of e^{at}, cos at, sin at, cosh at, sinh at, t^n, n, a positive integer – e^{at} f (t) , $t^n f(t)$, f ′(t), f ″(t) – Inverse Laplace Transform of standard functions – Solving differential equations of Second order with constant coefficients using Laplace Transform.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S. Narayanan and T. K. Manickavasagam Pillai, Calculus Vol. III S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit I, V)
2. M.K.Venkataraman , Numerical methods in Science and Engineering , NPC, Chennai, 1999.(For Unit II)
3. S. Narayanan and T. K. Manickavasagam Pillai, Algebra Vol. II S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit III)
4. S. Narayanan and T. K. Manickavasagam Pillai, Trigonometry, S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit IV)

References

1. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd., 2003.
2. Dr.J.K.Goyal and G.P.Gupta, Laplace and Fourier Transforms, 16th Edition, Pragati Prakashan, Meerut, 2003.
3. Dr.S.Arumugam, A.Thangapandi Isaac and A.Somasundaram, Numerical Methods, 2nd reprint, Scitech Publication India Pvt, Ltd., 2004.
4. P.Kandsamy, K.Thilagavathi and K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, New Delhi,2003.

MAPPING

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

S- Strong; H-High; M-Medium; L-Low

24UMA2AB

Programme Code: 04		B.Sc Chemistry		
Title of the paper		Allied Paper 2 - Mathematics II		
Batch	**Hrs/Week**	**Total Hours**	**Credits**	**Skill**
2024-2027	**7**	105	5	**development**

Course Objectives

1. To give basic knowledge about Mathematical concepts in Calculus.
2. To understand the concepts of Evaluating Double and Triple integrals.
3. To get the ability of solving Partial differential equations .

Course Outcomes (CO)

K1 to K5	CO1	Remembering the formulas in Differentiation and Integration.
	CO2	Illustrating the Fourier Coefficient for periodic Functions.
	CO3	Solving Partial Differential Equation by using the Lagrange's Method.
	CO4	Analyzing the differential operator to find Gradient, Divergence and Curl
	CO5	Evaluating the Fourier series with different intervals.

SYLLABUS

UNIT I **(21hrs)**

Calculus - Differentiation: Derivatives of standard functions (Algebraic*, Trigonometric, Logarithmic, Exponential) .Curvature and radius of Curvature in Cartesianform.

UNIT II **(21hrs)**

Evaluation of double and triple integral using Jacobian only- Beta and Gamma function– Relations, properties and simple problems.

UNIT III **(21hrs)**

Vector calculus – Gradient of a scalar point function – Divergence and curl of a vector point function.

UNIT IV **(21hrs)**

Partial differential equation :Formation of Partial differential equations by eliminating arbitrary constants and arbitrary functions* – Solutions of standard types of first order equations – f (p, q) = 0, f(x, p, q)=0, f(y, p, q)=0, f(z, p, q)=0, $f_1(x, p) = f_2(y, q)$, z = px+qy+f (p, q) , Clairaut's form– Lagrange method of solving linear partial differential equations P p + Q q = R. (problems only)

UNIT V **(21hrs)**

Fourier series – Definition – Finding Fourier coefficients for a given periodic function with period 2π -Odd and Even functions – Half range series.

*** denotes self study(Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. S.Narayanan and T.K. Manickavasagam Pillai, Calculus Vol. I, Vol. II, S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 2003 (For Unit I, II)
2. P.Duraipandian and Lakshmi Duraipandian, Vector Analysis, Emerald publishers, Chennai –2, 1998. (For Unit III)
3. S.Narayanan and T.K. Manickavasagam Pillai, Calculus Vol. III, S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 2010. (For Units IV &V)

Reference Books

1. Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi, 2004.
2. B.M.Aggarwal, Integral Calculus, 1st Edition, Satya Prakashan Publishers, New Delhi, 1992.
3. P.N.Chatterji, Vector Calculus, 1st Edition, Rajhans Prakahan Publishers, Chennai, 1998.

MAPPING

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

S- Strong; H-High; M-Medium; L-Low

24UCS1A1/24USC1A1

Programme Code : 09		B.Sc Computer Science		
Title of the paper		Allied 1 - DISCRETE MATHEMATICS AND STATISTICS		
Batch 2024-2027	**Hours / Week** 6	**Total Hours** 90	**Credits** 5	**Employability**

Course Objectives

1. To understand the concepts of discrete structures, formal languages.
2. To use finite state machines to model computer operations.
3. To solve real time problems using various statistical techniques.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the fundamental ideas and notation of discrete mathematics with examples.
	CO2	Understanding the concept of measures of central tendency, measures of dispersion, Correlation, regression, probability distributions, hypothesis testing.
	CO3	Applying problem solving techniques to solve real world problems.
	CO4	Analyzing the experimental and observational data and draw appropriate conclusions.
	CO5	Interpreting the coefficient of correlation and regression.

Syllabus

UNIT I **(18 Hours)**

MATHEMATICAL LOGIC: Connective, well-formed formula, tautology equivalence of formulas, tautological implications, **duality law***, normal forms, predicates, variables, quantifiers, Free and bound variables. Theory of inference for statement calculus and predicate calculus.

UNIT II **(18 Hours)**

FORMAL LANGUAGES AND AUTOMATA: Grammars, phrase-structure grammar, context-sensitive grammar , context-free grammar, regular grammar. Finite State automata: Deterministic Finite-State automata, non-deterministic finite-state automata-conversion of non-deterministic finite state automata to deterministic finite state automata.

UNIT III **(18 Hours)**

Measures of Central Tendency: Mean, median, mode, geometric mean and harmonic mean. Measures of dispersion: **Range***, Quartile deviation, Standard deviation and co-efficient of variance. Skewness: Meaning- Bowley's and Pearson's coefficient of skewness.

UNIT IV **(18 Hours)**

Correlation: Meaning and Definition – Types - Scatter diagram – Pearson's Correlation – co-efficient of correlation – Rank Correlation. Regression: Regression equation of two variables. Probability – Binomial – Poisson and normal distribution (simple problems).

UNIT V **(18 Hours)**

Concept of sampling – Test of Mean for large samples - t - test: specified mean – difference between two sample means. F test of significance for small sample. Chi-Square test for goodness of fit and Independent test for attributes.

Note:Derivations not Included.

*** denotes Self study (Questions for examinations may be taken from the self study portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books :

1. V. Sunderesan, K.S.Ganapathy Subramanian and K.Ganesan, Discrete Mathematics, A.R Publications, 2000. (UNIT I,II)

2. S.P. Gupta, Statistical Methods, S. Chand and Company Ltd., 46th edition, 2021, (UNIT III, IV, V).

Reference Books :

1. J.P. Trembley and R.P. Manohar, Discrete Mathematical structures with applications to computer science**,** Tata MCGraw Hill, 1997.
2. J.K.Sharma, Discrete Mathematics, Macmillan Publishers India Limited, 2nd Edition, 2009
3. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014.
4. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.
5. P.R.Vittal, Mathematical Statistics, Margham Publications, Chennai, 2004.

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24UCS1A1

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 70

24UCT1A1

Programme Code: 11		B.Sc Computer Technology		
Title of the paper		Allied 1-Discrete Mathematics and Statistics		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To understand the concepts and principles of mathematical logic, formal languages
2. To classify Measures of central tendency and dispersion
3. To know the purpose of correlation and regression

Course Outcomes (CO)

K1 to K5	CO1	Remembering about the fundamental ideas and notation of discrete mathematics with examples
	CO2	Understanding the concepts of measures of central tendency and dispersion
	CO3	Applying Logic and Boolean algebra concepts in circuit construction
	CO4	Analyzing grammar in shortest path construction
	CO5	Evaluating the regression coefficient among the variables.

Syllabus

UNIT I **(18 Hours)**

Mathematical Logic: Connectives, Well-formed formula, Tautology, Equivalence formulae, Tautological implications, Duality law, Normal forms.

UNIT II **(18 Hours)**

Formal Languages and Automata - Grammars: Phrase-structure grammar, context-sensitive grammar, context-free grammar and regular grammar. Finite state Automata: Deterministic finite state automata- Non deterministic finite state automata - Conversion of non deterministic finite state automata to deterministic finite state automata.

UNIT III **(18 Hours)**

Lattices and Boolean algebra: Partial ordering set- Poset- Lattices, distributive lattices. Boolean algebra: Minimization of Boolean function using K-map.

UNIT IV **(18 Hours)**

Measures of central tendency: Mean, Median, Mode, Geometric mean and Harmonic mean. Measures of Dispersion: Range, Quartile deviation, Standard deviation and coefficient of variation.

UNIT V **(18 Hours)**

Correlation and Regression - Correlation: Meaning and definition - Types- Scatter diagram- Karl Pearson coefficient of correlation- Rank correlation. Regression: Meaning and definition- Regression equation of two variables - **Difference between correlation and Regression***.

*** denotes Self study(Questions may be taken from these portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books:

1. M. K. Venkataraman, N. Sridharan, N. Chandrasekaran, Discrete Mathematics, National Publishing Company, Chennai, 2011.
2. S.P.Gupta, Statistical Methods, Sultan Chand and Sons, 46th Edition, 2021.

Reference Books:

1.J.P. Trembley and R.P. Manohar, Discrete Mathematical structures with applications to computer science". Tata MCGraw Hill-1997.
2.J.K. Sharma, Mathematical Statistics, Margham Publications, Chennai, 2004.
3.R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014.
4. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.
5.P.R. Vittal, Mathematical Statistics, Margham Publications, Chennai, 2004.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UCA2A2

Programme Code: 10		BCA		
Title of the paper		COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To demonstrate the mathematical concepts underlying the numerical methods considered.
2. To understand the concepts in statistical techniques.
3. To motivate students an intrinsic interest in statistical thinking.

Course Outcomes (CO)

K1 to K5	CO1	Finding the unknown values in simultaneous linear equations using some methods in Numerical Techniques.
	CO2	Extending the idea of finding the integration of simple functions using Numerical Techniques.
	CO3	Choosing the concept of measures of central tendency and dispersion.
	CO4	Analyzing the concept of sampling and some of the Statistical Tests.
	CO5	Evaluating the statistical data by the concept of sampling techniques.

Syllabus

UNIT I **(18 Hours)**

Numerical Methods: Solution Of Simultaneous Linear Algebraic Equation – Gauss Elimination, Gauss Jordan, Gauss Jacobi, Gauss Seidal and Inverse Of a Matrix By Gauss Elimination Method.

UNIT II **(18 Hours)**

Interpolation: Newton's forward - Newton's backward- Lagrange's Interpolation method. Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule and Romberg's integration.

UNIT III **(18 Hours)**

Measures of Central Tendency: Mean, Median, Mode, **Geometric Meanand Harmonic Mean*.** Measures of Dispersion: Range, Quartile Deviation, Standard-deviation, Variance, Coefficient of variation.

UNIT IV **(18 Hours)**

Skewness: Karl Pearson's and Bowley's coefficient of Skewness. Correlation – Karl Pearson's coefficient of correlation – Rank correlation. Regression: Regression equation of two variables.

24UCA2A2

UNIT V **(18 Hours)**

Concept of sampling – Test of Mean for large samples - t- test: specified mean – difference between two sample means. F test of significance for small sample. Chi-Square test for goodness of fit and Independent test for attributes.

*** denotes Self Study (Questions for examinations may be taken from Self Study Portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books:

1.M.K.Venkataraman, Numerical methods for Science and Engineering, The National Publishers & Co, 5th Edition, 2007. (Units I , II)

2.S.P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021.(Units III, IV & V)

Reference Books:

1.P. Kandasamy , K. Thilagavathi, K. Gunavathi, Numerical Methods, S.Chand & company Ltd., New Delhi Revised Edition 2005.

2.R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014.

3.S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.

4.P.R. Vittal, Mathematical Statistics, Margham Publications, Chennai, 2004.

Mapping

PO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	H	M	H
CO2	S	M	S	S	M
CO3	H	M	M	H	S
CO4	S	H	H	S	M
CO5	S	M	S	H	S

S-Strong; **H**-High; **M**-Medium; **L**-Low

UMA 74

24UBT3A3

Programme Code : 08		**B.Sc Biotechnology**		
Title of the paper		Fundamentals of Mathematics		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	5	75	4	

Course Objectives

1. To understand the fundamental knowledge on mathematics in biology.
2. To provide the necessary basic concepts of numerical methods and the problem solving techniques in scientific problems using Numerical methods.
3. To expose that the differential and integral equations are powerful tools in solving problems in biology and medicine.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts in mathematics.
	CO2	Demonstrating various numerical algorithms for solving simultaneous linear algebraic equations.
	CO3	Applying the concepts of Differentiation and Integration in the field of Bio-technology.
	CO4	Analyzing the solutions of differential and integral equations by various numerical techniques.
	CO5	Evaluating numerical solutions for differentiation and integration using Numerical methods

Syllabus

UNIT I **(15 Hours)**

Matrices-Types of matrices - ***Addition – Subtraction -** Multiplication – Determinant – Inverse of a matrix- Eigen values and Eigen vectors – Solution of simultaneous linear equation using Inverse matrix method and Cramer's rule.

UNIT II **(15 Hours)**

Differentiation of algebraic, exponential and logarithmic functions - Physical interpretation of derivatives with references to velocity and acceleration- Applications of differentiation to maxima and minima (Simple problems).

UNIT III **(15 Hours)**

Integration of simple algebraic, exponential and logarithmic functions –Method of partial fractions – Integration by parts.

UNIT IV **(15 Hours)**

The Solution of Simultaneous Linear Algebraic Equation: Gauss Elimination method – Gauss-Jordan method – Gauss-Seidal method – Gauss - Jacobi method. Interpolation: Newton forward interpolation – Newton backward interpolation – Lagrange's method.

UNIT V **(15 Hours)**

Numerical Differentiation: Newton's forward difference to find derivative – Newton's backward difference to find derivative. Numerical Integration: Trapezoidal rule – Simpson's $1/3^{rd}$ rule – Simpson's $3/8^{th}$ rule.

*** denotes Self Study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books:

1. A.R. Vasistha , Matrices, Emerald Publications, 2002.
2. S.Narayanan and T.K.M. Pillai, Calculus Vol I and II, S. Viswanathan Printers and Publications Pvt Ltd., 2010. (For Units II and III)
3. Dr. M. K. Venkataraman, Numerical Methods in Science and Engineering, The National Publishers Co., 5^{th} Edition, 2009 (For Units IV and V)

Reference Books:

1. P.Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.
2. A.R.Vasishtha and S.K.Sharma, Integral Calculus , Krishna Prakashan Mandir, Meerut,1990.
3. Shanthi Narayan, Differential Calculus, Shyam Lal Charitable Trust, New Delhi, 1993.
4. P. Kandasamy, K. Thilagavathi, K. Gunavathi, Numerical Methods, S.Chand &company Ltd., New Delhi, Revised Edition 2005, (Unit IV & V).

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 76

24UIT1A1

Programme Code: 12		Information Technology		
Title of the paper		Allied 1-Mathematical Foundation for Computer Science		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1.To understand the concepts and principles of mathematical logic

2.To classify Measures of central tendency and dispersion

3.To know the purpose of correlation and regression

Course Outcomes (CO)

K1 to K5	CO1	Remembering about the fundamental ideas and notation of discrete mathematics with examples
	CO2	Understanding the concepts of measures of central tendency and dispersion
	CO3	Applying Logic and Boolean algebra concepts in circuit construction
	CO4	Analyzing the results through the program outputs
	CO5	Evaluating the regression coefficient among the variables.

Syllabus

UNIT I **(18 Hours)**

Relations – Binary Relations – Set operation on relations-Types of Relations – Partial order relation – Equivalence relation – Composition of relations – Functions – Types of functions – Invertible functions – Composition of functions.

UNIT II **(18 Hours)**

Mathematical Logic: Connective, well-formed formula, tautology equivalence of formulas, tautological implications,duality law, normal forms, predicates, variables, quantifiers, free and bound variables. Theory of inference for statement calculus and predicate calculus.

UNIT III **(18 Hours)**

The Solution of Numerical Algebraic & Transcendental Equations: Bisection method – Newton-Raphson method - The method of false position.

The Solution of Simultaneous Linear Algebraic Equation: Gauss Elimination method –Gauss-Jordon method – Gauss-Seidal method – Gauss-Jacobi method.

UNIT IV **(18 Hours)**

Interpolation: Newton forward interpolation – Newton backward interpolation – Lagrange's method. Numerical solution of ordinary differential equations: Taylor method –Euler method – Runge- Kutta method.

UNIT V **(18 Hours)**

Measures of central tendency: Mean, Median, Mode. Measures of Dispersion: ***Range** – Quartile deviation- standard deviation-coefficient of variation.Correlation: Meaning and definition - Karl Pearson coefficient of correlation- Rank correlation. Regression: Meaning and definition-Regression equation of two variables - Difference between correlation and Regression.

*** denotes Self study(Questions may be taken from these portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books:

1. J.K.Sharma, Discrete Mathematics**,** Macmillan India Ltd, 2005. (UNIT I, II)
2. P. Kandasamy, K. Thilagavathi, K. Gunavathi, Numerical Methods, S.Chand & company Ltd., New Delhi, Revised Edition 2005 (UNIT III, IV)
3. R. S. N. Pillai, V. Bagavathi, Statistics**,** Sultan Chand and Sons& Company Ltd., New Delhi. Reprint 2014. (UNIT V).

Reference Books:

1. J. P Tremblay R Manohar, Discrete Mathematics Structures With Applications To Computer Science, Mc Graw Hill International, 2010.
2. V.Sunderasan, K.S.Ganapathi Subramaniam and K.Ganesan, Discrete Mathematics, A.R. Publication, 2000.
3. V. Rajaraman, Computer Oriented Numerical Methods, PHI Pub, 2008.
4. S C Gupta, V. K. Kapoor, Fundamental Of Mathematical Statistics**,** Sultan Chand and Sons,2010.

MAPPING

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

S-Strong; **H**-High; **M**-Medium; **L**-Low

24UBA1A1

Programme Code : 17		BBA CA		
Title of the paper		MATHEMATICS FOR MANAGEMENT – I		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To Understand the concepts of Matrices, concepts related with banking and concepts of various statistical tools.
2. To study the concepts of statistics, Measures of dispersion and Analysis of time series. Also understand the applications of these concepts in real world problems.
3. To use mathematical knowledge to analyze and solve problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic concepts of mathematics in business analysis
	CO2	Understanding the problem-solving methods
	CO3	Applying basic mathematical calculations in business problems
	CO4	Analyzing mathematical techniques and applications
	CO5	Evaluating correlation and regression coefficient among the variables

Syllabus

UNIT I **(18 Hours)**

Arithmetic and Geometric Series - Simple and Compound Interest - Present value - Discounting of Bills - True Discount - Banker's Gain.

UNIT II **(18 Hours)**

Matrix: Basic Concept - Addition & Multiplication of Matrices - Determinant of a Matrix- Inverse of a Matrix - Solution of Simultaneous Linear Equation using inverse matrix and elementary transformation of a matrix.

UNIT III **(18 Hours)**

Meaning and Scope of statistics - Sources of data - Collection of data - Primary and secondary data - Method of Primary and Secondary data collection - Classification and Tabulation - Presentation of data by diagram - Bar diagram and Pie diagram - Graphical Representation – Frequency distribution.

UNIT IV **(18 Hours)**

Measures of central tendency - Arithmetic mean, Median, Mode, Geometric and Harmonic mean. Measures of dispersion - **range*** - quartile and standard deviations - coefficient of variation.

UNIT V **(18 Hours)**

Skewness: Meaning- Bowley's and Pearson's Co-efficient of Skewness – Correlation - meaning and definition - scatter diagram - Pearson's correlation co-efficient - Rank correlation – Regression :Meaning of regression - regression in two variables.

*** denotes Self Study (Questions for examinations may be taken from the self study portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A.Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014.
2. S.P. Gupta, Statistical Methods, Sultan Chand and Company Pvt Ltd., New Delhi, 46th Edition, 2021.
3. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi-2, 2011.
4. P.R.Vittal, Business Mathematics and Statistics, Margham publications, Chennai, 6th Edition, 2006.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UCM3A3

Programme Code : 13		B.Com		
Title of the Paper		BUSINESS MATHEMATICS		
Batch	**Hours / Week**	**Total Hours**	Credits	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To give basic knowledge about Mathematical concepts
2. To solve the modern business problems using various mathematical techniques.
3. To solve the various real life business problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the application of mathematics in business analysis
	CO2	Understanding the concepts of mathematics in finance
	CO3	Applying basic mathematical calculations in business problems
	CO4	Analyzing the business conditions using Effective rate of Interest.
	CO5	Evaluating the solution for business problems using Graphical and Simplex method

Syllabus

UNIT I **(18 Hours)**

Set Theory– Arithmetic and Geometric series – Simple and Compound Interest – Effective rate of Interest – Sinking Fund – Annuities – Discounting of Bills.

UNIT II **(18 Hours)**

Matrix: Basic Concepts – ***Addition of matrices** and Multiplication of matrices – Inverse of a matrix – Rank of a matrix – Solution of Simultaneous Linear equations(Cramer's rule and Inverse Matrix method) – Input – Output Analysis.

UNIT III **(18 Hours)**

Variables, Constants and Functions– Limits of Algebraic functions – Differentiation of functions (algebraic, exponential and logarithmic) – Meaning of derivatives – Evaluation of First and Second order derivatives – Application to Business Problems: Marginal concepts- Elasticity-Increasing and decreasing functions-Maxima and Minima.

UNIT IV **(18 Hours)**

Elementary Integral Calculus – Determining indefinite and definite integrals of algebraic, exponential and logarithmic functions –Method of Partial fractions- Integration by parts-Uses in Economics.

24UCM3A3

UNIT V **(18 Hours)**

Linear Programming Problems – Formulation of LPP – Solving LPP by Graphical method –Standard and Canonical form of LPP- Solving LPP by Simplex method(Less than or equal to constraints only).

*** denotes Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

Navaneetham P. A. **"Business Mathematics & Statistics",** Jai Publisher, 2015.

Reference Books:

1. Dr. P R Vittal **"Business Mathematics & Statistics"** ,Margham Publications, Chennai,6th edition,2006.
2. A.V. Dharmapadam **"Business Mathematics"** ,S.Viswanathan publishing company, 1st Edition, 1979.
3. Sundaresan and Jayaseelan**, "Introduction to Business Mathematics**", Sultan Chand Co& Ltd,New Delhi,2010.
4. Sanchetti, D.C and V.K. Kapoor, V.K**, "Business Mathematics**", Sultan Chand Co& Ltd, New Delhi, 2014.
5. G.K.Ranganath, C.S.Sampamgiram and Y.Rajaram –"**Business Mathematics**"- Himalaya Publishing House, New Delhi, 2015.

MAPPING

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

S-Strong; H-High; M-Medium;L-Low.

24UPA1A1

Programme Code : 15		B.Com PA		
Title of the Paper		MATHEMATICS FOR BUSINESS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. On successful completion of this course, the student should have understood the basic concepts.
2. To use Mathematical Techniques to solve the modern business problems.
3. To enable the students to apply basic mathematical knowledge to solve the real life business problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic concepts of mathematics in business analysis
	CO2	Understanding the concepts of mathematics in finance
	CO3	Applying basic mathematical calculations in business problems
	CO4	Analyzing the business conditions using Differentiation and Integration
	CO5	Evaluating the solution for business problems using Graphical and Simplex Method.

Syllabus

UNIT I **(18 hours)**

Set Theory* – Arithmetic and Geometric Series – Simple and Compound Interest – Effective rate of Interest –Sinking Fund – Annuity - Present Value – Discounting of Bills – True Discount – Banker's Gain.

UNIT II **(18 hours)**

Matrix: Basic Concepts – Addition and Multiplication of Matrices – Inverse of a Matrix – Rank of Matrix– Solution of Simultaneous Linear Equations – Input-Output Analysis.

UNIT III **(18 hours)**

Variables, Constants and Functions – Limits of Algebraic Functions – Simple Differentiation of Algebraic Functions – Meaning of Derivations – Evaluation of First and Second Order Derivatives –Maxima and Minima – Application to Business Problems.

UNIT IV **(18 hours)**

Elementary Integral Calculus – Determining Indefinite and Definite Integrals of simple Functions –Integration by Parts.

UNIT V **(18 hours)**

Linear Programming Problem – Formation – Solution by Graphical Method – Solution by Simplex Method.

*** denotes Self Study(Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A.Navaneetham, Business Mathematics & Statistics, Jai Publisher, 2015.

Reference Books:

1. Dr. P R Vittal, Business Mathematics & Statistics, Margham Publications, Chennai, 6th edition,2006.
2. A.V. Dharmapadam, Business Mathematics, S.Viswanathan publishing company, 1st Edition, 1979.
3. Sundaresan and Jayaseelan, Introduction to Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2010.
4. D.C.Sanchetti and V.K. Kapoor, Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2014.
5. G.K.Ranganath, C.S.Sampamgiram and Y.Rajaram, Business Mathematics, Himalaya Publishing House, New Delhi, 2015.

MAPPING

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

S-Strong; H-High;M-Medium;L-Low.

24UCC1A1

Programme Code :14		B.Com CA		
Title of the Paper		BUSINESS MATHEMATICS		
Batch 2024-2027	**Hours / Week** 6	**Total Hours** 90	**Credits** 5	**Employability**

Course Objectives

1. To give basic knowledge about Mathematical concepts
2. To solve the modern business problems using various mathematical techniques
3. To enable the students to apply basic mathematical knowledge to solve the real life business problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic concepts of mathematics in business analysis
	CO2	Understanding the concepts of mathematics in finance
	CO3	Applying basic mathematical calculations in business problems
	CO4	Analyzing the business conditions using Differentiation and Integration
	CO5	Evaluating Linear programming problem by using graphical and tabulation method.

Syllabus

UNIT I **(18 Hours)**

Set Theory– Arithmetic and Geometric series – Simple and Compound Interest – Effective rate of Interest – Sinking Fund – Annuities – Discounting of Bills.

UNIT II **(18 Hours)**

Matrix: Basic Concepts – ***Addition of matrices** and Multiplication of matrices – Inverse of a matrix – Rank of a matrix – Solution of Simultaneous Linear equations (Cramer's rule and Inverse Matrix method) – Input – Output Analysis.

UNIT III **(18 Hours)**

Variables, Constants and Functions - Limits of Algebraic functions - Differentiation of functions (algebraic, exponential and logarithmic) - Meaning of Derivatives - Evaluation of First and

24UCC1A1

Second order derivatives - Applications to business problems: Marginal Concepts-Elasticity-Increasing and decreasing functions-Maxima and minima.

UNIT IV **(18 Hours)**

Elementary Integral Calculus - Determining indefinite and definite integrals of algebraic, exponential and logarithmic functions -Method of partial fractions- Integration by parts-Uses in Economics.

UNIT V **(18 Hours)**

Linear Programming Problems – Formulation of LPP – Solving LPP by Graphical method –Standard and Canonical form of LPP- Solving LPP by Simplex method(less than or equal to constraints only)

*** denotes Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. Dr. P.R. Vittal, Business Mathematics and Statistics, Margham Publications, 6th edition, 2006.
2. A.V.Dharmapadam, Business Mathematics, S.Viswanathan Publications, 1st edition, 1979.
3. D.C.Sanchetti and V.K. Kapoor, Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2014.
4. G.K.Ranganath, C.S.Sampamgiram and Y.Rajaram, Business Mathematics, Himalaya Publishing House, New Delhi, 2015.

MAPPING

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

S-Strong**; H-**High; **M-**Medium; **L-**Low**.**

24UCB1A1

Programme Code : 19		B.Com (Banking & Insurance)		
Title of the paper		BUSINESS MATHEMATICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. On successful completion of this course, the student should have understood the basic concepts.
2. To use Mathematical Techniques to solve the modern business problems.
3. To enable the students to apply basic mathematical knowledge to solve the real life business problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic concepts of mathematics in business analysis
	CO2	Understanding the concepts of mathematics in finance
	CO3	Applying basic mathematical calculations in business problems
	CO4	Analyzing the business conditions using Linear Programming problems.
	CO5	Evaluating the solution for business problems using Graphical and Simplex method

Syllabus

UNIT I **(18 hours)**

Simple and Compound Interest –Effective rate of Interest-Annuities-Sinking Fund-Discounting of bills.

UNIT II **(18 hours)**

Matrix: Basic concepts -***Addition of matrices and Multiplication of matrices** –Inverse of a matrix -Rank of a matrix -Solution of Simultaneous linear equations(Cramer's rule and Inverse Matrix method) -Input-Output Analysis.

UNIT III **(18 hours)**

Variables, Constants and Functions -Limits of Algebraic functions -Differentiation of functions (algebraic, exponential and logarithmic) -Meaning of Derivatives -Evaluation of First and Second order derivatives -Applications to business problems: Marginal Concepts-Elasticity-Increasing and decreasing functions-Maxima and minima.

24UCB1A1

UNIT IV **(18 hours)**

Elementary Integral Calculus -Determining indefinite and definite integrals of algebraic, exponential and logarithmicfunctions -Method of partial fractions-Integration by parts-Uses in Economics.

UNIT V **(18 hours)**

Linear Programming Problems –Formulation of LPP –Solving LPP by Graphical method – Standard and Canonical form of LPP-Solving LPP by Simplex method(less than or equal to constraints only)

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. Dr. P.R. Vittal, Business Mathematics and Statistics, Margham Publications, 6th edition, 2006.
2. A.V.Dharmapadam, Business Mathematics, S.Viswanathan Publications, 1st edition, 1979.
3. Sundaresan and Jayaseelan**,** Introduction to Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2010.
4. D.C.Sanchetti and V.K. Kapoor, Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2014.
5. G.K.Ranganath, C.S.Sampamgiram and Y.Rajaram, Business Mathematics, Himalaya Publishing House, New Delhi, 2015.

*** denotes Self Study(Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

MAPPING

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

S-Strong; H-High; M-Medium; L-Low.

24UPS3A3

Programme Code : 21		B.Sc Psychology		
Title of the paper		**ALLIED III: PSYCHOLOGICAL STATISTICS**		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	5	75	5	

Course Objectives

1. To give basic knowledge about statistical concepts.
2. To solve the social problems using various statistical techniques.
3. To provide knowledge and skills to select and conduct appropriate statistical tests for psychological research.

Course Outcomes (CO)

K1 to K5	CO1	Remembering appropriate Statistical techniques for summarizing and displaying social science data.
	CO2	Understanding the concepts of measures of central tendency and formulate percentile by arranging the data from smallest to largest.
	CO3	Applying the statistical tools to solve sociological problems.
	CO4	Analyzing and interpret the variance form ANOVA output.
	CO5	Evaluating the correlation among the variables.

Syllabus

UNITI **(15 Hours)**

Meaning and Definition of Statistics – *__Nature and Scope of Statistics__-Uses and Limitations of Statistics -Importance of Statistics in Psychology and Research - Collection of Data - Primary and Secondary Data - Classification and Tabulation of Data - Formation of Frequency Distribution.

UNIT II **(15 Hours)**

Diagrammatic and Graphical Representation of Statistical Data - Simple, Multiple, SubDivided, Percentage Bar Diagrams and Pie Diagram - Histogram, Frequency Polygon, Frequency Curve, Ogives - Measures of Central Tendency – Computations and Properties of Mean, Median ,Mode, Geometric Mean and Harmonic Mean .

UNIT III **(15 Hours)**

Measures of Dispersion – Range, Quartile Deviation, Mean Deviation (about Mean), Standard Deviation and Co-efficient of Variation – Concept of Skewness – Karl Pearson's and Bowley's Coefficient of Skewness – Simple Problems

UNIT IV **(15 Hours)**

Correlation – Types of Correlation-Scatter Diagram – Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation. Regression Equations – Properties of Regression Coefficients – Simple Problems.

24UPS3A3

UNIT V **(15 Hours)**

Concept of Sampling- Test of Mean for Large Samples-t-test: Specified Mean-Difference between two Samples Means. F-Test of Significance for small sample-Meaning, purpose and assumptions of Analysis of variance – One way ANOVA – Chi square test for goodness of fit and independent test for attributes.

*** denotes Self Study**
(Questions for Examination may be taken from the Self Study Portion also).

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

1. S.P.Gupta - Statistical Methods, Sultan Chand & Sons, New Delhi, 46 th revised Edition, 2021.
2. R.S.N. Pillai and V. Bagavathi - Statistics – Sultan Chand & Sons Company Ltd, New Delhi, Reprint 2014
3. J.P Verma and Mohammed Ghufran- Statistics for Psychology, Tata McGraw Hill Education (P) Ltd. New Delhi.

Reference Books:

1. Garrett, H.E. (2004). Statistics in Psychology and Education, 6th Edition, New Delhi: Paragon International Publishers.
2. Guilford, J.P., and Fruchter. (1987). Fundamental Statistics in Psychology and Education, 6th Edition, Singapore: McGraw Hill.
3. Mangal, S.K. (2004). Statistics in Psychology and Education, 2th Edition, New Delhi: Prentice Hall.
4. Girija, M., Sasikala, L.,andGirija. (2004). Introduction to Statistics, 1st Edition, New Delhi: Vrinda Publications.
5. Bhandarkar, K.M. (2006). Statistics in Education, 1st Edition, Hyderabad: Neelkamal.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 90

24UAF3A3

Programme Code : 20		B.Com (Accounting and Finance)		
Title of the paper		BUSINESS MATHEMATICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	5	

Course Objectives

1. To give basic knowledge about Mathematical concepts
2. To solve the modern business problems using various mathematical techniques.
3. To solve the various real life business problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the application of mathematics in business analysis
	CO2	Understanding the concepts of mathematics in finance
	CO3	Applying basic mathematical calculations in business problems
	CO4	Analyzing the business conditions using Effective rate of Interest.
	CO5	Evaluate the solution for business problems using Graphical and Simplex method

Syllabus

UNIT I **(18 Hours)**

Set Theory– Arithmetic and Geometric series – Simple and Compound Interest – Effective rate of Interest – Sinking Fund – Annuities – Discounting of Bills.

UNIT II **(18 Hours)**

Matrix: Basic Concepts – ***Addition of matrices** and Multiplication of matrices – Inverse of a matrix – Rank of a matrix – Solution of Simultaneous Linear equations(Cramer's rule and Inverse Matrix method) – Input – Output Analysis.

UNIT III **(18 Hours)**

Variables, Constants and Functions– Limits of Algebraic functions – Differentiation of functions (algebraic, exponential and logarithmic) – Meaning of derivatives – Evaluation of First and Second order derivatives – Application to Business Problems: Marginal concepts- Elasticity-Increasing and decreasing functions-Maxima and Minima.

UNIT IV **(18 Hours)**

Elementary Integral Calculus – Determining indefinite and definite integrals of algebraic, exponential and logarithmic functions –Method of Partial fractions- Integration by parts-Uses in Economics.

24UAF3A3

UNIT V **(18 Hours)**

Linear Programming Problems – Formulation of LPP – Solving LPP by Graphical method –Standard and Canonical form of LPP- Solving LPP by Simplex method(Less than or equal to constraints only).

*** denotes Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics & Statistics, Jai Publisher, 2015.

Reference Books:

1. Dr. P R Vittal, Business Mathematics & Statistics, Margham Publications, Chennai, 6th edition, 2006.
2. Dharmapadam, Business Mathematics, S.Viswanathan publishing company, 1st edition, 1979.
3. Sundaresan and Jayaseelan**,** Introduction to Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2010.
4. D.C.Sanchetti and V.K. Kapoor, Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2014.
5. G.K.Ranganath, C.S.Sampamgiram and Y.Rajaram, Business Mathematics, Himalaya Publishing House, New Delhi, 2015.

MAPPING

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

S-Strong; H-High; M-Medium; L-Low.

24UAI1A1

Programme Code : 24		B.Sc Artificial Intelligence and Machine Learning		
Title of the paper		**ALLIED 1:** Discrete Mathematics and Statistics		
Batch 2024-2027	**Hours / Week** 6	**Total Hours** 90	**Credits** 4	**Employability**

Course Objectives

1. To understand the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.
2. To understand the concepts and principles of mathematical logic, formal languages
3. To use finite state machines to model computer operations
4. To classify Measures of central tendency and dispersion
5. To know the purpose of correlation and regression

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts in mathematical logic and statistics.
	CO2	Analyze and construct mathematical arguments that relate to the study of discrete structures
	CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation
	CO4	Understanding the concepts of measures of central tendency and dispersion
	CO5	Analyze the correlation among the variables.

Syllabus

UNIT I **(18 Hours)**

Introduction-Propositional Calculus –Basic Logical Operators – Statement Generated by a set – Conditional Statement- Converse, incerse and Contra positive statements-Biconditional Statement-Tautologies-Contradiction- Contingency- Arugument-Methods of Proof-Direct Proof-Indirect proof

UNIT II **(18 Hours)**

Formal Languages and Automata - Grammars: Phrase-structure grammar, context-sensitive grammar, context-free grammar and regular grammar. Finite state Automata: Deterministic finite state automata- Non deterministic finite state automata - Conversion of non deterministic finite state automata to deterministic finite state automata

UNIT III **(18 Hours)**

Graph Theory – Basic terminology – paths, cycle & Connectivity – Sub graphs – Types of graphs – Representation of graphs in computer memory - Trees – Properties of trees – Binary trees – traversing Binary trees – Computer Representation of general trees.

UNIT IV **(18 Hours)**

Measures of central tendency: Mean, Median, Mode, Geometric mean and Harmonic mean. Measures of Dispersion: Range, Quartile deviation, Standard deviation and coefficient of variation.

UNIT V **(18 Hours)**

Correlation and Regression - Correlation: Meaning and definition - Types- Scatter diagram- Karl Pearson coefficient of correlation- Rank correlation. Regression: Meaning and definition- Regression equation of two variables - Difference between correlation and Regression.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

TEXT BOOK

1. J.K.Sharma, Discrete Mathematics**,** Lakshmi Publications Pvt. Ltd., 4th Edition 2015.
2. S.P.Gupta, Statistical Methods, Sultan Chand and Sons Pvt. Ltd., 46th Edition, 2021.

REFERENCE BOOKS

1. J.P. Tremblay and R. Manohar, Discrete and Combinatorial Mathematics, An Introduction, Addison Wesley, 2009
2. Kenneth H. Rosen, Discrete Mathematics and its applications, McGraw Hill, 2011.
3. Judith L.Gersting, Mathematical Structures for Computer Science‖, W.H. Freeman and Company, 2014.
4. M. K. Venkataraman, N. Sridharan, N. Chandrasekaran, Discrete Mathematics, National Publishing Company, Chennai, 2011.
5. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014.

MAPPING

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

S - Strong; H: High; **M**-Medium; **L**-Low

24UDA1A1

Programme Code : 24		B.Sc Computer Science with Data Analytics		
Title of the paper		**ALLIED 1: Discrete Mathematics and Statistics**		
Batch 2024-2027	**Hours / Week** 6	**Total Hours** 90	**Credits** 4	**Employability**

Course Objectives

1. To understand the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.
2. To understand the concepts and principles of mathematical logic, formal languages
3. To use finite state machines to model computer operations
4. To classify Measures of central tendency and dispersion
5. To know the purpose of correlation and regression

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts in mathematical logic and statistics.
	CO2	Analyze and construct mathematical arguments that relate to the study of discrete structures
	CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation
	CO4	Understanding the concepts of measures of central tendency and dispersion
	CO5	Analyze the correlation among the variables.

Syllabus

UNIT I **(18 Hours)**

Introduction-Propositional Calculus –Basic Logical Operators – Statements Generated by a set – Conditional Statement- Converse, incerse and Contra positive statements-Biconditional Statement-Tautologies-Contradiction- Contingency- Arugument-Methods of Proof-Direct Proof-Indirect proof

UNIT II **(18 Hours)**

Formal Languages and Automata - Grammars: Phrase-structure grammar, context-sensitive grammar, context-free grammar and regular grammar. Finite state Automata: Deterministic finite state automata- Non deterministic finite state automata - Conversion of non deterministic finite state automata to deterministic finite state automata

UNIT III **(18 Hours)**

Graph Theory – Basic terminology – paths, cycle & Connectivity – Sub graphs – Types of graphs – Representation of graphs in computer memory - Trees – Properties of trees – Binary trees – traversing Binary trees – Computer Representation of general trees.

UNIT IV **(18 Hours)**

Measures of central tendency: Mean, Median, Mode, Geometric mean and Harmonic mean. Measures of Dispersion: Range, Quartile deviation, Standard deviation and coefficient of variation.

UNIT V **(18 Hours)**

Correlation and Regression - Correlation: Meaning and definition - Types- Scatter diagram- Karl Pearson coefficient of correlation- Rank correlation. Regression: Meaning and definition- Regression equation of two variables - Difference between correlation and Regression.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

TEXT BOOK

1.J.K.Sharma, Discrete Mathematics**,** Lakshmi Publications Pvt. Ltd., 4th Edition 2015.

2.S.P.Gupta " Statistical Methods", Sultan Chand and Sons-2007.

REFERENCE BOOKS

1.J.P.Tremblay and R.Manohar, Discrete and Combinatorial Mathematics, An Introduction, Addison Wesley, 2009

2.Kenneth H. Rosen, Discrete Mathematics and its applications, McGraw Hill, 2011.

3.Judith L.Gersting, Mathematical Structures for Computer Science, W.H. Freeman and Company, 2014.

4.M. K. Venkataraman, N. Sridharan, N. Chandrasekaran, Discrete Mathematics, National Publishing Company, Chennai, 2011

5. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014.

MAPPING

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

S - Strong; H: High; **M**-Medium; **L**-Low

24UCI1A1

Programme Code : 22		B.Com IT		
Title of the paper		ALLIED I- BUSINESS MATHEMATICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To impart basic knowledge about Mathematical concepts
2. To solve the business problems using various mathematical techniques
3. To enable the students to apply basic mathematical knowledge to solve the real life business problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the applications of mathematics in business analysis
	CO2	Understanding the concepts of mathematics in finance
	CO3	Applying basic Mathematical concepts in business problems
	CO4	Analyzing the business conditions using Linear Programming Problems.
	CO5	Evaluating the solution for business problems using graphical method and Simplex method

Syllabus

UNIT I **(18 Hours)**

Arithmetic and Geometric Series – Simple and Compound Interest –Effective rate of interest – Annuities – Discounting of Bills.

UNIT II **(18 Hours)**

Matrix: Basic Concept – ***Addition of matrices** and Multiplication of Matrices – Determinant of a Matrix- Inverse of a Matrix – Solution of Simultaneous Linear Equations (Cramer's rule and Inverse matrix method) – Input and Output analysis.

UNIT III **(18 Hours)**

Variables, Constants and Functions– Limits of Algebraic functions – Differentiation of functions (algebraic, exponential and logarithmic) – Meaning of derivatives – Evaluation of First and Second order derivatives – Application to Business Problems: Marginal concepts- Elasticity-Increasing and decreasing functions-Maxima and Minima.

UNIT IV **(18 Hours)**

Elementary Integral Calculus – Determining indefinite and definite integrals of algebraic, exponential and logarithmic functions –Method of Partial fractions- Integration by parts-Uses in Economics.

UNIT V **(18 Hours)**

Linear Programming Problems – Formulation of LPP – Solving LPP by Graphical method –Standard and Canonical form of LPP- Solving LPP by Simplex method(Less than or equal to constraints only).

*** denotes Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham , Business Mathematics & Statistics, Jai Publisher, 2015.

Reference Books:

1.Dr. P R Vittal, Business Mathematics & Statistics, Margham Publications, Chennai, 6th edition, 2006.
2.A.V.Dharmapadam, Business Mathematics, S.Viswanathan publishing company, 1st edition, 1979.
3.Sundaresan and Jayaseelan**,** Introduction to Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2010.
4.D.C.Sanchetti and V.K. Kapoor, Business Mathematics, Sultan Chand Co& Ltd, New Delhi, 2014.
5. G.K.Ranganath, C.S.Sampamgiram and Y.Rajaram, Business Mathematics, Himalaya Publishing House, New Delhi, 2015.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	M	H
CO2	S	M	H	S	M
CO3	M	H	S	S	H
CO4	M	H	S	M	M
CO5	S	H	M	S	H

S – Strong **H** – High **M** – Medium **L** – Low

UMA 98

24UCS2A2/24USC2A2

Programme Code : 9		B.Sc Computer Science		
Title of the Paper		ALLIED 2 – OPERATIONS RESEARCH		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To understand the various mathematical applications in industries and decision making for real time environment.
2. To gain the knowledge about the principles and applications of operations research.
3. To develop skills necessary to effectively analyze and synthesize the inter-relationships inherent in complex socio-economic productive systems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering mathematical formulation of the problem.
	CO2	Understanding the notions of linear programming in solving transportation problems and Assignment Problems.
	CO3	Applying the fundamental concept of inventory control and Queuing theory.
	CO4	Analyzing CPM and PERT techniques, to plan, schedule, and control project activities.
	CO5	Determine new simple models to improve decision making and develop critical thinking.

Syllabus

UNIT I **(18 Hours)**

Linear programming: Introduction – Mathematical formulation of the problem – Graphical solution – General form of LPP – **Canonical & standard forms of LPP *** - Simplex method –Big M method.

UNIT II **(18 Hours)**

Transportation problem: Mathematical formulation of the problem – Initial basic feasible solution (Matrix minimum method , North –west corner rule & VAM) – Moving towards optimality – Unbalanced transportation problems.

Assignment problem: Mathematical formulation of an assignment problem – Hungarian assignment method – Unbalanced Assignment problems.

UNIT III **(18 Hours)**

Inventory control: Introduction – various costs involved in Inventory - EOQ models with and without shortage – Buffer stock & reorder level- EOQ problems with price –breaks.

UNIT IV **(18 Hours)**

Replacement problems: Introduction- Replacement of equipments that deteriorates gradually: Value of money does not change with time –Value of money changes with time- to find the optimal Replacement Policy – Replacement of equipment that fails suddenly.

PERT-CPM: Introduction – Rules of network construction – CPM and PERT calculations – **Distinction between PERT and CPM*** – Applications of Network Techniques- Advantages of Network Techniques.

UNIT V **(18 Hours)**

Queuing theory: Introduction – characteristics of Queuing system- Traffic Intensity – classification of Queues – Problems from single server infinite & finite population model.

Derivations not included.

*** - denotes Self Study(Questions for examinations may be taken from the self study portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

Kanti Swarup, P.K Gupta & Man Mohan, Operations Research**,** Sultan chand publications, 16th Edition, 2012, New Delhi.

Reference Books:

1. P.K.Gupta & ManMohan, Problems in Operations Research Sultan Chand Publications, 13th Edition, 2010, New Delhi.
2. Hamdy A. Taha, "Operations Research, An Introduction",Pearson Education, 9thEdition, 2013.
3. B.S. Goel and S.K.Mittal, Operations Research, Pragathi Prakashan Publishers, Meerut, 16th edition, 1999.
4. Premkumar Gupta and D.S.Hira, Operations Research, S.Chand & Company Ltd., 2009

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UIT2A2

Programme Code :12		B.Sc. Information Technology		
Title of the Paper		Operations Research		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To understand the concept of Linear Programming Problem
2. To explain the various mathematical applications in industries
3. To show the optimization concepts in real time environment

Course Outcomes (CO)

K1 to K5	CO1	Remembering the replacement problem.
	CO2	Understanding the notions of Linear Programming in solving Transportation Problems and Assignment Problems.
	CO3	Applying the fundamental concept of inventory control.
	CO4	Knowing the application of CPM & PERT
	CO5	Evaluating the real life problems using the concept of Queuing theory.

Syllabus

UNIT I **(18 Hours)**

Linear programming: Introduction – Mathematical formulation of the problem – Graphical solution – General form of LPP, **Canonical & standard forms of LPP*** - Simplex method –Big M method – Solving Linear Programming Problems using R programming.

UNIT II **(18 Hours)**

The Transportation problem: Mathematical formulation of the problem – Initial basic feasible solution (Matrix minimum method , North –west corner rule & VAM) – Moving towards optimality – Unbalanced transportation problems.

Assignment problem: Mathematical formulation of an assignment problem – Hungarian assignment method – **Unbalanced Assignment problems***

UNIT III (Derivations not included) **(18 Hours)**

Inventory control: Introduction – various costs involved in Inventory – EOQ models without and with shortage – Buffer stock & reorder level –EOQ problems with price –breaks.

UNIT IV **(18 Hours)**

Replacement problems: Introduction- Replacement of equipments that deteriorates gradually – Replacement of equipment that fails suddenly.

24UIT2A2

PERT-CPM: Introduction – Rules of network construction – Critical Path Method calculations– PERT calculations- Distinction between PERT and CPM- Applications of Network Techniques- Advantages of Network Techniques.

UNIT V (Derivations not included) (18 Hours)

Queuing theory: Introduction – characteristics of Queuing system- Traffic Intensity – Poisson process & exponential distribution –classification of Queues – Problems from single server infinite & finite population model.

*** denotes Self study(Questions may be taken from these portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

Kanti Swarup, P.K Gupta & Man Mohan, Operations Research**,** Sultan chand publications, 16th Edition, 2012, New Delhi.

Reference Books:

1. P.K.Gupta & ManMohan, Problems in Operations Research Sultan Chand Publications, 13th Edition, 2010, New Delhi.
2. Hamdy A. Taha, "Operations Research, An Introduction",Pearson Education, 9thEdition, 2013.
3. B.S. Goel and S.K.Mittal, Operations Research, Pragathi Prakashan Publishers, Meerut, 16th edition, 1999.
4. Premkumar Gupta and D.S.Hira, Operations Research, S.Chand & Company Ltd., 2009

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UCA3A3

Programme Code: 10		BCA		
Title of the Paper		**OPERATIONS RESEARCH**		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To identify and develop operational research models from the verbal description of the real system.
2. To understand the mathematical tools that are needed to solve optimization problems.
3. To develop a report that describes the model and the solving technique.

Course Outcomes (CO)

K1 to K5	CO1	Showing that the real time problems can be solved by using operations research techniques.
	CO2	Demonstrating the idea of finding the shortest path using transportation problem.
	CO3	Appling the concept of inventory control and replacement techniques in business.
	CO4	Examining the concept of traffic intensity in real life problems.
	CO5	Evaluating the real life problems using the concept of queuing theory.

Syllabus

UNIT I **(18 Hours)**

Linear programming: Introduction - Mathematical formulation of the problem - Graphical solution - **General form of LPP, Canonical & standard forms of LPP *** - Simplex method -Big M method.

UNIT II **(18 Hours)**

The Transportation probem: Mathematical formulation of the problem - Initial basic feasible solution (Matrix minimum method , North -west corner rule & VAM) - Moving towards optimality - Unbalanced transportation problems.

Assignment problem: Mathematical formulation of an assignment problem - Hungarian assignment method - Unbalanced Assignment problems

24UCA3A3

UNIT III **(18 Hours)**

Inventory control: Introduction - various costs involved in Inventory - EOQ models with and without shortage - Buffer stock & reorder level- EOQ problems with price -breaks.

UNIT IV **(18 Hours)**

Replacement problems: Introduction- Replacement of equipments that deteriorates gradually: Value of money does not change with time –Value of money changes with time- to find the optimal Replacement Policy - Replacement of equipment that fails suddenly.

PERT-CPM: Introduction - Rules of network construction – CPM and PERT calculations- Distinction between PERT and CPM- Applications of Network Techniques- Advantages of Network Techniques.

UNIT V **(18 Hours)**

Queueing theory: Introduction - characteristics of Queueing system- Traffic Intensity - classification of Queues - Problems from single server infinite & finite population model. (Derivations not included)

*** denotes Self Study (Questions for examinations may be taken from Self Study Portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

Kanti Swarup, P.K Gupta & Man Mohan, Operations Research**,** Sultan chand publications, 16th Edition, 2012, New Delhi.

Reference Books:

1. P.K.Gupta & ManMohan, Problems in Operations Research Sultan Chand Publications, 13th Edition, 2010, New Delhi.
2. Hamdy A. Taha, "Operations Research, An Introduction",Pearson Education, 9thEdition, 2013.
3. B.S. Goel and S.K.Mittal, Operations Research, Pragathi Prakashan Publishers, Meerut, 16th edition, 1999.
4. Premkumar Gupta and D.S.Hira, Operations Research, S.Chand & Company Ltd., 2009

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 105

24UBT4A4

Programme Code : 08		B.Sc Biotechnology		
Title of the Paper		Bio-Statistics		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	4	60	4	

Course Objectives

1. To provide the fundamental knowledge on statistics in biology.
2. Students can be able to know the level of significance after analysis of data and also applied in research work.
3. Acquire knowledge on sources for the biological data base and its storage and analysis

Course Outcomes (CO)

K1 to K5	CO1	Remembering the concept of sampling techniques.
	CO2	Understanding the significant of biostatistics on biological sciences and also applied in research work.
	CO3	Applying the bio-statistical formula to solve the biological related problems.
	CO4	Analyzing one way and two way classification.
	CO5	Evaluating the correlation and regression coefficients among the variables.

Syllabus

UNIT I **(12 Hours)**

Introduction: **Basis of Statistics- History and Growth of Statistics***- Definition Available- Statistical methods- Biological Measurement- Kinds of Biological Data- Functions of Statistics- Limitations of Statistics.

Collection, Organisation and Representation: Collection of Data- Sampling and Sampling Design- Classification and Tabulation- Diagrammatic Representation- Graphic Representation of Data.

UNIT II **(12 Hours)**

Measures of Central Tendency: Mean- Median- Mode- Geometric mean- Harmonic mean.

Measures of dispersion: Range- Quartile deviation- Standard deviation- Coefficient of variation.

UNIT III **(12 Hours)**

Correlation Analysis**:** Types of correlation- Methods of studying correlation : Karl Pearson's coefficient of correlation-Rank correlation.

Regression Analysis: Regression line- Regression equation of X on Y and Y on X – Properties of Regression lines.

UNIT IV **(12 Hours)**

Sampling and Tests of Significance**:** Steps in test of hypothesis- Sampling distribution- standard error- Tests of significance for attributes- Tests of significance of large samples- sampling variables.

UNIT V **(12 Hours)**

Chi Square test and Goodness of fit**:** Characteristics of χ^2 test- Applications of Chi Square. Analysis of Variance**:** One way classification- Analysis of variance in two way classification model.

*** Self Study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

1. S. Palanichamy, M. Manoharan, Statistical Methods for Biologists, Palani Paramount Publications, 1999.

Reference Books

1. S.P. Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi, 46th edition, 2021.
2. Sabine Landau and Brian S. Everitt, A Handbook of Staistical analyses using SPSS, A CRC press company, Washington.
3. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan chand &sons,Newdelhi-2, 2011.
4. P.R. Vital, Mathematical statistics Margham Publications, Chennai, 2004.
5. B.L. Agarwal, Basic Statistics, New Age International Publishers, Chennai, 2009.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 107

24UBT4AL

Programme Code : 08		B.Sc Biotechnology		
Title of the Paper		Lab in Bio-Statistics		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	2	30	2	

Course Objectives

1. To provide practical experience for the students.
2. Students can be able to know the level of significance after analysis of data and also applied in research work.
3. To analyze the data by using varied statistical methods.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic concepts of R Programming.
	CO2	Understanding the importance of R Programming in research problems
	CO3	Applying the concepts of average and statistical test in R programming
	CO4	Analyzing thr various features available in R programming
	CO5	Evaluating the mathematical problems using R programming

List of Practical

Using R – Programming

1. Calculate the mean.
2. Calculate the median.
3. Calculate the mode.
4. Calculate the standard deviation.
5. Calculate the correlation co-efficient .
6. Calculate the regression.
7. Calculate the t-test in the given sample.
8. Calculate the F-test in the given sample.
9. Calculate the one way ANOVA test.
10. Calculate the problem of chi square test.

Distribution of Marks in ESE		**CIA**	
Experiment	: 20	CIA Practical Exam	: 25 (Converted to 10)
Record	: 05	Attendance	: 05
Total	**25**	Observation Note Book	: 10
		Total	**: 25**

To be awarded jointly by the internal and external examiners.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 109

24UCM4A4

Programme Code : 13		B.Com		
Title of the Paper		BUSINESS STATISTICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To demonstrate understanding of basic concepts of probability and statistics embedded in their courses
2. Statistics in the social sciences involves the collection, analysis, interpretation, and Presentation of data to answer questions about the social world.
3. To Perform Correlation & Compute the equation of simple regression line from a sample data and the intercept of the equation

Course Outcomes (CO)

K1 to K5	CO1	Selecting appropriate Statistical techniques for summarizing and displaying business data.
	CO2	Understanding the measures of central tendency, symmetrical and asymmetrical distribution
	CO3	Identifying and carryout basic statistical analyses used in sociological inquiry.
	CO4	Analyzing and draw inferences from business data using appropriate statistical methods.
	CO5	Evaluating the trend lines from business data using business forecasting models

Syllabus

UNIT I **(18 Hours)**

Meaning and Scope of Statistics - Sources of data* - Collection of data: Primary and Secondary data - Classification and Tabulation - Presentation of data by diagrams - Bar diagram and Pie diagram - Graphic representation - Frequency distribution.

UNIT II **(18 Hours)**

Method of Central Tendency: Mean, Median, Mode, Geometric mean and harmonic mean - their computation - properties and uses - Measures of dispersion : Range, quartile deviation, standard deviation and co-efficient of variation.

UNIT III **(18 Hours)**

Skewness: Meaning- Bowley's and Pearson's Co-efficient of Skewness – Correlation - meaning and definition - scatter diagram - Pearson's correlation co-efficient - Rank correlation – Regression :Meaning of regression - regression in two variables.

UNIT IV **(18 Hours)**

Interpolation: Newton, Lagrange's and binomial methods - Index numbers - meaning – Uses - Methods of construction - Aggregative and relative types - Tests of an index number: Time Reversal test and Factor Reversal test - Cost of living index .

UNIT V **(18 Hours)**

Time Series – Meaning – Components – Models - Business forecasting - Methods of estimating trend - graphic, semi-average, moving average and least square method - Seasonal Variation : Method of Simple Average .

*** denote Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. S..P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021
2. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014
3. P.R.Vittal, Business Mathematics and Statistics, Margham publications, Chennai, 6th Edition, 2006.
4. S.P.Gupta and M.P.Gupta, Business Statistics, Sultan Chand & Sons, 14th edition, 2007.
5. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UCC2A2

Programme Code :14		B.Com CA		
Title of the Paper		BUSINESS STATISTICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To give basic knowledge about statistical concepts.
2. To solve the modern business problems using various statistical techniques
3. To estimate the mean and standard deviation of the marginal distribution of the response variable and use this information to inform a business decision

Course Outcomes (CO)

K1 to K5	CO1	Selecting appropriate Statistical techniques for summarizing and displaying business data
	CO2	Interpreting correlation coefficients and Formulate regression line by identifying dependent and independent variables.
	CO3	Identifying and carryout basic statistical analyses used in sociological inquiry.
	CO4	Analyzing and draw inferences from business data using appropriate statistical methods.
	CO5	Evaluating the trend lines from business data using business forecasting models

Syllabus

UNIT I **(18 Hours)**

Meaning and Scope of Statistics - Sources of data* - Collection of data: Primary and Secondary data - Classification and Tabulation - Presentation of data by diagrams - Bar diagram and Pie diagram - Graphic representation - Frequency distribution.

UNIT II **(18 Hours)**

Method of Central Tendency: Mean, Median, Mode, Geometric mean and harmonic mean - their computation - properties and uses - Measures of dispersion : Range, quartile deviation, standard deviation and co-efficient of variation.

UNIT III **(18 Hours)**

Skewness: Meaning- Bowley's and Pearson's Co-efficient of Skewness – Correlation - meaning and definition - scatter diagram - Pearson's correlation co-efficient - Rank correlation – Regression :Meaning of regression - regression in two variables.

24UCC2A2

UNIT IV **(18 Hours)**

Interpolation: Newton, Lagrange's and binomial methods - Index numbers - meaning – Uses - Methods of construction - Aggregative and relative types - Tests of an index number: Time Reversal test and Factor Reversal test - Cost of living index .

UNIT V **(18 Hours)**

Time Series – Meaning – Components – Models - Business forecasting - Methods of estimating trend - graphic, semi-average, moving average and least square method - Seasonal Variation : Method of Simple Average .

*** denotes Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. S..P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021
2. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014
3. P.R.Vittal, Business Mathematics and Statistics, Margham publications, Chennai, 6th Edition, 2006.
4. S.P.Gupta and M.P.Gupta, Business Statistics, Sultan Chand & Sons, 14th edition, 2007.
5. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 113

24UPA2A2

Programme Code : 15		B.Com PA		
Title of the Paper		STATISTICS FOR BUSINESS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To give basic knowledge about statistical concepts.
2. To solve the modern business problems using various statistical techniques
3. To estimate the mean and standard deviation of the marginal distribution of the response variable and use this information to inform a business decision

Course Outcomes (CO)

K1 to K5	CO1	Choosing a statistical method for solving practical problems.
	CO2	Understanding and use the basic measure of central tendency.
	CO3	Identifying different types of statistical data.
	CO4	Classifying the structure and characteristics of statistical data.
	CO5	Evaluating the trend lines from business data using business forecasting models

Syllabus

UNIT I **(18 hours)**

Meaning and Definition of Statistics – Collection of data — **Primary and Secondary*** - Classification and Tabulation – Diagrammatic and Graphical presentation. Measures of Central tendency – Mean, Median, Mode, Geometric Mean and Harmonic Mean –simple problems

UNIT II **(18 hours)**

Measures of Dispersion – Range, Quartile Deviation, Mean Deviation, Standard Deviation and Co-efficient of Variation. Skewness – Meaning – Measures of Skewness - Pearson's and Bowley's co-efficient of Skewness.

UNIT III **(18 hours)**

Correlation –Meaning and Definition –Scatter diagram, Karl Pearson's co-efficient of Correlation, Spearman's Rank Correlation, Co-efficient of Concurrent deviation. Regression Analysis – Meaning of regression and linear prediction – Regression in two variables– Uses of Regression.

UNIT IV **(18 hours)**

Time Series – Meaning, Components and Models – Business forecasting – Methods of estimating trend – Graphic, Semi-average, Moving average and Method of Least squares – Seasonal Variation – Method of Simple average. Index Numbers – Meaning, Uses and Methods of construction – Un-weighted and Weighted index numbers – Tests of an Index number – Cost of living index number.

UNIT V **(18 hours)**

Interpolation: Binomial, Newton's and Lagrange methods. Probability – Concept and Definition– Addition and Multiplication theorems of Probability (statement only) – simple problems based on Addition and Multiplication theorems only.

*** denotes Self Study (Questions for examinations may be taken from the self study portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. S..P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021
2. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014
3. P.R.Vittal, Business Mathematics and Statistics, Margham publications, Chennai, 6th Edition, 2006.
4. S.P.Gupta and M.P.Gupta, Business Statistics, Sultan Chand & Sons, 14th edition, 2007.
5. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 115

24UBA2A2

Programme Code :17		BBA CA		
Title of the Paper		MATHEMATICS FOR MANAGEMENT – II		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To understand various mathematical applications in industries.
2. To know the mathematical tools that are needed to solve optimization Problems.
3. To understand the Decision making for real time environment.

Course Outcomes (CO)

K1 to K5	CO1	Remembering to use the variables for formulating mathematical models in management.
	CO2	Understanding the concept of Transportation and Assignment models
	CO3	Applying the fundamental concept of Queuing theory.
	CO4	Analyzing CPM and PERT techniques, to plan, schedule, and control project activities.
	CO5	Evaluating the solution for business problems using Graphical and Simplex method

Syllabus

UNIT I **(18 Hours)**

Introduction to Operations Research - Mathematical Formulation of a Problem - Graphical solution Method - General Linear Programming problem - Canonical and standard forms of LPP - Simplex Method.

UNIT II **(18 Hours)**

The Transportation problem: Mathematical formulation of the problem - Initial basic feasible solution - North West Corner rule - Matrix minima method - Vogel's approximation method- Moving towards optimality - Unbalanced transportation problems.

Assignment problem: Mathematical formulation of assignment problem - Hungarian assignment method - Unbalanced Assignment problems.

UNIT III **(18 Hours)**

Game theory: Introduction - Two Person zero Sum Game - The Maximin - Minimax Principle - Games without saddle points - mixed Strategies - Solution of 2x2 Rectangular Games - Graphical method - Dominance Property.

UNIT IV **(18 Hours)**

Replacement problems: Introduction - Replacement of Equipment that deteriorates gradually - Replace of Equipment that fails suddenly.

Queuing Theory: Introducing - Characteristic of Queuing system - symbols and Notations - Problems in (M/M/1) : (∞/FIFO).

UNIT V (Derivations not included.) **(18 Hours)**

PERT-CPM: Introduction - **Rules of network construction*** - critical path method - Programme Evaluation and Review technique (PERT) calculations- Distinction between PERT and CPM- Applications of Network Techniques- Advantages of Network Techniques.

*** denotes Self Study (Questions for examinations may be taken from the self study portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

Kanti Swarup, P.K.Gupta & Manmohan, "Operations Research," Sultan & Sons, New Delhi, 16th Edition, 2012.

Reference Book:

1.J. K. Sharma, "Operations Research Theory & Applications", Macmillan India Ltd., 4th Edition, 2010.

2 P.K.Gupta & ManMohan, Problems in Operations Research Sultan Chand Publications, 13th Edition, 2010, New Delhi.

3.Hamdy A. Taha, "Operations Research, An Introduction",Pearson Education, 9thEdition, 2013.

4.B.S. Goel and S.K.Mittal, Operations Research, Pragathi Prakashan Publishers, Meerut, 16th edition, 1999.

5.Premkumar Gupta and D.S.Hira, Operations Research, S.Chand & Company Ltd., 2009

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

UMA 117

24UCT2A2

Programme Code :11		B.Sc. Computer Technology		
Title of the Paper		Operations Research		
Batch	**Hours / week**	**Total Hours**	**Credits**	Employability
2024-2027	6	90	5	

Course Objectives

1. To understand the concept of Linear Programming Problem
2. To explain the various mathematical applications in industries
3. To show the optimization concepts in real time environment

Course Outcomes (CO)

K1 to K5	CO1	Remembering the replacement problem.
	CO2	Understanding the notions of Linear Programming in solving Transportation Problems and Assignment Problems.
	CO3	Applying the fundamental concept of inventory control.
	CO4	Knowing the application of CPM & PERT
	CO5	Evaluating the real life problems using the concept of Queuing theory.

Syllabus

UNIT I **(18 Hours)**

Linear programming: Introduction - Mathematical formulation of the problem - Graphical solution - General form of LPP, **Canonical & standard forms of LPP*** - Simplex method -Big M method.

UNIT II **(18 Hours)**

The Transportation problem: Mathematical formulation of the problem - Initial basic feasible solution (Matrix minimum method , North -west corner rule & VAM) - Moving towards optimality - Unbalanced transportation problems.

Assignment problem: Mathematical formulation of an assignment problem - Hungarian assignment method - **Unbalanced Assignment problems***

UNIT III (Derivations not included) **(18 Hours)**

Inventory control: Introduction – various costs involved in Inventory – EOQ models without and with shortage – Buffer stock & reorder level -EOQ problems with price –breaks.

UNIT IV **(18 Hours)**

Replacement problems: Introduction- Replacement of equipments that deteriorates gradually – Replacement of equipment that fails suddenly.

PERT-CPM: Introduction – Rules of network construction – Critical Path Method calculations– PERT calculations- Distinction between PERT and CPM- Applications of Network Techniques- Advantages of Network Techniques.

UNIT V (Derivations not included) (18 Hours)

Queuing theory: Introduction – characteristics of Queuing system- Traffic Intensity – Poisson process & exponential distribution –classification of Queues – Problems from single server infinite & finite population model.

*** denotes Self study(Questions may be taken from these portions also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

Kanti Swarup, P.K Gupta & Man Mohan, Operations Research**,** Sultan chand publications, 16th Edition, 2012, New Delhi.

Reference Books:

1. P.K.Gupta & ManMohan, Problems in Operations Research Sultan Chand Publications, 13th Edition, 2010, New Delhi.
2. Hamdy A. Taha, "Operations Research, An Introduction",Pearson Education, 9thEdition, 2013.
3. B.S. Goel and S.K.Mittal, Operations Research, Pragathi Prakashan Publishers, Meerut, 16th edition, 1999.
4. Premkumar Gupta and D.S.Hira, Operations Research, S.Chand & Company Ltd., 2009

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UCB2A2

Program Code :19		B.Com (Banking & Insurance)		
Title of the Paper		BUSINESS STATISTICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To impart basic knowledge about statistical concepts.
2. To solve the business problems using various statistical techniques
3. To Understand the Correlation and Regression problems.

Course Outcomes (CO)

K1 to K5	CO1	Selecting appropriate Statistical techniques for summarizing and displaying business data
	CO2	Understanding to use the basic measure of central tendency.
	CO3	Identifying the statistical tool to solve sociological problems.
	CO4	Analyzing and drawing inferences from business data using appropriate statistical methods.
	CO5	Evaluating correlation and regression analysis among the variables.

Syllabus

UNIT I **(18 Hours)**

Meaning and Definition of Statistics –Collection of data —**Primary and Secondary***- Sampling Techniques - Classification and Tabulation –Diagrammatic and Graphical presentation.

Unit II **(18 Hours)**

Measurers of Central Tendency A. M. Combined mean of two groups, *__Properties__, Median and Mode -Geometric Mean and Harmonic Mean.

Unit III **(18 Hours)**

Measures of Dispersion - Absolute and relative measures of dispersion, Range, Coefficient of range, Variance, Standard deviation, Combined Standard deviation for two groups only, Coefficient of Variation.

Unit IV **(18 Hours)**

Skewness –Meaning –Measures of Skewness -Pearson's and Bowley's co-efficient of Skewness.Interpolation: Binomial, Newton's and Lagrange methods.

Unit V **(18 Hours)**

Correlation and Regression - Correlation, types of correlation, Scatter diagram, Correlation Coefficient, regression, lines of regression.

*** denotes Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. S..P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021
2. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014
3. P.R.Vittal, Business Mathematics and Statistics, Margham publications, Chennai, 6th Edition, 2006.
4. S.P.Gupta and M.P.Gupta, Business Statistics, Sultan Chand & Sons, 14th edition, 2007.
5. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UPS4A4

Programme Code : 21		B.Sc Psychology		
Title of the Paper		**ALLIED IV: RESEARCH METHODOLOGY**		
Batch 2024-2027	**Hours / Week** 5	**Total Hours** 75	**Credits** 5	**Skill development**

Course Objectives

1. To give basic knowledge about research and its methodologies.
2. To identify the concepts and procedures of sampling, data collection, analysis and Reporting.
3. To develop an understanding of various research designs and techniques.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the research problem and technique and defining a problem are developing a research Plan.
	CO2	Understanding the concepts of sampling, error and its degrees of freedom.
	CO3	Identifying various sources of information for data collection.
	CO4	Analyzing to prepare key elements of a research report.
	CO5	Interpreting the results of the data using statistical techniques.

Syllabus

UNIT I **(15 Hours)**

Introduction: Meaning of Research-Objectives Research-Types of Research-Research Approaches-Significance of Research-Research Methods versus Methodology- Research and Scientific Method-Research Process-Criteria of Good Research –Problems Encountered by Research in India.

Defining the Research Problem: What is a Research Problem? - Selecting the Problem -Necessity of Defining the Problem-Technique Involved in Defining a Problem -An illustration-Conclusion.

UNIT II **(15 Hours)**

Research Design: Meaning of Research Design-Need for Research Design - Features of a Good Design- Important Concepts Relating to Research Design - Different Research Designs – Basic Principles of Experimental Designs-Important Experimental Designs-Conclusion.

UNIT III **(15 Hours)**

Data Collection: Introduction-Experiments and Surveys-Collection of Primary Data-Collection of Secondary Data-Selection of Appropriate Methods for Data Collection-Case Study Method.

Data Preparation: Data Preparation Process-Some Problems in Preparation Process-Missing Values and Outliers-Types of Analysis-Statistics in Research.

UNIT IV **(15 Hours)**

Testing of Hypothesis: What is a Hypothesis- Basic Concepts Concerning Testing of Hypothesis-Testing the Hypothesis-Test Statistic and Critical Region-Critical Value and Decision Rule- Procedure for Hypothesis Testing- Hypothesis Testing for Mean- Hypothesis Testing for Proportion- Hypothesis Testing for Variance- Hypothesis Testing for Difference of Two Mean-Hypothesis Testing for Difference of Two Proportions- Hypothesis Testing for Difference of Two Variance.

UNIT V **(15 Hours)**

Interpretation and Report Writing: Meaning of Interpretation-Techniques of Interpretation-Precautions in Interpretation- Significance of Report Writing- Different Steps in Writing Report-Layout of the Research Report-Types of Reports-Oral Presentation-Mechanics of Writing a Research Report-Precautions for Writing Research Reports-Conclusion.

*** Denotes Self Study**

(Questions for Examination may be taken from the Self Study Portion also).

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

C.R.Kothari & Gaurav Garg, Research Methodology Methods and Techniques, 4th Multi Colour Edition, New Age International (P) Limited, Publishers, New Delhi, 2019.

Unit I	Chapter 1	Pages 1 - 20
	Chapter 2	Pages 24 - 28
Unit II	Chapter 3	Pages 29 - 51
Unit III	Chapters 6	Pages 89-109
	Chapters 7	Pages 114-128
Unit IV	Chapter 10	Pages 179-199
Unit V	Chapters 19	Pages 416-431

24UPS4A4

Reference Books

1. Panneerselvam.R, Research Methodology, 3rd Edition, Hall of India (Pvt.,), New Delhi, 2006.
2. Yogesh Kumar Singh, Fundamental of Research Methodology and Statistics, Ist Edition, New Age International (P) Ltd, New Delhi, 2006.
3. Santosh Gupta, Research Methodology and Statistical Techniques, Deep &Deep PublicationsPvt.Ltd, New Delhi, 2003.
4. Kenneth S.Bordens Bruce B.Abbott, Research and Design Methods A Process Approach, 6thEdition, Tata Mcgraw- Hill Publication, Company Ltd., New York, 2006.
5. P.Saravanavel, Research Methodology, Reprint, KitabMahal, Allahabad, 2008.
6. Pradeep Rohilla, Research Methodology, APH Publishing Corporation, New Delhi, 2017.

MAPPING

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

S-Strong : H – High : M- Medium : L – Low.

24UAF4A4

Programme Code : 20		B.Com (Accounting and Finance)		
Title of the Paper		BUSINESS STATISTICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2024-2027	6	90	5	

Course Objectives

1. To demonstrate understanding of basic concepts of probability and statistics embedded in their courses
2. Statistics in the social sciences involves the collection, analysis, interpretation, and Presentation of data to answer questions about the social world.
3. To Perform Correlation & Compute the equation of simple regression line from a sample data and the intercept of the equation

Course Outcomes (CO)

K1 to K5	CO1	Selecting appropriate Statistical techniques for summarizing and displaying business data.
	CO2	Understanding the measures of central tendency, symmetrical and asymmetrical distribution
	CO3	Identifying the appropriate statistical tool to solve sociological problems.
	CO4	Analyzing and drawing inferences from business data using appropriate statistical methods.
	CO5	Evaluating the solution for business problems using Graphical and Simplex method

Syllabus

UNIT I **(18 Hours)**

Meaning and Scope of Statistics - Sources of data* - Collection of data: Primary and Secondary data - Classification and Tabulation - Presentation of data by diagrams - Bar diagram and Pie diagram - Graphic representation - Frequency distribution.

UNIT II **(18 Hours)**

Method of Central Tendency: Mean, Median, Mode, Geometric mean and harmonic mean - their computation - properties and uses - Measures of dispersion : Range, quartile deviation, standard deviation and co-efficient of variation.

UNIT III **(18 Hours)**

Skewness: Meaning- Bowley's and Pearson's Co-efficient of Skewness – Correlation - meaning and definition - scatter diagram - Pearson's correlation co-efficient - Rank correlation – Regression :Meaning of regression - regression in two variables.

UNIT IV **(18 Hours)**

Interpolation: Newton, Lagrange's and binomial methods - Index numbers - meaning – Uses - Methods of construction - Aggregative and relative types - Tests of an index number: Time Reversal test and Factor Reversal test - Cost of living index .

UNIT V **(18 Hours)**

Time Series – Meaning – Components – Models - Business forecasting - Methods of estimating trend - graphic, semi-average, moving average and least square method - Seasonal Variation : Method of Simple Average .

*** denote Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. S..P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021
2. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014
3. P.R.Vittal, Business Mathematics and Statistics, Margham publications, Chennai, 6th Edition, 2006.
4. S.P.Gupta and M.P.Gupta, Business Statistics, Sultan Chand & Sons, 14th edition, 2007.
5. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.

MAPPING

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

24UAI2A2

Programme Code : 24		B. Sc Artificial Intelligence and Machine Learning		
Title of the Paper		ALLIED 2:OPTIMIZATION TECHNIQUES AND LINEAR ALGEBRA		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	4	

Course Objectives

1. To introduce certain OR techniques such as LPP, Transportation problems, Assignment problems and network techniques.
2. To help the students to develop logical reasoning.
3. To apply mathematical tools to managerial and real life problems.
4. Introduce students to prove mathematical statements by means of inductive reasoning

Course Outcomes (CO)

K1 to K5	**CO1**	Remembering the rules to construct an LPP and Remembering to write the system of linear equations in terms of matrix equations.
	CO2	Understanding the rules of artificial variables and summarizing the concept of simplex problems and Understanding the systems of linear equations and matrix equations to determine linear dependency or independency.
	CO3	Applying the notions of linear programming in solving transportation problems and Assignment Problem and Solving problems that can be modeled by systems of linear equations.
	CO4	Analyzing the concept of CPM & PERT and Examining the solution set of a system of linear equations.
	CO5	Determining the solution for various real time Travelling salesman problems and Assessing Gram-Schmidt forms.

Syllabus

UNIT I **(18 Hours)**

Linear programming: Introduction – Mathematical formulation of the LPP – Graphical solution – General form of LPP – **Canonical & standard forms of LPP * -** Simplex method.

UNIT II **(18 Hours)**

Transportation problem: Mathematical formulation of the problem – Initial basic feasible solution (Matrix minimum method, North –west corner rule & VAM) – Moving towards optimality – Unbalanced transportation problems.

Assignment Problem: Mathematical formulation of assignment problem –Hungarian Assignment method – A Typical Assignment problems – Travelling Salesman problems.

UNIT III **(18 Hours)**

PERT-CPM: Introduction – Rules of network construction – CPM and PERT calculations.

UNIT IV **(18 Hours)**

Introduction – Vectors and Matrices – Length and Dot Products – Solving Linear Equations – Linear Equations – The Idea of Elimination – Elimination Using Matrices – Rules for Matrix Operations – Inverse Matrices – Elimination = Factorization: A = LU – Transposes and Permutations.

UNIT V **(18 Hours)**

Vector Spaces and Subspaces – Spaces of Vectors – The Null space of A: Solving Ax = 0 – The Rank and the Row Reduced Form – The complete solution to Ax=b – Independence, Basis, and Dimensions – Dimensions of the four Subspaces – Orthogonality – Orthogonality of the Four Subspaces – Projections – Least Squares Approximations – Orthogonal Bases and Gram – Schmidt.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

TEXT BOOK

1. Kantiswarup, P.K.Gupta and Man Mohan, Operations Research, 16th Thoroughly Revised Ed., Sultan Chand & Sons, New Delhi, (Reprint 2014).

2. Gilbert Strang (2016), Introduction to Linear Algebra, 5th Edition. Wellesley – Cambridge Press.

REFERENCE BOOKS

1. P.K.Gupta & ManMohan**, "**Problems in Operations Research**"** SultanChand Publications, 6th Edition, 1994, New Delhi.

2. B.S.Goel and S.K.Mittal , Operations Research, 16th Edition, Pragathi Prakashan Publishers, Meerut, 1999.

3. S.Lang (1997), Introduction to Linear Algebra, Second Edition, Springer.
4. Schaum's Outline series, Linear Algebra, McGraw Hill Book Company, New Delhi.
5. Dr.S.N.Goel, Linear Algebra, 4th Edition, Kadar Nath, Ram Nath, Meerut.

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	S
CO2	M	S	S	S	M
CO3	S	M	M	M	S
CO4	S	S	M	M	S
CO5	S	S	S	M	M

S – Strong; **M**-Medium; **L**-Low H-High

24UDA2A2

Programme Code : 24		B. Sc Computer Science with Data Analytics		
Title of the Paper		ALLIED 2:OPTIMIZATION TECHNIQUES AND LINEAR ALGEBRA		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Skill development**
2024-2027	6	90	4	

Course Objectives

1.To introduce certain OR techniques such as LPP, Transportation problems, Assignment problems and network techniques.

2.To help the students to develop logical reasoning.

3.To apply mathematical tools to managerial and real life problems.

4.Introduce students to prove mathematical statements by means of inductive reasoning

Course Outcomes (CO)

K1 to K5	**CO1**	Remembering the rules to construct an LPP and Remembering to write the system of linear equations in terms of matrix equations.
	CO2	Understanding the rules of artificial variables and summarizing the concept of simplex problems and Understanding the systems of linear equations and matrix equations to determine linear dependency or independency.
	CO3	Applying the notions of linear programming in solving transportation problems and Assignment Problem and Solving problems that can be modeled by systems of linear equations.
	CO4	Analyzing the concept of CPM & PERT and Examining the solution set of a system of linear equations.
	CO5	Determining the solution for various real time Travelling salesman problems and Assessing Gram-Schmidt forms.

UNIT I **(18 Hours)**

Linear programming: Introduction - Mathematical formulation of the LPP - Graphical solution - General form of LPP - **Canonical & standard forms of LPP *** - Simplex method.

UNIT II **(18 Hours)**

Transportation problem: Mathematical formulation of the problem - Initial basic feasible solution (Matrix minimum method, North -west corner rule & VAM) - Moving towards optimality – Unbalanced transportation problems.

Assignment Problem: Mathematical formulation of assignment problem -Hungarian Assignment method – A Typical Assignment problems – Travelling Salesman problems.

UNIT III **(18 Hours)**

PERT-CPM: Introduction - Rules of network construction – CPM and PERT calculations.

UNIT IV **(18 Hours)**

Introduction – Vectors and Matrices – Length and Dot Products – Solving Linear Equations – Linear Equations – The Idea of Elimination – Elimination Using Matrices – Rules for Matrix Operations – Inverse Matrices – Elimination = Factorization: A = LU – Transposes and Permutations.

UNIT V **(18 Hours)**

Vector Spaces and Subspaces – Spaces of Vectors – The Null space of A: Solving Ax = 0 – The Rank and the Row Reduced Form – The complete solution to Ax=b – Independence, Basis, and Dimensions – Dimensions of the four Subspaces – Orthogonality – Orthogonality of the Four Subspaces – Projections – Least Squares Approximations – Orthogonal Bases and Gram – Schmidt.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

TEXT BOOKS

1.Kantiswarup, P.K.Gupta and Man Mohan, Operations Research, 16th Thoroughly Revised Ed., Sultan Chand & Sons, New Delhi, (Reprint 2014).
2.Gilbert Strang (2016), Introduction to Linear Algebra, 5th Edition. Wellesley – Cambridge Press.

REFERENCE BOOKS

1.P.K.Gupta & ManMohan**, "**Problems in Operations Research**"** SultanChand Publications, 6th Edition, 1994, New Delhi.

2. B.S.Goel and S.K.Mittal , Operations Research, 16th Edition, Pragathi Prakashan Publishers, Meerut, 1999.

3.S.Lang (1997), Introduction to Linear Algebra, Second Edition, Springer.

4.Schaum's Outline series, Linear Algebra, McGraw Hill Book Company, New Delhi.

5.Dr.S.N.Goel, Linear Algebra, 4th Edition, Kadar Nath, Ram Nath, Meerut.

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	S
CO2	M	S	S	S	M
CO3	S	M	M	M	S
CO4	S	S	M	M	S
CO5	S	S	S	M	M

S - Strong; **M**-Medium; **L**-Low H - High

UMA 132

24UCI2A2

Programme Code : 22		B.COM IT		
Title of the Paper		ALLIED.II- STATISTICS FOR BUSINESS		
Batch 2024-2027	**Hours / Week** 6	**Total Hours** 90	**Credits** 5	**Employability**

Course Objectives

1. To impart basic knowledge about statistical concepts.
2. To solve the business problems using statistical techniques
3. To develop the students ability in business by using the graphical and algebraic techniques.

Course Outcomes (CO)

K1 to K5	CO1	Choose a statistical method for solving practical problems.
	CO2	Understand and use the basic measure of central tendency.
	CO3	Identify different types of statistical data.
	CO4	Classify the structure and characteristics of statistical data.
	CO5	Evaluate the correlation coefficients and Formulate regression line by identifying dependent and independent variables

Syllabus

UNIT I **(18 hours)**

Meaning and Scope of statistics - Sources of data - Collection of data - Primary and secondary data - Classification and Tabulation - Presentation of data by diagram - Bar diagram and Pie diagram - Graphical Representation –Frequency distribution.

UNIT II **(18 Hours)**

Measures of central tendency : Arithmetic mean, Median, Mode, Geometric and Harmonic mean – their computation – Properties and uses (Statements only).

Measures of dispersion : R**ange*** - Quartile deviation - Standard deviation - coefficient of variation.

UNIT III **(18 Hours)**

Skewness: Meaning- Bowley's and Pearson's Co-efficient of Skewness – Correlation - meaning and definition - scatter diagram - Pearson's correlation co-efficient - Rank correlation – Regression :Meaning of Regression - Regression in two variables.

24UCI2A2

UNIT IV **(18 Hours)**

Interpolation: Newton, Lagrange's and binomial methods - Index numbers - meaning – Uses - Methods of construction - Aggregative and relative types - Tests of an index number: Time Reversal test and Factor Reversal test - Cost of living index .

UNIT V **(18 Hours)**

Time Series – Meaning – Components – Models - Business forecasting - Methods of estimating trend - graphic, semi-average, moving average and least square method - Seasonal Variation : Method of Simple Average.

*** denote Self Study (Questions for Examination may be taken from the Self Study Portion also).**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

P.A. Navaneetham, Business Mathematics and Statistics, Jai Publishers, 2015.

Reference Books:

1. S..P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021
2. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014
3. P.R.Vittal, Business Mathematics and Statistics, Margham publications, Chennai, 6th Edition, 2006.
4. S.P.Gupta and M.P.Gupta, Business Statistics, Sultan Chand & Sons, 14th edition, 2007.
5. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	S	S	H
CO2	M	H	S	M	S
CO3	S	H	M	H	M
CO4	H	S	H	S	H
CO5	S	M	H	M	S

S – Strong **H** – High **M** – Medium **L** – Low

Major Elective Papers

Programme Code : 02	B.Sc Mathematics			
Title of the Paper	Major Elective Paper - Operations Research			
Batch 2024-2027	Hours / Week 6	Total Hours 90	Credits 5	Entrepreneurship

Course Objectives

1. To introduce certain OR techniques such as LPP, Transportation problems, Assignment problems and network techniques.
2. To help the students to develop logical reasoning.
3. To apply mathematical tools to managerial and real life problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the rules to construct an LPP.
	CO2	Understanding the rules of artificial variables and summarizing the concept of replacement problems.
	CO3	Applying the notions of linear programming in solving transportation problems and Assignment Problem.
	CO4	Analyzing the concept of CPM & PERT
	CO5	Determining the solution for various real time decision making problems.

Syllabus

UNIT I **(18 Hours)**

Linear programming: Introduction - Mathematical formulation of the LPP - Graphical solution - General form of LPP - **Canonical & standard forms of LPP *** - Simplex method

UNIT II **(18 Hours)**

Linear Programming Problem: Use of Artificial Variables - Big M method - Two phase simplex method.

Advanced Techniques: Introduction – Revised Simplex Method

UNIT III **(18 Hours)**

Transportation problem: Mathematical formulation of the problem - Initial basic feasible solution (Matrix minimum method, North -west corner rule & VAM) - Moving towards optimality – Unbalanced transportation problems.

Assignment Problem: Mathematical formulation of an assignment problem - Hungarian assignment method – A Typical Assignment problems – Travelling Salesman problem

UNIT IV **(18 Hours)**

Replacement Problems: Introduction- Replacement of equipments that deteriorates gradually: Value of money does not change with time –Value of money changes with time- to find the optimal Replacement Policy - Replacement of equipment that fails suddenly.

UNIT V **(18 Hours)**

PERT-CPM: Introduction - Rules of network construction – CPM and PERT calculations.

*** Self Study**

Questions for examinations may be taken from the self study portions also.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

1. Kantiswarup, P.K.Gupta and Man Mohan, Operations Research, 16th Thoroughly Revised Ed., Sultan Chand & Sons, New Delhi, (Reprint 2014).

Unit I	Chapter 2	Sections 2.1 to 2.3
	Chapter 3	Sections 3.1 to 3.5
	Chapter 4	Sections 4.3
Unit II	Chapter 4	Sections 4.4
	Chapter 9	Sections 9.1, 9.2
Unit III	Chapter 10	Sections 10.1 to 10.2, 10.9 to10.13, 10.15
	Chapter 11	Sections 11.1 to 11.4, 11.7
Unit IV	Chapter 18	Sections 18.1 to 18.3
Unit V	Chapter 25	Sections 25.1 to 25.7

Reference Books

1. P.K.Gupta & ManMohan**, "**Problems in Operations Research**"** SultanChand Publications, 6th Edition, 1994, New Delhi.

2. B.S.Goel and S.K.Mittal , Operations Research, 16th Edition, Pragathi Prakashan Publishers, Meerut,1999.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

Programme Code: 02	**B.Sc Mathematics**			
Title of the Paper	**Major Elective Paper-** NUMERICAL METHODS WITH MATLAB			
Batch 2024-2027	**Hours / Week** 5	**Total Hours** 75	**Credits** 5	**Employability**

Course Objectives

1. To solve algebraic and transcendental equations for finding roots using numerical methods.
2. To solve simultaneous linear algebraic equations using various numerical methods
3. To know about finite differences and its uses to interpolate the values for equal and unequal intervals.

Course Outcomes (CO)

K1 to K5	CO1	Remembering various numerical methods for finding the solution of algebraic and transcendental equations.
	CO2	Demonstrating various numerical algorithms for solving simultaneous linear algebraic equations.
	CO3	Applying finite difference methods for interpolation.
	CO4	Analyzing the various methods of interpolation for equal and unequal intervals.
	CO5	Evaluating the solutions of the algebraic and transcendental equations using MATLAB.

Syllabus

UNIT I **(15 Hours)**

The numerical solution of algebraic and transcendental equations : The bisection method – Method of successive Approximation –The method of false position - **Newton-Raphson method*.**

UNIT II **(15 Hours)**

Simultaneous linear algebraic equations: Direct methods: **Gauss elimination method*** - Gauss Jordan method, Method of triangularisation. Inverse of a matrix using Gauss elimination method. Indirect method: Jacobi method of iteration – Gauss- Seidel method of iteration .

UNIT III **(15 Hours)**

Finite differences: First difference –Higher differences- Operators- Forward difference table- Backward difference table- Expression of any value of y in terms of y_n and the backward differences of y_n- Differences of a polynomial- Factorial polynomial.

UNIT IV **(15 Hours)**

Interpolation with equal intervals: Gregory – Newton's forward interpolation formula – Gregory –Newton's backward interpolation formula. Central difference interpolation: Gauss's forward interpolation formula – Gauss's backward interpolation formula -Stirling's formula. Interpolation with unequal intervals: Divided differences - Newton's interpolation formula for unequal intervals - Lagrange's interpolation formula –Inverse interpolation.

UNIT V **(15 Hours)**

Basic Operations of MATLAB: Input/Output of Data from MATLAB Command Window - Input/Output of Data Through Files - Input/Output of Data Using Keyboard - 2-D Graphic Input/Output - 3-D Graphic Output - Mathematical Functions - Operations on Vectors and Matrices - Random Number Generators - Flow Control Solving a System of Linear Equations: Gauss Elimination – Partial Pivoting – Gauss–Jordan Elimination - Inverse Matrix - LU Decomposition (Factorization): Triangularization Iterative Methods to Solve Equations: Jacobi Iteration - Gauss–Seidel Iteration – Problems

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books

1. P.Kandasamy, K.Thilagavathi and K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, New Delhi, 2012.

Unit I	Chapter III	Sections 3.1 - 3.4
Unit II	Chapter IV	Sections 4.1- 4.4, 4.7- 4.9
Unit III	Chapter V	Sections 5.1 -5.4
Unit IV	Chapter VI	Sections 6.1-6.3
	Chapter VII	Sections 7.1-7.5
	Chapter VIII	Sections 8.1 -8. 5, 8.7-8.8

2. Won Young Yang, Wenwu Cao, Tae-Sang Chung, John Morris, Applied Numerical Methods Using Matlab, Wisley-Interscience, A John Wiley & Sons, Inc., Publication 2005.

Unit V	Chapter 1	Sections 1.1.1-1.1.9
	Chapter 2	Sections 2.2.1-2.4.1 and 2.5.1- 2.5.2

Reference Books

1. M.K. Venkataraman, Numerical Methods in Science and Engineering, NPC, 5th Edition, 2001.
2. M.K.Jain, S.R.K. Iyengar and R.K.Jain , Numerical Methods for Scientific and Engineering Computations, New Age International publishers, New Delhi, 2004.
3. A.Singaravelu, Numerical Methods , Meenakshi Publications, Arpakkam, 2002.
4. Numerical Methods using MATLAB, John H. Mathews and Kurtis D. Fink, Prentice Hall Publication (1999), 3rd Edition.
5. Brain R. Hunt, Ronald L.Lipsman, Rosenberg, " A Guide to MATLAB for Beginners and Experienced users, Cambridge University Press-UK, Edition-I, 2008.

Mapping

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

S- Strong; H-High; M-Medium; L-Low

Programme Code : 02	B.Sc Mathematics			
Title of the Paper	Major Elective Paper- LINEAR ALGEBRA			
Batch 2024-2027	Hours / Week 5	Total Hours 75	Credits 5	Skill development

Course Objectives

1.Represent mathematical information and communicate mathematical reasoning symbolically and verbally.

2.Apply mathematical methods involving arithmetic, algebra, geometry, and graphs to solve problems.

3.Interpret and analyze numerical data, mathematical concepts, and identify patterns to formulate and validate reasoning

Course Outcomes(CO)

K1 to K5	CO1	Remembering to write the system of linear equations in terms of matrix equations
	CO2	Understanding the systems of linear equations and matrix equations to determine linear dependency or independency.
	CO3	Solving problems that can be modeled by systems of linear equations.
	CO4	Examining the solution set of a system of linear equations
	CO5	Assessing bilinear symmetric forms.

Syllabus

UNIT I **(15 Hours)**

Elementary Canonical Forms :**Characteristic values – Annihilating polynomials*** – Invariant subspaces.

UNIT II **(15 Hours)**

Elementary canonical forms: Direct – sum decompositions – Invariant direct sums- The primary decomposition theorem.

UNIT III **(15 Hours)**

The Rational and Jordan forms: Cyclic subspaces and Annihilators – cyclic decompositions and the Rational Form.

UNIT IV **(15 Hours)**

The Rational and Jordan forms: The Jordan form computation of invariant factors.

UNIT V **(15 Hours)**

Bilinear forms: Bilinear forms – symmetric Bilinear forms.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

Kenneth Hoffman and Ray Kunze, Linear Algebra, 2nd Edition, Prentice Hall of India Pvt., Ltd., New Delhi, 1996.

Unit I	Chapter 6	Sections	6.1 to 6.4
Unit II	Chapter 6	Sections	6.6 to 6.8
Unit III	Chapter 7	Sections	7.1, 7.2
Unit IV	Chapter 7	Sections	7.3 , 7.4
Unit V	Chapter 10	Sections	10.1, 10.2

Reference Books

1. Schaum's Outline series, Linear Algebra, McGraw Hill Book Company, New Delhi.
2. Dr.S.N.Goel, Linear Algebra, 4th Edition, Kadar Nath, Ram Nath, Meerut.

Mapping

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

S- Strong; H-High; M-Medium; L-Low

Programme Code : 02	**B.Sc Mathematics**			
Title of the Paper	**Major Elective Paper**-ASTRONOMY			
Batch 2024-2027	**Hours / Week** 5	**Total Hours** 75	**Credits** **5**	Employability/ Skill Development/ Entrepreneurship

Course Objectives

1. To acquire the knowledge about the celestial objects and planets.
2. Develop skills to design observing projects with research telescopes and projects drawing upon data in the literature and in archives.
3. To be familiar with the appearance of a range of common astronomical objects, such as asteroids, comets, satellites, planets, stars, and galaxies.

Course Outcomes(CO)

K1 to K5	CO1	Defining about the observed properties of physical systems that comprise the known universe.
	CO2	Demonstrate their ability to read, understand, and critically analyze the astronomical/physical concepts
	CO3	Applying their physics and mathematical skills to problems in the areas of planetary science.
	CO4	Analyzing for valid scientific conclusions and communicate those conclusions in a clear and articulate manner.
	CO5	Demonstrating eclipse of moon

Syllabus

UNIT I **(15 Hours)**

Celestial sphere, Diurnal Motion – Celestial Co-ordinates.

UNIT II **(15 Hours)**

The Earth: **Zones of Earth*** – Terrestrial Latitudes and Longitudes – Dip of Horizon – Twilight.

UNIT III **(15 Hours)**

Refraction.

UNIT IV **(15 Hours)**

Kepler's laws*, seasons – calendar.

UNIT V **(15 Hours)**

The moon – eclipses.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

S.Kumaravelu and Susheela Kumaravelu, Astronomy for Degree classes, Rainbow Printers, Nagercoil, 2000.

Unit I	Chapter II	Sections 39 to 79
Unit II	Chapter III	Sections 1, 2, 5 ,6
Unit III	Chapter IV	
Unit IV	Chapter VI	
	Chapter VII	Sections 2, 3
Unit V	Chapter XII	
	Chapter XIII.	

Reference Books

1. V.B.Bhatia , Text book for Astronomy and Astrophysics with elements of Cosmology, 2nd Edition, Narosa Publishing House, New Delhi, 2001.

Mapping

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

S- Strong; H-High; M-Medium; L-Low

Programme Code : 02	**B.Sc Mathematics**			
Title of the Paper	Major Elective Paper **FUZZY MATHEMATICS**			
Batch 2024-2027	**Hours / Week** 5	**Total Hours** 75	**Credits 5**	**Skill Development**

Course Objectives

1. To know the basic definitions of fuzzy set theory.
2. To know the fundamentals of fuzzy Algebra.
3. To know the applications of fuzzy Technology.

Course Outcomes(CO)

K1 to K5	CO1	Remembering the basic concepts of Boolean algebra.
	CO2	Understanding the concepts of fuzzy sets.
	CO3	Identifying the concepts of Algebra of fuzzy relations and logic connectives.
	CO4	Analyzing fuzzy subgroup and Preimage of subgroupoid.
	CO5	Evaluating the fuzzy invariant for subgroup.

Syllabus

UNIT I **(15 Hours)**

Introduction- Fuzzy subsets- Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy – ***level sets** – properties of fuzzy subsets.

UNIT II **(15 Hours)**

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-Cartesian product of fuzzy subsets

UNIT III **(15 Hours)**

Introduction- Algebra of fuzzy relations-logic-connectives.

UNIT IV **(15 Hours)**

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Preimage of subgroupoid.

UNIT V **(15 Hours)**

Fuzzy invariant subgroups-fuzzy subrings.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

S. Nanda and N. R. Das Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi, 2010.

Reference Books

1. M.Ganesh, Introduction to Fuzzy Sets & Fuzzy Logic, Prentice Hall of India Pvt. Ltd., 2006.

2. John N.Mordeson and Premchand S.Nair, Fuzzy Mathematics, Spring verlong, 2001

Mapping

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

S- Strong; H-High; M-Medium; L-Low

Programme Code : 02	**B.Sc Mathematics**			
Title of the Paper	Major Elective Paper **COMBINATORICS**			
Batch 2024-2027	**Hours / Week** 5	**Total Hours** 75	**Credits** **5**	Skill Development

Course Objectives

1. To learn about recurrence relation.
2. To have knowledge about permutation.
3. To be familiar with assignment problems.

Course Outcomes(CO)

K1 to K5	CO1	Remembering the basic concepts of Fibonacci sequence.
	CO2	Understanding the concepts of Permutation and Fibonacci type relation.
	CO3	Identifying the concepts of counting simple electrical networks.
	CO4	Analyzing inclusion and Exclusion principle.
	CO5	Evaluating Fibonacci relation using generating function.

Syllabus

UNIT I **(15 Hours)**

Introduction to Basic ideas – General formula for f(n,k) – Recurrence Relation – boundary condition – Fibonacci sequence – *__generating function__ .

UNIT II **(15 Hours)**

Permutation – Ordered selection – unordered selection – further remarks on Binomial theorem.

UNIT III **(15 Hours)**

Passing within a set – Pairing between set and optimal assignment problem – Gala's optimal assignment problem.

UNIT IV **(15 Hours)**

Fibonacci type relation – using generating function – Miscellaneous method – counting simple electrical networks.

UNIT V **(15 Hours)**

The inclusion – Exclusion principle – Rook polynomial.

*** denotes self study (Questions may be asked from these portions also)**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

Jan Anderson, A First Course in Combinatorial Mathematics, Oxford Applied Mathematics and Computing Science Series, UK, 2013.

Reference Books

1.V.K.Balakrishnan, Combinatorics, Schuam Series, 1996.

2. Russell Merris, Combinatorics, John Wiley & Sons, 2003.

Mapping

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

S- Strong; H-High; M-Medium; L-Low

SKILL BASED SUBJECTS

24UGC3S1

Programme Code :	**For B.A., BBA CA, B.Com, BCA and B.Sc., Degree Students**		
	SKILL BASED SUBJECT 1 – CYBER SECURITY		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2024-2025	**2**	**30**	**3**

COURSE OBJECTIVES

- The course introduces the basic concepts of Cyber Security
- To develop an ability to understand about various modes of Cyber Crimes and Preventive measures
- To understand about the Cyber Legal laws and Punishments

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 ↕ K5	CO1	To Understand the Concepts of Cybercrime and Cyber Frauds
	CO2	To Know about Cyber Terrorism and its preventive measures
	CO3	To Analyze about the Internet, Mobile Phone and E-commerce security issues
	CO4	To Understand about E-mail and Social Media Issues
	CO5	To Describe about various legal responses to Cybercrime

SYLLABUS

UNIT I **6 Hours**

Introduction to Cyber Security: Definition of Cyber Security- Why is Cyber Security important? Layers of Cyber Security- Evolution of Cyber Security. Cyber hacking - Cyber fraud: Definition- Different modes of cyber fraud - Cyber fraud in India. Cyber pornography.

UNIT II **6 Hours**

Cyber Terrorism: Modes of cyber terrorism. Cybercrime: What is Cybercrime? Cybercrime preventive methods - Preventive steps for individuals & organizations - Kinds of cybercrime - Malware and its types – Cyber attacks.

24UGC3S1

UNIT III **5 Hours**

Internet Mobile Phone and E-commerce Security issues: Data theft - Punishment of data theft- Theft of internet hours - Internet safety tips for children & parents. Mobile phone privacy- E-Commerce security issues.

UNIT IV **6 Hours**

Email and Social media issues: Aspects of Social Media - The Vicious Cycle of unhealthy social media use- Modifying social media use to improve mental health. Computer Virus - Antivirus – Firewalls.

UNIT V **7 Hours**

Cyber Forensics and Digital Evidence: What does Digital Footprint Mean? - Web Browsing and Digital Footprints- Digital Footprint examples – How to Protect Your Digital Footprints? - How to erase your Footprints? - Browser Extensions and Search Engine Deletion - Cyber Crime and Cyber Laws - Common Cyber Crimes and Applicable Legal Provisions: A Snapshot - Cyber Law (IT Law) in India – The Information Technology Act of India 2000 - Cyber Law and Punishments in India - Cyber Crime Prevention guide to users – Regulatory Authorities.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book:

1. **"Cyber Security", Text Book** prepared by "Kongunadu Arts and Science College", Coimbatore -29, 2022.

Reference Books:

1. Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed, **"Fundamental of Cyber Security",** BPB Publications, 1st Edition, 2017.
2. Anand Shinde, "**Introduction to Cyber Security-Guide to the world of Cyber Security**",Notion Press,2021.
3. Paul Grishman, "**Cyber Terrorism- The use of the Internet for Terrorist Purpose**",Axis Publication,1st Edition 2010.
4. Shilpa Bhatnagar, **"Encyclopaedia of Cyber and Computer Hacking**", Anmol Publications, 1st Edition 2009.

Web References:

1. http://deity.gov.in/ - Department of Electronics and Information Technology,
2. Govt. of India
3. http://cybercellmumbai.gov.in/ - Cybercrime investigation cell
4. http://ncrb.gov.in/ - National Crime Records Bureau

5. http://catindia.gov.in/Default.aspx - Cyber Appellate Tribunal
6. http://www.cert-in.org.in/ - Indian Computer Emergency Response Team
7. http://cca.gov.in/rw/pages/index.en.do - Controller of Certifying Authorities
8. www.safescrypt.com - Safescrypt
9. www.nic.in – National Informatics Centre
10. https://www.kaspersky.com/resource-center/definitions/what-is-a-digital-footprint
11. https://geekflare.com/digital-footprint/

Mapping

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	H	S	S	H	S
CO3	M	H	M	S	H
CO4	S	H	H	M	H

S – Strong **H** – High **M** – Medium **L** – Low

24UGC3S1

Question Paper Pattern

Duration: 3 hrs **Max: 75 marks**

Section - A (10x1=10)

Choose the correct answer

Section - B (5x5=25)

Short answer questions, either or type, one question from each unit.

Section - C (5x8=40)

Essay answer questions, either or type, one question from each unit.

CIA EXAMINATION MARK BREAKUP

S. NO	DISTRIBUTION COMPONENT	MARKS
1.	CIA I – 75 Marks Converted to 30	**30**
2.	CIA II – 75 Marks Converted to 30	**30**
3.	Assignment I	**10**
4.	Assignment II	**10**
5.	Attendance	**05**
6.	Any Case Study related to Cyber Security	**15**
	Total	**100**

UMA 153

24UMA4SL

Programme Code : 02	**B.Sc Mathematics**		
	Skill Based Subject 2 Fundamentals of LaTeX-Practical		
Batch 2024-2027	**Hours / Week** 2	**Total Hours** 30	**Credits** 2

Course Objectives

1. LaTeX is a typewriting system that is extremely useful for typing and formatting scientific documents.
2. Typing Mathematical equations is very intuitive and easy in LaTeX.
3. This practical subject is Job and Skill oriented for the students.

Course Outcomes (CO)

K3 to K5	CO1	Choosing LaTeX software to prepare letters, dissertation, curriculum vitae and other documents
	CO2	Illustrate model question papers, matrix, case statements and tables using LaTeX software
	CO3	Select LaTeX software for preparing research papers as per the journal's template.
	CO4	Construct molecular orbital diagrams for Homo and Hetro diatomic molecules by using MO diagram package in LaTeX software
	CO5	Recommending R software to merge the coding of R with the LaTeX documents

List of Practical

1. Using LaTeX, type a document in different ways (Left, Right, Center, Justify)
2. Using LaTeX environment, type the following text

   (a) Numbering 1
   - Bullet 1
   - Bullet 2

   (b) Numbering 2
   i. Type 3
   ii. Type 4

3. Using LaTeX environment, type the following text

   1 Modern Algebra

   1.1 Group

   1.1.1 Subgroup

   1.2 Ring

   1.2.1 Homomorphism

4. Using LaTeX, type the following equation

$$\sqrt{\sqrt{n!+\sqrt{45}}}+\int_{0}^{x}\int_{\sqrt{\sqrt{16}}}^{x}\sqrt{\sqrt{e^{x}}dx}+\frac{d^{2}y}{dx^{2}}$$

5. Using LaTeX, type the following equation

$$\int_0^{\infty} e^{-\rho}\rho^{2l}\left[L_{n+l}^{2l+1}(\rho)\right]^2\rho^2 d\rho = \frac{2n[(n+l)!]^3}{(n\ l\ 1)!}$$

6. Using LaTeX, type your own Curriculum Vitae.

7. Using LaTeX, type a question paper for the subject Modern Algebra as per the following pattern.

Kongunadu Arts and Science College(Autonomous)
Coimbatore-641029
Department of Mathematics
CIA TEST-II

Class & Major:	II B.Sc. Mathematics
Title of the Paper:	Algebra
Date & Session:	DD/MM/YYYY 2.00pm - 5.00pm AN
Time: 3hrs	Max.marks:75

Answer ALL Questions

SECTION-A(10×1=10 Marks)

Choose the correct answer:

1.

a) b) c) d)

SECTION - B (5×5=25 Marks)

11.a).

(or)

b).

SECTION - C(5×8=40 Marks)

16.a).

(or)

b).

8. Using LaTeX, type the following table.

	Item	Budget			(in Rupees)
		1st Year	2nd Year	3rd Year	Total
A	Recurring	JRF	JRF	SRF	
1	Salaries/Wages	1,65,600	1,65,600	1,93,200	5,24,400
2	Consumables	50,000	50,000	50,000	1,50,000
3	Travel	75,000	75,000	75,000	2,25,000
4	Other costs				
(i)	Books/Journals	75,000	75,000	75,000	2,25,000
(ii)	Contingency	50,000	50,000	50,000	1,50,000
B	Equipments	1,50,000	-	-	1,50,000
	Grand Total (A+B)				14,24,400
	Total FEC*				NIL
	Over head Charge (20% of the grand total)				2,84,880
	Total				17,09,280

9. Using LaTeX, type the following Case Statements.

$$(a) x_\lambda = \begin{cases} x & if\ \lambda\ is\ an\ eigenvalue \\ -x & if\ -\lambda\ is\ an\ eigenvalue \\ 0 & otherwise \end{cases}$$

$$(b) |x| = \begin{cases} x & if\ x \geq 0 \\ -x & if\ x < 0 \\ 0 & \text{otherwise} \end{cases}$$

10. Using LaTeX, type the following Matrices

(a) $$\begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{pmatrix}$$

(b) $$B = \begin{array}{c} \\ s_1 \\ s_2 \\ s_3 \\ s_4 \\ s_5 \end{array} \begin{array}{c} \begin{array}{ccc} d_1 & d_2 & d_3 \end{array} \\ \begin{pmatrix} (0.6,0.2) & (0.6,0.2) & (0.3,0.4) \\ (0.3,0.5) & (0.2,0.6) & (0.7,0.2) \\ (0.1,0.8) & (0.2,0.7) & (0.7,0.2) \\ (0.4,0.5) & (0.7,0.2) & (0.3,0.4) \\ (0.1,0.7) & (0.1,0.8) & (0.2,0.7) \end{pmatrix} \end{array}$$

(c) $$\begin{Bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{Bmatrix}$$

11. Using LaTeX, type the following complicated mathematical structures.

(a) $$\binom{m+n}{m} = \frac{(m+n)!}{m!n!} = \frac{\overbrace{(m+n)(m+n-1)\cdots(n+1)}^{m\ factors}}{\underbrace{m(m-1)\cdots1}_{m\ factors}}$$

(b) $$\begin{aligned} 1+2+\cdots+n &= \frac{1}{2}\left((1+2+\cdots+n)+(n+\cdots+2+1)\right) \\ &= \frac{1}{2}\underbrace{(n+1)+(n+1)+\cdots+(n+1)}_{n\ copies} \\ &= \frac{n(n+1)}{2} \end{aligned}$$

12. Create a frame environment with title LaTeX Beamer presentation and include author name, institute, current date and footnote.
13. Include few figures in documents.
14. Create references using bibliography environment and cite the references in a document.

Distribution of Marks in ESE

Experiment	:	50
Record	:	10
Total		**60**

CIA

CIA Practical	:	25
Exam		
Attendance	:	5
Observation Note Book	:	10
Total		**40**

To be awarded jointly by the internal and external examiners.

Mapping

PO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	S	M	H	S	H
CO3	M	H	S	H	S
CO4	S	H	S	M	S
CO5	H	S	S	H	M

S - Strong; **H** - High; **M** - Medium; **L** - Low

24UBI6S3

Programme Code :	**For B.A., BBA, B.Com, BCA and B.Sc., Degree Students**		
Skill Based Subject III - BASICS OF INTELLECTUAL PROPERTY RIGHT'S			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2024-2025	**2**	**30**	**3**

COURSE OBJECTIVES

- To create awareness about recent trends in IPR and Innovation
- To explore the basic concepts IPR
- To focus upon trademarks, copyrights, patents, industrial designs and traditional knowledge.
- To learn more about managing IP rights and legal aspects.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 ↕ K5	CO1	Know about basic concepts of IPR and patent
	CO2	Understand copyrights, industrial designs and geographical indication of goods.
	CO3	Differentiate between trademarks and trade secrets
	CO4	Acquire knowledge on parotection of traditional knowledge and plant varieties.
	CO5	Manage and protect IP Rights

UNIT – I **(6 hours)**

Introduction -origin and development of Intellectual Property Rights (IPR), need for protecting IP, **Patents:** Foundation of patent law, patent searching process, basic criteria of patentability. Patentable and non - patentable subject matters in India. Patent prior art search, drafting the patent specification and filing procedure

UNIT – II **(6 hours)**

Copyrights: Fundamentals of copyright law, originality of material, right of reproduction, right to perform the work publicly, copyright ownership issues, notice of copyright. **Industrial Designs:** Kind of protection provided in Industrial design. **Geographical Indication of Goods:** Basic aspects and need for the registration.

UNIT – III **(6 hours)**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, transfer of rights, selecting and evaluating trademark, registration of trademarks, claims. **Trade Secrets:** Trade secret law, determination of trade secret status, liability form is appropriation of trade secrets, trade secret litigation.

UNIT – IV **(6 hours)**

Protection of traditional knowledge - Objectives, concept of traditional knowledge, issues concerning, bioprospecting and biopiracy. **Protection of Plant Varieties -** Objectives, international position, plant varieties protection in India. Rights of farmers, breeders and researchers.

UNIT- V **(6 hours)**

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, protecting IP Rights: non-disclosure agreement, cease and desist letter, settlement memorandum. **Transferring IP Rights:** Assignment contract, license agreement, deed of assignment. Infringement and enforcement.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

TEXT BOOKS

1. Ramakrishna Chintakunta and M. Geethavani (2022). A Textbook of Intellectual Property Rights. Blue Hills publications.
2. N.K Acharya (2021).Intellectual property rights(8thEdn). Asia Law House.
3. Craig Allen Nard, Michael J. Madison, and Mark P. McKenna. (2017). Law of Intellectual Property (5thEdn). New York Aspen publishers.
4. Barrett and Margreth (2009). Intellectual Property. New York Aspen publishers.
5. Deborah E.Bouchoux(2013). Intellectual property:The Law of Trademarks, Copyrights, Patents, and Trade Secrets. Publisher: Cengage India

REFERENCES

1. B.Ramakrishna and H.S.Anil Kumar (2017). Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers.Notion Press.
2. V. K. Ahuja(2013). Law relating to Intellectual Property rights (2nd Edn). LexisNexis.
3. R. Radhakrishnan and S. Balasubramanian(2008).Intellectual property rights: Text and Cases. Excel Books India.
4. D. Goeland S. Parashar (2013). IPR Biosafety and Bioethics. Pearson Education India.

Extra Departmental Course (EDC)

24UMA5X1

Programme Code:		For UG STUDENTS		
Extra Departmental Course (EDC)				
Batch 2024-2027	**Hours / Week 2**	**Total Hours 30**	**Credits 3**	**Employability/ Skill Development/ Entrepreneurship**

Course Objectives

1. To understand the basic concepts in Mathematics and Statistics.
2. To study the concepts related with banking using various Mathematical concepts.
3. To understand the application of these mathematical concepts in the real life problems.

Course Outcomes (CO) COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 ↕ K5	CO1	Remembering the problems based on Time and work.
	CO2	Understanding the concepts based on Time and Distance.
	CO3	Applying basic mathematical concepts in business problems.
	CO4	Analyzing the different measures of central tendency.
	CO5	Evaluating the correlation and its types.

Syllabus

UNIT I **(6 Hours)**

TIME AND WORK: Problems based on Time and Work – TIME AND DISTANCE: Problems based on Time and Distance - Simple Problems.

UNIT II **(6 Hours)**

NUMBERS: Types of Numbers – Test of Divisibility – Simple Problems.

UNIT III **(6 Hours)**

MATHEMATICS FOR FINANCE: *Arithmetic Progression – Geometric Progression - Simple interest – Compound interest – Simple problems.

UNIT IV **(6 Hours)**

MEASURES OF CENTRAL TENDENCY: Arithmetic mean – Median – Mode – Geometric mean – Harmonic mean –Relation among A.M., G.M., and H.M. –Simple problems.

UNIT V **(6 Hours)**

CORRELATION : Correlation–Types of correlation– Karl Pearson's coefficient of correlation – Rank correlation – Simple problems only.

***Self study**

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Book

1. Dr.R.S.Aggarwal, "Quantitative Aptitude", S.Chand and company Limited (Unit I, II)
2. P.A. Navaneethan, "Business mathematics and Statistics", Jai publishers, 2010. (Unit III, IV, V)

Reference Books

1. R.V.Praveen, "Quantitative Aptitude and Reasoning", PHI Learning Private Limited, 2013.
2. S.C.Gupta , V.K.Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons publisher,2010.

Mapping

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

S - Strong; **H**-High; **M**-Medium; **L**-Low

PART IV

24EVS101

For B.A., BBA, B.Com, BCA and B.Sc., Degree Students			
PART IV – ENVIRONMENTAL STUDIES			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2024-2025	**2**	**30**	**2**

COURSE OBJECTIVES

1. The course will provide students with an understanding and appreciation of the complex interactions of man, health and the environment. It will expose students to the multi-disciplinary nature of environmental health sciences
2. To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
3. To shape students into good "Ecocitizens" thereby catering to global environmental needs.
4. This course is designed to study about the types of pollutants including gases, chemicals petroleum, noise, light, global warming and radiation as well as pollutant flow and recycling and principles of environmental pollution such as air, water and soil
5. The course will address environmental stress and pollution, their sources in natural and workplace environments, their modes of transport and transformation, their ecological and public health effects, and existing methods for environmental disease prevention and remediation.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 ↑	CO 1	Understand how interactions between organisms and their environments drive the dynamics of individuals, populations, communities and ecosystems
	CO2	Develop an in depth knowledge on the interdisciplinary relationship of cultural, ethical and social aspects of global environmental issues
	CO3	Acquiring values and attitudes towards complex environmental socio-economic challenges and providing participatory role in solving current environmental problems and preventing the future ones
	CO4	To gain inherent knowledge on basic concepts of biodiversity in an ecological context and about the current threats of biodiversity
↓ K5	CO5	To appraise the major concepts and terminology in the field of environmental pollutants, its interconnections and direct damage to the wildlife, in addition to human communities and ecosystems

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT (6 HOURS)

Definition : scope and importance – Need for public awareness - Natural resources – Types of resources – Forest Resources – Water Resources – Mineral Resources – Food Resources – Energy Resources – Land Resources.

UNIT II ECOSYSTEMS (6 HOURS)

Concept of an ecosystem – Structure and functions of an ecosystem – Procedures, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food web and ecological pyramids – Structure and function of the following ecosystem – Forest Ecosystem –Grassland Ecosystem – Desert Ecosystem – Aquatic Ecosystem.

UNIT III BIODIVERSITY AND ITS CONSERVATION (6HOURS)

Introduction – Definition – Genetic – Species and ecosystem diversity- Bio geographical classification of India – Value of biodiversity – Biodiversity at global, national and local levels – India as a mega - diversity Nation - Hot spot of biodiversity – Threats to biodiversity - Endangered and endemic species of India – Conservation of Biodiversity – *Insitu* Conservation of Biodiversity – *Exsitu* Conservation of Biodiversity

UNIT IV ENVIRONMENTAL POLLUTION (6 HOURS)

Definition - Causes, effects and control measures of : Air Pollution – Water Pollution – Soil Pollution – Marine Pollution – Noise Pollution – Thermal Pollution – Nuclear Pollution – Solid Waste Management: Causes, effects, control measures of urban and industrial wastes – Role of individual in prevention of pollution – Pollution case studies – domestic waste water, effluent from paper mill and dyeing, cement pollution – Disaster Management – Food, Drought, Earthquake, Tsunami, Cyclone and Landslide.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT (6 HOURS)

Sustainable Development – Smart City, Urban planning, Town Planning , Urban problems related to energy – Water Conservation: Rain Water Harvesting and Watershed Management – Resettlement and rehabilitation of people, its problems and concerns, case studies Narmatha Valley Project – Environmental ethics, issues and possible solutions – Climate change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies – Hiroshima and Nagasaki, Chernobyl – Consumerism and waste products – Environmental Protection Act – Air Pollution Act (Prevention and Control) – Water Pollution Act (Prevention and control) – Wild Life Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness – Human Population and the environment – Population Growth and Distribution – Population Explosion – Family Welfare Programme – Environment and Human Health – Human Rights – Value Education – HIV/ AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

24EVS101

Text Book

1.P.Arul, A Text Book of Environmental Studies, Environmental Agency, No 27, Nattar street, Velacherry main road, Velacheery, Chennai – 42, First Edition, Nov.2004.

References

1.Purohit Shammi Agarwal, A text Book of Environmental Sciences, Publisher Mrs.Saraswati Prohit, Student Education , Behind Naswan Cinema Chopansi Road, Jodhpur.

2.Dr.Suresh and K.Dhameja, Environmental Sciences and Engineering , Publisher S.K.Kataria & Sons, 424/6, Guru Nanak Street, Vaisarak, Delhi -110 006.

3.J.Glynn Henry and Gary W Heinke, Environmental Science and Engineering, Prentice Hall of India Private Ltd., New Delhi – 110 001

Question Paper Pattern

Duration: 3 hours **Total Marks: 50**

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

24VED201

Programme Code:	**For B.A., BBA, B.Com, BCA and B.Sc., Degree Students**		
VALUE EDUCATION – MORAL AND ETHICS			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2024-2027	2	30	**2**

COURSE OBJECTIVES

- To impart Value Education in every walk of life.
- To help the students to reach excellence and reap success.
- To impart the right attitude by practicing self introspection.
- To portray the life and messages of Great Leaders.
- To insist the need for universal brotherhood, patience and tolerance.
- To help the students to keep them fit.
- To educate the importance of Yoga and Meditation.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1	CO1	will be able to recognize Moral values, Ethics, contribution of leaders, Yoga and its practice
↕	CO2	will be able to differentiate and relate the day to day applications of Yoga and Ethics in real life situations
	CO3	can emulate the principled life of great warriors and take it forward as a message to self and the society
	CO4	will be able to Analyse the Practical outcome of practicing Moral values in real life situation
K5	CO5	could Evaluate and Rank the outcome of the pragmatic approach to further develop the skills

SYLLABUS

UNIT I: **(4 Hours)**

Moral and Ethics: Introduction – Meaning of Moral and Ethics – Social Ethics – Ethics and Culture – Aim of Education.

UNIT II: **(6 Hours)**

Life and Teachings of Swami Vivekananda: Birth and Childhood days of Swami Vivekananda – At the Parliament of Religions – Teachings of Swami Vivekananda

24VED201

UNIT III: (4 Hours)

Warriors of our Nation: Subhas Chandra Bose – Sardhar Vallabhbhai Patel – Udham Singh – V. O. Chidambaram Pillai – Bhagat Singh – Tiruppur Kumaran – Dheeran Chinnamalai – Thillaiaadi Valliammai – Velu Nachiyar – Vanchinathan

UNIT IV: (8 Hours)

Introduction -yoga and its benefits - Ardhasiddhasana- Yoga for peace- Yoga for health - Yoga for wellbeing - Yoga for success - Brain yoga benefits - The science of Yoga.

UNIT V: (8 Hours)

Isha kriya -Surya Shakthi and it's benefits.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Text Books:

- Value Based Education – Moral and Ethics – compiled by Kongunadu Arts and Science College (Autonomous), 3rd Edition (2024).

Reference Books:

1. Swami Vivekananda - A Biography, Swami Nikhilananda, Advaita Ashrama, India, 24th Reprint Edition (2010).
2. Gandhi, Nehru, Tagore and other eminent personalities of Modern India, Kalpana Rajaram, Spectrum Books Pvt. Ltd., revised and enlarged edition(2004).
3. Freedom Fighters of India, Lion M.G. Agrawal, Isha Books Publisher, First Edition (2008).
4. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication(2000).

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Question Paper Pattern

Duration: 3 hours **Total Marks: 50**

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

24UHR3N1

Programme Code :	**For B.A., BBA, B.Com, BCA and B.Sc., Degree Students**		
PART IV –NON MAJOR ELECTIVE –I HUMAN RIGHTS			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2024-2027	**2**	**30**	**2**

COURSE OBJECTIVES

- To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
- To impart education on national and international regime on Human Rights.
- To sensitive students to human suffering and promotion of human life with dignity.
- To develop skills on human rights advocacy
- To appreciate the relationship between rights and duties
- To foster respect for tolerance and compassion for all living creature.

COURSE OUTCOMES

After Completion of the Course the student will be able to

K1	CO1	To understand the hidden truth of Human Rights by studying various provisions in the Constitution of India.
↕	CO2	To acquire overall knowledge regarding the Feminist perspectives in the Liberative Empowerment of Women.
	CO3	To gain knowledge about various gender roles and stereotypes involved in the comprehension of gender equality and women's rights.
	CO4	To comprehend the legal provisions and policies that foreground the safety of children in the society and to promote awareness.
K5	CO5	To gain enhanced knowledge about sexual and gender minorities to recognize, celebrate and acknowledge the diversified forms of gender expressions and rights.

SYLLABUS

UNIT I **(6 Hours)**

HUMAN RIGHTS HUMANS RIGHTS CONSTITUTION OF INDIA: Humans Rights - Constitution Of India

24UHR3N1

UNIT II **(6 Hours)**

WOMEN EMPOWERMENT IN INDIA: Feminism And Sexual Violence - Women And Liberation

UNIT III **(6 Hours)**

GENDER EQUALITY AND WOMEN'S RIGHTS: Stereotype Gender Roles - Women's Education, Power And Science

UNIT IV **(6 Hours)**

RIGHTS OF THE CHILD IN INDIA: Status of child in contemporary Indian society - Special Laws and Policies for protection of children

UNIT V **(6 Hours)**

SOGIESC RIGHTS: Understanding SOGIESC- basic Definitions- inclusivity of SOGIESC- importance of studying SOGIESC- presence of SOGIESC in Indian Traditions- temples and cultural practices that exemplify SOGIESC in India- Genetics of Sex determination- Genetics of Intersex community- Successful SOGIESC Personalities and achievers – Alan Turing- Sally Ride- Leonardo da vinci- Alan Hart- Virginia -Woolf- Bayard Rustin- Padmini Prakash- Akkai Padmashali- K Prithika Yashini- Laxmi Narayan Tripati- Madhu Bai Kinnar-Manabi Bandhopadhyay- SOGIESC Rights and laws

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

Books for Study:

1. Human Rights (2024) Compiled by Kongunadu Arts and Science College, Coimbatore –29.

REFERENCES:

1. Human Rights, (2018) by Jaganathan, MA.,MBA.,MMM.,ML.,ML., (Humanitarian Law) and J.P. Arjun Proprietor: Usha Jaganathan, Refugee Law series, 1st floor, Narmatha Nanthi Street, Magathma Gandhi Nagar, Madurai – 625014.

2. Country Report on SOGIESC Rights In India: An Unfinished Agenda.

Weblink: https://www.ilgaasia.org/publications/india-country-report-an-unfinished-agenda

3. Intersex.

Weblink: https://my.clevelandclinic.org/health/articles/16324-intersex

4. SOGIESC Personalities:

https://www.bbc.com/news/world-asia-india-29357630

https://en.wikipedia.org/wiki/Laxmi_Narayan_Tripathi

https://en.wikipedia.org/wiki/Akkai_Padmashali

https://www.indiatoday.in/india/story/prithika-yashini-india-first-transgender-police-officer-tamil-nadu-969389-2017-04-04

https://yourstory.com/2018/03/first-transgendre-college-principal-west-bengal

5. SOGIESC Rights and laws

https://www.openglobalrights.org/lgbtqia-to-sogiesc-reframing-sexuality-gender-human-rights/

https://static1.squarespace.com/static/5a84777f64b05fa9644483fe/t/625ead0484f9005d75b92 dd0/1650371887436/ILGA+Asia+India+Report+2021.pdf

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QUESTION PAPER PATTERN

Duration: 3 Hours **Max. Marks: 75**

SECTION A (5 x 5 = 25 marks)

Short answers, either or type, one question from each unit.

SECTION B (5 x 10 = 50 marks)

Essay type questions, either or type, one question from each unit.

24UWR4N2

Programme Code:	For B.A., BBA, B.Com, BCA and B.Sc., Degree Students		
	Part IV -NON- MAJOR ELECTIVE – II WOMEN'S RIGHTS		
Batch 2024-2027	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To know about the laws enacted to protect Women against violence.
- To impart awareness about the hurdles faced by Women.
- To develop a knowledge about the status of all forms of Women to access to justice.
- To create awareness about Women's rights.
- To know about laws and norms pertaining to protection of Women.
- To understand the articles which enables the Women's rights.
- To understand the Special Women Welfare laws.
- To realize how the violence against Women puts an undue burden on healthcare services.

COURSE OUTCOMES

After Completion of the Course the student will be able to

K1	CO1	Appraise the importance of Women's Studies and incorporate Women's Studies with other fields
↑	CO2	Analyze the realities of Women Empowerment, Portrayal of Women in Media, Development and Communication
↕	CO3	Interpret the laws pertaining to violence against Women and legal consequences
↕	CO4	Contribute to the study of the important elements in the Indian Constitution, Indian Laws for Protection of Women
K5	CO5	Spell out and implement Government Developmental schemes for women and create awareness on modernization and impact of technology on Women

Syllabus

Unit I **(6 Hours)**

Women's Studies: Basic concepts of Women's studies in Higher education, Women's studies perspectives- Socialization- Patriarchy- Women's studies as an academic discipline- Growth and development of Women's studies as a discipline internationally and in India.

Unit II **(6 Hours)**

Socio-Economic Development of Women: Family welfare measures, role of Women in economic development, representation of Women in media, status of Women land rights, Women Entrepreneurs, National policy for the empowerment of women.

Unit III **(6 Hours)**

Women's Rights – Access to Justice: Crime against Women, domestic violence – physical abuse- verbal abuse – emotional abuse - economic abuse – minorities, dowry- harassment and death, code of conduct for work place, abetment of suicide.

Unit IV **(6 Hours)**

Women Protective acts: Protective legislation for Women in the Indian constitution- Anti dowry, SITA, PNDT, and Prevention Sexual Harassment at Workplace (Visaka case), Domestic violence (Prevention) Act.

Unit V **(6 Hours)**

Women and Child welfare: Safety provisions - various forms of mass media, radio, visual, internet, cyber space, texting, SMS and smart phone usage. Healing measures for the affected Women and child society by private and public sector, NGO and society.

Teaching Methods:

- Smart Class Room / Power point Presentation / Seminar / Quiz / Discussion / Flipped Class

Text Book:

1.Women's Rights (2021), compiled by Kongunadu Arts & Science College, Coimbatore – 641 029.

Reference Books:

1."Rights of Indian Women" by Vipul Srivatsava. Publisher: Corporate Law Advisor, 2014.

2."Women's security and Indian law" by Harsharam Singh. Publisher: Aabha Publishers and Distributors, 2015.

3."Women's Property Rights in India" by Kalpaz publications, 2016.

UMA 174

24UWR4N2

QUESTION PAPER PATTERN

Duration: 3 Hours **Max. Marks: 75**

SECTION A (5 x 5 = 25 marks)

Short answers, either or type, one question from each unit.

SECTION B (5 x 10 = 50 marks)

Essay type questions, either or type, one question from each unit.

Programme Code :	For B.A., B.Sc., and BCA Degree Students		
PART IV - NON- MAJOR ELECTIVE III –CONSUMER AFFAIRS			
Batch	**Hours/Week**	**Total Hours**	**Credits**
2024-2027	**2**	**30**	**2**

COURSE OBJECTIVES

1.To familiarize the students with their rights and responsibilities as a consumer.
2.To understand the procedure of redress of consumer complaints.
3.To know more about decisions on Leading Cases by Consumer Protection Act.
4.To get more knowledge about Organizational set-up under the Consumer Protection Act
5.To impart awareness about the Role of Industry Regulators in Consumer Protection
6.To understand Contemporary Issues in Consumer Affairs

COURSE OUTCOMES

K1 to K5	CO1	Able to know the rights and responsibility of consumers.
	CO2	Understand the importance and benefits of Consumer Protection Act.
	CO3	Applying the role of different agencies in establishing product and service standards.
	CO4	Analyse to handle the business firms' interface with consumers.
	CO5	Assess Quality and Standardization of consumer affairs

SYLLABUS

UNIT I **(6 Hours)**

Conceptual Framework - Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000suite

UNIT II **(6 Hours)**

The Consumer Protection Law in India - Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

UNIT III **(6 Hours)**

Grievance Redressal Mechanism under the Indian Consumer Protection Law - Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNIT IV **(6 Hours)**

Role of Industry Regulators in Consumer Protection

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance Ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI
v. Electricity Supply: Electricity Regulatory Commission
vi. Real Estate Regulatory Authority

UNIT V **(6 Hours)**

Contemporary Issues in Consumer Affairs - Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer

protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

Note: Unit 2 and 3 refers to the Consumer Protection Act, 2086. Any change in law would be added appropriately after the new law is notified.

Teaching Methods

Smart ClassRoom /Powerpoint presentation /Seminar /Quiz/Discussion /Flipped Class/ peer Learning/ Experiential Learning/Blended learning

SUGGESTED READINGS:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, UniversitiesPress.

2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications PvtLtd.

3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, RegalPublications

4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, NewDelhi

5 .Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company

6. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.

7. E-books :-www.consumereducation.in

8. Empowering Consumers e-book,www.consumeraffairs.nic.in

9. ebook,www.bis.org

10. The Consumer Protection Act, 2086 and its later versions.

Question paper pattern

Duration: 3 hrs **Max: 75 Marks**

Section A (5 x 5=25)

Short notes

Either – or / type – question from each unit.

Section B (5 x 10=50)

Essay type

Either – or / type – question from each unit.

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VALUE ADDED COURSE
STATISTICAL TOOLS USING R PROGRAMMING

Semester : IV
Duration : 30 Hours

CHAPTER – 1 INTRODUCTION

- •Introduction and preliminaries
- •The R environment - Related software and documentation
- •Installing and overview of R and R studio
- •Getting help with functions and features - R commands, case sensitivity
- •Executing commands from or diverting output to a file
- •Data permanency and removing objects
- •Simple manipulations; numbers and vectors: Vectors and assignment - Vector Arithmetic
- •Generating regular sequences - Logical vectors

CHAPTER – 2 OBJECTS AND ATTRIBUTES

- •Missing values - Character vectors
- •Index vectors - selecting and modifying subsets of a data set
- •Objects, their modes and attributes
- •Changing the length of an object - Getting and setting attributes
- •Ordered and unordered factors
- •The function apply () and ragged arrays - Ordered factors

CHAPTER – 3 ARRAY AND MATRICES

- •Arrays and matrices
- •Array indexing - Subsections of an array
- • Index matrices - The array () function – Mixed vector and array arithmetic
- •The recycling rule
- • Matrix facilities - Matrix multiplication Lists
- •Data frames - Working with data frames
- •Managing the search path

CHAPTER – 4 CONDITIONAL EXECUTION

- •Reading data from files
- •Accessing built - in datasets - Editing data
- •Grouping, loops and conditional execution - Control statements
- •Repetitive execution: for loops, repeat and while
- •The '...' argument - Assignments within functions

CHAPTER – 5 R – PACKAGES

- •Graphical procedures: High-level plotting commands
- •Graphics parameters list - Graphical elements
- •Pre – defined methods
- •CHARTS – pie charts, bar chart, plot
- •Packages
- •Spam detection
- •Credit card fraud detection

CHAPTER – 6 SUMMARY STATISTICS

- ·Measures of Location
- ·Measures of dispersion

CHAPTER – 7 CLASSICAL STATISTICAL TESTS

·Null-hypothesis testing
·Test statistics

VALUE ADDED COURSE

PYTHON Programming

Semester : V
Duration : 30 Hours

- **Introduction**
  - Comparison C, C++, Python
  - Programming LanguageIntroduction
- **Python**
  - AboutPython
  - WhyPython?
  - PythonInterpreter
  - PythonCompilation
  - Python Scripts in Linux/Unix &Windows
  - White spaceSignificance
  - LineTermination
  - Comments in Python
  - Basic OutputGeneration
  - Simple User Input
  - PythonModules
  - Module SearchPaths
  - Determining the System SearchPath
- **Programming in Python**
  - PythonVariables
  - Naming Conventions & Rules
  - Types asObjects
  - Variable References & GarbageCollection
  - Sequence Types
  - ListIteration
  - ListEnumeration
  - NumericTools
  - The DecimalModule
  - OperatorPrecedence
  - Generating Strings inPython
  - Common String Methods
  - Type Conversion in Python
  - Formatting StringOutput
  - VariableSubstitution
  - StringSlicing
  - Conditional Statements and Looping
  - Basic Input/Output with Files

- Arrays&Functions

- **Python'sLists**
  - Common List Methods
  - Other ListOperations
  - The range ()Function
  - Multidimensional
  - Lists(Matrices)
  - Tuples
- **Python Dictionaries**
  - Introduction
  - Assigning Values toDictionaries
  - DictionaryMethods
  - Dictionaries Vs. Lists & Tuples
- **Modules & Packages**
  - ModuleBasics
  - Packages
  - Using all and _Variables
  - Usingname
- **OOP'sProgramming**
  - The ClassStatements
  - ClassInheritance
  - Classes as Objects
  - Using Dictionaries
  - Understanding self
  - Overriding Inherited Methods
  - More Inheritance
  - Operator Overloading
  - Empty Classes for Storage
- **Databases Connection with Python**
  - About Database Access
  - Postgre SQL Connect Strings
  - Cursor Objects
- **Exception Handling**
  - Default Exception Handler
  - Exception Classes
  - Using Try/Except/Finally Exceptions
  - Custom Exceptions
  - Exception Implementation
  - Using Asserts
- **Python & the Web**

- About the Web
- Understanding HTTP
- Using the CGI Module