KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

Program Name : B.Sc Mathematics

Curriculum and Scheme of Examination under CBCS

(Applicable to the students admitted during the Academic Year 2021-2022 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	21TML101@	Language I@	6	25	75	100	3	3
	II	21ENG101	English -I	6	25	75	100	3	3
	III	21UMA101	Core Paper 1 - Classical Algebra	4	25	75	100	3	4
	III	21UMA102	Core Paper 2 - Calculus	5	25	75	100	3	4
	III	21UMA1I1	Allied Paper 1 - Statistics I	7	25	75	100	3	5
	IV	21EVS101	Environmental Studies **	2	-	50	50	3	2
	Total			**30**	-	-	**550**	-	**21**
II	I	21TML202 @	Language II@	6	25	75	100	3	3
	II	21ENG202	English –II	6	25	75	100	3	3
	III	21UMA203	Core Paper 3 - Differential Equations and Laplace Transforms	4	25	75	100	3	4
	III	21UMA204	Core Paper 4 - Trigonometry, Vector calculus and Fourier Series	5	25	75	100	3	4
	III	21UMA2I2	Allied Paper 2 - Statistics II	7	25	75	100	3	5
	IV	21VED201	Value Education- Moral	2	-	50	50	3	2

			and Ethics**						
	Total			**30**	-	-	**550**	-	**21**
III	I	21TML303@	Language III@	6	25	75	100	3	3
	II	21ENG303	English –III	6	25	75	100	3	3
	III	21UMA305	Core Paper 5 - Analytical Geometry	4	25	75	100	3	4
	III	21UMA306	Core Paper 6 - Statics	3	25	75	100	3	3
	III	21UPH3A3	Allied Paper 3 - Physics I Theory	5	20	55	75	3	4
	III	-	Allied Practical 1- Physics I Practical	2	-	-	-	-	-
	IV	21UGA3S1	Skill Based subject 1- General Awareness	2	25	75	100	2	3
	IV	21TBT301/21TAT301/21UHR3N1	Basic Tamil* / Advanced Tamil**/ Non-major elective- I**	2	-	75	75	3	2
	Total			**30**	-	-	**650**	-	**22**
IV	I	21TML404 @	Language IV@	6	25	75	100	3	3
	II	21ENG404	English –IV	6	25	75	100	3	3
	III	21UMA407	Core Paper 7 –Number Theory	3	25	75	100	3	3
	III	21UMA408	Core Paper 8 - Dynamics	4	25	75	100	3	4
	III	21UPH4A4	Allied Paper 4 - Physics II – Theory	5	20	55	75	3	4
	III	21UPH4AL	Allied Practical 1- Physics I Practical	2	20	30	50	3	2
	IV	21UMA4S2	Skill Based subject 2- Vedic Mathematics	2	25	75	100	3	3

	IV	21TBT402/21TAT402/21UHR4N2	Basic Tamil* / Advanced Tamil**/ Non-major elective- II**	2	-	75	75	3	2
	Total			**30**	-	-	**700**	**-**	**24**
V	III	21UMA509	Core Paper 9 - Real Analysis I	5	25	75	100	3	3
	III	21UMA510	Core Paper 10 - Complex Analysis I	6	25	75	100	3	4
	III	21UMA511	Core Paper 11 - Modern Algebra I	6	25	75	100	3	4
	III	21UMA512	Core Paper 12 - Programming in C- Theory	4	25	75	100	3	3
	III	21UMA5CL	Core Practical - Programming in C- Practical	2	40	60	100	3	2
	III	21UMA5E1	Major Elective 1	5	25	75	100	3	5
	IV	-	**EDC**	2	25	75	100	3	3
	-	21UMA5IT	Internship Training ****	Grade					
	Total			**30**	-	-	**700**	**-**	**24**
VI	III	21UMA613	Core Paper 13 - Real Analysis II	6	25	75	100	3	4
	III	21UMA614	Core Paper 14 - Complex Analysis II	6	25	75	100	3	4
	III	21UMA615	Core Paper 15 - Modern Algebra II	6	25	75	100	3	4
	III	21UMA6E2	Major Elective 2	6	25	75	100	3	5
	III	21UMA6Z1	Project***	3	20	80	100	-	5
	IV	21UMA 6SL	Skill Based Subject 3- Fundamentals of LaTeX- Practical	3	40	60	100	3	3

	-	-	SWAYAM-MOOC	-	-	-	-	-	2
	Total			**30**	-	-	600	-	**27**
	V	21NCC/NSS/YRC/PYE/ECC/RRC/ WEC101#	Extension Activities*	-	50	-	50	-	1
Grand Total				**-**	**-**	**-**	**3800**	**-**	**140**

Note :

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

@ Hindi/Malayalam/ French/ Sanskrit – 21HIN/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 an Internship training / field work for a minimum period of 2 weeks at the end of the fourth semester during summer vacation and submit the report in the fifth semester. The report will be evaluated for 100 marks along with the internal viva voce by the respective Faculty. 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
3. Linear Algebra
4. Astronomy
5. Fuzzy Mathematics
6. Combinatorics

Non-Major Elective Papers

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

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

21UMA5X1 - Fundamentals of Mathematics

 # List of Extension 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)

Diploma Course

1. Diploma course in Vedic Mathematics for both UG and PG students.

Certificate Course

1. Certificate course in Vedic Mathematics for both UG and PG students.

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	58
	-	SWAYAM-MOOC	-	2
	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	Extension 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.
- The students should complete a **SWAYAM-MOOC** before the completion of the 5th semester and the course completed certificate should be submitted through the HOD to the Controller of Examinations. Two credits will be given to the candidates who have successfully completed. In case the students have completed more than one online course, the appropriate 2 extra credits shall be awarded to such candidates upon the submission of certificate through the HOD to the Controller of Examinations.
- A **Field Trip** preferably relevant to the course should be undertaken every year.

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	

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

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

1. Theory Examination - Part I, II & III

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

Knowledge Level	Section	Marks	Description	Total
K1 – K2 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K2 – K4 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K2 - K4 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

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

Knowledge Level	Section	Marks	Description	Total
K1 – K2 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 – K4 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K2- K4 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. Practical Examination:

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

3. Project Viva Voce:

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

21UMA101

Programme Code: 02		**B.Sc Mathematics**		
Course Code: 21UMA101		Core Paper 1 - Classical Algebra		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	4	60	4

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 K4	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.

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)**

21UMA101

Teaching Methods

Chalk and Talk /Powerpoint presentation/ Seminar/Quiz/Discussion/Assignment/ Smart Class Room

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

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

21UMA102

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA102		Core Paper 2 –CALCULUS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	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 K4	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.

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.

21UMA102

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class Room

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

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

21UMA1I1

Programme Code : 02		**B.Sc Mathematics**		
Course Code : 21UMA1I1		Allied Paper 1-STATISTICS – I		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	7	105	5

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 K4	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, Poission and Normal distributions.
	CO4	Analyzing how correlation is used to identify the relationships between variables and how regression analysis is used to predict outcomes.

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.

21UMA1I1

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class Room

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.

21UMA1I1

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

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

21EVS101

PART IV – ENVIRONMENTAL STUDIES

Total Credits: 2 Total Hours: 30

Objectives:

1. To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
2. To shape students into good "eco-citizens" thereby catering to global environmental needs.

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.

21EVS101

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT (6 hours)

Sustainable Development – 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 -.

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

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.

21UMA203

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA203		Core Paper 3 - Differential Equations And Laplace Transforms		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	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.

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.

21UMA203

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 .

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

Teaching Methods

Chalk and Talk / Powerpoint presentation/ Seminar/Quiz/Discussion/Assignment/ Smart Class Room

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

21UMA203

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

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

21UMA204

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA204		Core Paper 4 - Trigonometry, Vector Calculus And Fourier Series		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	5	75	4

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 K4	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.

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.

21UMA204

UNIT IV **(15 Hours)**

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

UNIT V **(15 Hours)**

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/Smart Class room

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

21UMA204

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.

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

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

21UMA2I2

Programme Code : 02		B.Sc Mathematics		
Course Code : 21UMA2I2		Allied Paper 2-STATISTICS – II		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	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.

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.

21UMA2I2

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.

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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

21UMA2I2

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

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

21VED201

SEMESTER – II

PART – IV VALUE EDUCATION: MORAL AND ETHICS

Total Hours: 30 **Total Credits: 2**

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.

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

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**

Physical Fitness and Mental Harmony: Simplified Physical Exercise – Hand Exercises – Leg Exercises – Neuro Muscular Breathing Exercises – Eye Exercises – Kabalabathi – Maharasana A & B – Massage - Acupressure – Relaxation – Kayakalpa Yogam - LifeForce – Aim & Objectives – Principle – Methods. Introspection – Analysis of Thoughts – Moralization of Desires – Neutralization of Anger – Eradication of Worries

21VED201

UNIT V: 8 Hours

Yoga and Meditation – The Asset of India: Yogasanam – Rules & Regulations – Surya Namaskar – Asanas –Sitting – Stanging – Prone - Supine - Pranayama – Naadi Sudhi – Ujjayi – Seethali – Sithkari - Benefits.Meditation – Thanduvasudhi - Agna – Shanthi – Thuriyam – Benefits.

Text Book:

Value Based Education – Moral and Ethics – Published by Kongunadu Arts and Science College (Autonomous), First Edition (2020).

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).

5. Yoga Practices - 1 – The World Community Service Centre – Vethathiri Publications, Sixth Edition (2017),Erode.

6. Yoga Practices - 2 – The World Community Service Centre – Vethathiri Publications – Eighth Edition (2017),Erode.

Question paper pattern

(External only)

Duration: 3 hrs Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

21UMA305

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA305		Core Paper 5 - Analytical Geometry		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	III	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 K4	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.

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.

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.

21UMA305

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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

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

21UMA306

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA306		Core Paper 6 –Statics		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	III	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 K4	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.

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) – Condition of any number of forces acting upon a particle.

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 – Resultant of coplanar couples – Resultant of a couple and a force.

21UMA306

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 – Conditions for a system of forces to reduce to a single force.

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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.

21UMA306

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

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

21UGA3S1

SEMESTER-III

PART-IV SBS I – GENERAL AWARENESS

Total Hours : 30 **Total Credits: 3**

Course Objectives

1. To acquire knowledge in relation to various competitive examinations.
2. To encourage the students to newspaper reading and journals.
3. To familiarise the students with online examinations which are being adopted in competitive examinations.

Course Outcomes (CO)

K1 to K4	CO1	Knowledge about literature, Reasoning, Science and Technology and Youth Red Cross.
	CO2	Remembering important data on general knowledge.
	CO3	Make use of the data for competitive examinations
	CO4	Analyse social phenomena

Syllabus

Unit I (6 Hours)

1. **Tamil and other Literatures**
   Tamil, English, Christian and Muslim Literatures – Ancient Literature – Bakthi Literature – Epics – Medieval Literature – Modern Literature (Novel, Dramas, Short Stories, Modern Poetry).

2. **Economics and Commerce**
   Basic Economics – Auditing – Management – Capital Market – Foreign Trade – Companies – Banking.

3. **Social studies**
   Indian History – Inventions – Indian Poetry – Constitution - Judiciary – Languages – Literacy – Indian Geography – Lithosphere – Climate – Soil – Agriculture – Population.

21UGA3S1

UNIT II (6 hours)

4. Numerical Aptitude

Objective Arithmetic : Number systems – probability – HCF and LCM of numbers - decimal fractions – simplification – square roots and cube roots – average – percentage – profit and loss – ratio and proportion – time and work – simple interest – area, volume and surface area**.**

5. Verbal Aptitude

Spot the odd one out – correct form of verb – preposition – find out the rightly spelt word – choose the correct meaning of idioms – synonyms and antonyms.

6. Abstract Reasoning

Logic Reasoning : Logic – statement – arguments – statement assumptions – Statement course of action – theme detection – deriving conclusion from passages.

Non – verbal Reasoning : Series – analogy – classification – analytical reasoning – mirror images – water images – paper folding – paper cutting – rule detection – grouping of identical figures.

UNIT III (6 hours)

7. General Science and Technology

SCIENCE - Basic principles and concepts in Physics, Chemistry, Botany and Zoology.

TECHNOLOGY - Metallurgy, instrumentation, discoveries and inventions of techniques.

8. Computer Science

Historical evolution of computers – Computer applications – Data processing concepts – Computer codes and arithmetic – Hardware components – Data Structures.

9. Education

Development process of the learner – Principles of development (physical, social, emotional and intellectual) – Learning process – Teaching and teacher behavior – Interaction analysis – Microteaching – Teacher as a leader – Motivation – Personality dimension – concept of mental health – Counseling.

UNIT IV (6 hours)

10. Library and Information Science

Library and Information Science – Basics, Computer, Library Network and others like Research, Reprography etc.

21UGA3S1

11. Sports and Games

Athletics – Track Events – Field Events – Games – Indoor Games – Outdoor Games – General knowledge – Sport and Olympics – First Aid.

12. Current Affairs

State, Central and International affairs: Budgets – Politics – Sports – Education – Commerce and Industry – Inventions – Science and Technology – Currency – Agriculture – Movies – Guinness records – Awards – IT Industry – Space Research – Defence etc.

UNIT V (6 hours)

13. National Cadet Corps (NCC)

Introduction to the Armed Forces (Army, Navy, Air Force) – Dril – Weapon Training – Map Reading – Civil Defence.

14. National Service Scheme (NSS)

History of NSS – History of Motto, Symbol, Badge – Aims and Objectives – Duties and Total Hours – Organisational and Administrational setup – History of voluntary organization – Regular activities – Special camp activities – Special programmes – awards – Important days.

15. Youth Red Cross (YRC)

History of International Red Cross – History of Indian Red Cross – History of Youth Red Cross – Main objectives of YRC – Emblem – Fundamental principles of Red Cross – Organizational Setup – Activities of Youth Red Cross – Role of different functionaries – Training programmes for YRC Program Officers – Training programme for YRC Volunteers – YRC Song – Working Hours – General orientation – Special orientation – Program skill learning.

Text Book

1. General Awareness, Question Bank, Kongunadu Arts and Science College, Coimbatore, First Edition 2014.

Reference Books

1. **General Knowledge Manual 2007**, Tata McGraw Hill Publication Company Limited, New Delhi, 2007.
2. Edgar Thorpe and Showick Thorpe, **The Pearson General Knowledge Manual 2013**, Dorling Kindersley India Pvt. Ltd, 2013.
3. Dr. Sanjay R Agashe, Introduction to **Physical Education Fitness and Sports**, Koncept Book, Uttarkhand, 2007.

21UGA3S1

Teaching Methods

Quiz/Discussion

MAPPING

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

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

21UMA407

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA407		Core Paper 7 - Number Theory		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	IV	3	45	3

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 K4	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.

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.

21UMA407

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.

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

Teaching Methods

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/Smart Class room

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

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

21UMA408

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA408		Core Paper 8 –Dynamics		
Batch 2021-2024	**Semester** IV	**Hours / Week** 4	**Total Hours** 60	**Credits** 4

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 K4	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 and solving two fold problems in central orbits.

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.

21UMA408

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

21UMA408

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

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

21UMA4S2

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA4S2		Skill Based Subject 2–Vedic Mathematics		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	IV	2	30	3

Course Objectives

1. To make the students to calculate faster.
2. To equip the students with skills to meet competitive examinations.
3. To train the students to solve complex problems efficiently.

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Course Outcomes (CO)

K1 to K4	CO1	To understand various techniques in Vedic Mathematics
	CO2	To remember the steps involved in each technique
	CO3	To solve general equations
	CO4	To analyze the different methods available for effective calculation

Syllabus

UNIT I **(6 Hours)**

Basic Level: Miscellaneous Simple Method.

UNIT II **(6 Hours)**

Criss-Cross System of Multiplication - Squaring numbers.

UNIT III **(6 Hours)**

Base method of Multiplication - Base method of Squaring.

UNIT IV **(6 Hours)**

***Magic Squares** - Dates and Calendars**.**

UNIT V **(6 Hours)**

General Equations - Tips for Competitive Exams.

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

Teaching Methods

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

21UMA4S2

Text Book

Vedic Mathematics Made Easy- Dhaval Bathia—Jaico Publication, 8th Edition, 2017 Mumbai-400 001.

Unit I	Chapter 1	Page No. 13-33
Unit II	Chapter 2	Page No. 35-43
	Chapter 3	Page No. 50-56
Unit III	Chapter 6	Page No. 81-103
	Chapter 7	Page No. 104-109
Unit IV	Chapter 9	Page No. 120-131
	Chapter 10	Page No. 132-144
Unit V	Chapter 11	Page No. 145-147
	Special Section	Page No. 205-212

Reference Books

1. Vedic Mathematics – V.S. Agrawal- Motilal Banarsidass Publisher, 1st Edition, 2014.
2. Vedic Mathematics Made Easy- Pandit Ramnandan—Arihant Publications-Meerut, 2011.
3. Vedic Mathematics Skills-Kapoor S.K.-Lotus Press, Delhi, 2006.

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

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

21UMA509

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA509		Core paper 9 - Real Analysis-I		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	V	5	75	3

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 K4	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.

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.

21UMA509

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.

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

Chalk and Talk/PowerPoint presentation/ Seminar/Quiz/ Discussion/ Assignment/ Smart Class room

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.

21UMA509

3. G. Birkhoff and MacLane, A survey of Modern Algebra, 1st Edition,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.

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

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

21UMA510

Programme Code: 02		**B.Sc Mathematics**		
Course Code: 21UMA510		Core Paper 10 - Complex Analysis – I		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	V	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 K4	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.

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.

21UMA510

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

Chalk and Talk /PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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

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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

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

21UMA511

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA511		Core Paper 11 - Modern Algebra I		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	V	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 K4	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.

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.

21UMA511

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

Chalk and Talk/Power point Presentations/ Group discussions/ Seminar/Assignment/ Smart Class room

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

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

21UMA512

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA512		Core paper 12 - Programming in C Theory		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	V	4	60	3

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 K4	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	Distinguish different types of arrays.

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.

21UMA512

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

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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

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Unit III	Chapter 6	Page No 131 – 155
Unit IV	Chapter 7	Page No 171 – 194
	Chapter 8	Page No 212 – 236
Unit V	Chapter 9	Page No 257 – 280

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

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

21UMA5CL

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA5CL		Core Practical 1 - Programming in C Practical		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	V	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	Applying the concepts of loops and control statements in C programs.
	CO2	Classify the various operators used to develop a solution for a mathematical problem
	CO3	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 find the Factorial of a number.
5. Program to frame Fibonacci series.
6. Program to find the arithmetic mean of n numbers.
7. Program to find the median 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 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

21UMA5CL

Distribution of Marks in ESE			**CIA**		
Experiment	:	50	CIA Practical	:	25
Record	:	10	Exam		
			Attendance	:	5
Total		**60**	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

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

21UMA5X1

Extra Departmental Course (EDC)				
Course Code: 21UMA5X1		Fundamentals of Mathematics		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2021-2024	V	2	30	3

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)

K1 to K4	CO1	Remembering the concepts of matrices and set theory.
	CO2	Understand the appropriate Statistical techniques for summarizing and displaying business data.
	CO3	Applying basic mathematical concepts in business problems.
	CO4	Analyze the correlation and its types.

Syllabus

UNIT I **(6 Hours)**

TIME AND WORK: Problems based on Time and Work – Simple Problems.

UNIT II **(6 Hours)**

TIME AND DISTANCE: Problems based on Time and Distance – 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.

21UMA5X1

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

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

21UMA613

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA613		Core Paper 13 - Real Analysis-II		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	VI	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 K4	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.

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.

21UMA613

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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, 4.23
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.
4. 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

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

21UMA614

Programme Code : 02		**B.Sc Mathematics**		
Course Code:21UMA614		Core paper 14 - Complex Analysis – II		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	VI	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 K4	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.

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.

21UMA614

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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.

21UMA614

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

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

21UMA615

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 21UMA615		Core Paper 15 - Modern Algebra II		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	VI	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 K4	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 .

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.

21UMA615

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

Chalk and Talk/PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Assignment/ Smart Class room

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.

21UMA615

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

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

21UMA6Z1

Programme Code : 02	B. Sc Mathematics
Course code: 21UMA6Z1	Project
Batch 2021-2024	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)

K3 toK5	CO1	Applying the relative notions in the respective areas and finding the results.
	CO2	Analyzing results with the existing results.
	CO3	Interpreting the results with suitable examples.

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

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

21UMA6SL

Programme Code : 02		**B.Sc Mathematics**		
Course Code:21UMA6SL		Skill Based Subject 3 Fundamentals of LaTeX-Practical		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	VI	3	45	3

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	Constructing the letters, dissertation, curriculum vitae and other documents using LaTeX.
	CO2	Analyzing the LaTeX software for the preparation of question papers and tables.
	CO3	Choosing LaTeX for typing Mathematical equation, case statements and Matrices.

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
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

21UMA6SL

4. Using LaTeX, type the following equation

$$\sqrt{\sqrt{n! + \sqrt{45}}} + \int_{0}^{x} \int_{\sqrt{\sqrt{16}}}^{x} \sqrt{\sqrt{e^x}} dx + \frac{d^2y}{dx^2}$$

5. Using LaTeX, prepare a letter to get permission from the Secretary, Kongunadu Arts and Science College, Coimbatore – 641 029 for organizing the educational tour through proper channel.
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:	I M.Sc. Mathematics
Title of the Paper:	Modern 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).

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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.

$$(a) x_\lambda = \begin{cases} x \ \ if\ \lambda\ is\ an\ eigenvalue \\ -x \ \ if\ -\lambda\ is\ an\ eigenvalue \\ 0 \ \ otherwise \end{cases}$$

$$(b) |x| = \begin{cases} x \ \ if\ x \geq 0 \\ -x \ \ if\ x < 0 \\ 0 \ \ otherwise \end{cases}$$

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) $\binom{m+n}{m} = \frac{(m+n)!}{m!n!} = \frac{\overbrace{(m+n)(m+n-1)\dots(n+1)}^{mfactors}}{\underbrace{m(m-1)\dots 1}_{mfactors}}$

(b)

$$1+2+\cdots+n = \frac{1}{2}\big((1+2+\cdots+n)+(n+\cdots+2+1)\big)$$

$$= \frac{1}{2}\underbrace{(n+1)+(n+1)+\cdots+(n+1)}_{ncopies}$$

$$= \frac{n(n+1)}{2}$$

12. Using LaTeX, type the following equation

$$\int_0^\infty e^{-\rho}\rho^{2l}\left[L_{n+l}^{2l+1}(\rho)\right]^2\rho^2 d\rho = \frac{2n[(n+l)!]^3}{(n-l-1)!}$$

13. Create a frame environment with title LaTeX Beamer presentation and include author name, institute, current date and footnote.
14. Include few figures in documents.
15. Create references using bibliography environment and cite the references in a document.
16. Use the LaTeX package “tikz” to draw the Petersen and Nauru diagrams.
17. Create molecular orbital diagrams for Homo and Hetero diatomic molecules by using MO diagram package.
18. Merge the coding of R with the LaTeX document and generate the output.
19. Create scientific poster using Tikz poster or beamer poster package.

21UMA6SL

Distribution of Marks in CIA

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

Distribution of Marks in ESE

Experiment: 50
Record: 10
Total: 60

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

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

Programme Code : 02	**B.Sc Mathematics**		
Major Elective Paper - Operations Research			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	6	75	5

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 K4	CO1	Analyzing the concept of linear programming problem using Simplex Method.
	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

Syllabus

UNIT I **(15 Hours)**

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

UNIT II **(15 Hours)**

Linear Programming Problem: Use of Artificial Variables - Big M method - Two phase simplex method

Advanced Techniques: Introduction – Revised Simplex Method

UNIT III **(15 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 **(15 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 **(15 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

Chalk and Talk/Power point Presentations,/Group discussions,/Seminar /Assignment/ Smart Class Room

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

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

Programme Code: 02	**B.Sc Mathematics**		
Major Elective Paper- NUMERICAL METHODS			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	5	75	5

Course Objectives

1. To solve algebraic and transcendental equations for finding roots usingnumerical 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 K4	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 ordinary differential equations by using numerical methods.

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 - Solving algebraic and transcendental equations using MATLAB.

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)**

Difference equations: Definition- Order and degree of a difference equation- Linear difference equation- To find complementary function of $f(E)y_x=\phi(x)$- To find particular integral of $f(E)y_x=\phi(x)$.

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

Teaching methods

Chalk and Talk/Power point Presentations, Group discussions, Seminar , Assignment, Smart Class Room

Text Book

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
Unit V	Chapter X	Sections 10.1 -10.4, 10.6

2. 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. 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.

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

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

Programme Code : 02	**B.Sc Mathematics**		
Major Elective Paper- LINEAR ALGEBRA			
Batch 2021-2024	**Hours / Week** 5	**Total Hours** 75	**Credits** 5

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 K4	CO1	Remember 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	Solve problems that can be modeled by systems of linear equations.
	CO4	Examining the solution set of a system of linear equations

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

Chalk and Talk/Power point Presentations/Group discussions/Seminar /Assignment/Smart Class Room

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

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

Programme Code : 02	**B.Sc Mathematics**		
Major Elective Paper-ASTRONOMY			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	5	75	5

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 K4	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	Analyze to draw valid scientific conclusions and communicate those conclusions in a clear and articulate manner.

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

Chalk and Talk/Power point Presentations/Group discussions/Seminar /Assignment/Smart Class Room

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

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

Programme Code : 02	**B.Sc Mathematics**		
Major Elective Paper **FUZZY MATHEMATICS**			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	5	75	5

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 K4	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.

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

Chalk and Talk/Power point Presentations/Group discussions/Seminar /Assignment/Smart Class Room

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

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

Programme Code : 02	**B.Sc Mathematics**		
Major Elective Paper **COMBINATORICS**			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	5	75	5

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 K4	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.

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

Chalk and Talk/Power point Presentations/Group discussions/Seminar /Assignment/Smart Class Room

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

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

21UHR3N1

Programme Code : 02	**B.Sc Mathematics**		
PART IV -NON MAJOR ELECTIVE –I HUMAN RIGHTS			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	2	30	2

Objectives

1. To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
2. To impart education on national and international regime on Human Rights.
3. To sensitive students to human suffering and promotion of human life with dignity.
4. To develop skills on human rights advocacy
5. To appreciate the relationship between rights and duties
6. To foster respect for tolerance and compassion for all living creature.

UNIT – I

Definition, Meaning, Concept ,Theories and Kinds of Human Rights- Evaluation and Protection of Human Rights in India- Development of Human Rights under the United Nations.

UNIT – II

United Nations Charter and Human Rights - U.N.Commission on Human Rights- Universal Declaration of Human Rights - International Covenant on

- Civil & Political Rights
- Economic, Social and Cultural Rights

UNIT – III

Human Rights and Fundamental Rights (Constitution) - Enactments regarding Human Rights Laws in India - National Human Rights Commission and State Human Rights Commission.

UNIT – IV

Aged persons and their Human Rights - Human Rights of Persons with Disabilities - Tribal Human Rights in India - Three Generation Human Rights -Social Awareness and Responsibilities of Individuals.

21UHR3N1

UNIT – V

Rights of Women, Child, Refugees and Minorities –Social media and Human Rights - NGO's in protection of Human Rights - Right to Election

Books for Study:

1. Human Rights (2019) Published by Kongunadu Arts and Science College, Coimbatore –29.

Book for Reference:

1.Human Rights, Humanitarian Law and Refugee Law (2018) Jaganathan,MA.,MBA.,MMM.,ML.,ML., J.P.Arjun Proprietor,Usha Jaganathan law series, 1st floor, Narmatha Nanthi Street, Magathma Gandhi Nagar, Madurai – 625014.

Question Paper Pattern
(External only)

Duration: 3 hrs Max: 75 marks

Section A(5x5=25)

Short notes

Either – Or/ Type - Question from each unit

Section B(5X10=50)

Essay type

Either – Or/ Type - Question from each unit

21UWR4N2

Programme Code : 02	**B.Sc Mathematics**		
PART IV -NON MAJOR ELECTIVE-II WOMEN'S RIGHTS			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	2	30	2

OBJECTIVES

1. To know about the laws enacted to protect women against violence.
2. To impart awareness about the hurdles faced by women.
3. To develop a knowledge about the status of all forms of women to access to justice.
4. To create awareness about women's rights.
5. To know about laws and norms pertaining to protection of women.
6. To understand the articles which enables the women's rights.
7. To understand the Special Women Welfare laws.
8. To realize how the violence against women puts an undue burden on health care services.

UNIT 1

Women Studies:

Basic concepts of Women's studies in Higher education,Women's studies perspectives- Socialisation- Patriarchy- Women's studies as an academic discipline- Growth and development of Women's studies as a discipline internationally and in India.

UNIT II

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

Womens' 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.

21UWR4N2

UNIT IV

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

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.

Book for study :1. Women's Rights (2019)Published by Kongunadu Arts & Science College, Coimbatore – 641 029

References

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.

Question paper pattern

(External Only)

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.

Programme Code : 02		**B.Sc Mathematics**	
NON- MAJOR ELECTIVE – CONSUMER AFFAIRS			
Batch 2021-2024	**Hours/Week** 2	**Total Hours** 30	**Credits** 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, and the role of different agencies in establishing product and service standards.
3. To have a handle the business firms' interface with consumers and the consumer related regulatory and businessenvironment.

UNIT I **(15 Hours)**

ConceptualFramework - 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 10000 suite

UNIT II **(15 Hours)**

The Consumer Protection LawinIndia - 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 tradepractice.

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 **(15 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 **(15 Hours)**

Role of Industry Regulators inConsumer Protection

i. Banking: RBI and BankingOmbudsman
ii. Insurance: IRDA and InsuranceOmbudsman
iii. Telecommunication:TRAI
iv. Food Products:FSSAI
v. Electricity Supply: Electricity RegulatoryCommission
vi. Real Estate RegulatoryAuthority

UNIT V **(15 Hours)**

Contemporary Issues inConsumerAffairs - 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 energyratings. 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, 1986. Any change in law would be added appropriately after the new law is notified.

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 PublishingCompany
6. Girimaji, Pushpa (2002). Consumer Right for Everyone PenguinBooks.
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, 1986 and its laterversions.

21UMA1A1

Programme Code: 03		B.Sc Physics		
Course Code:21UMA1A1		Allied Paper 1 - Mathematics I		
Batch	**Semester**	**Hrs/Week**	**Total Hours**	**Credits**
2021-2024	I	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 K4	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.

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.

21UMA1A1

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

Chalk and Talk, Powerpoint presentation, Assignments, Seminar, Smart Class Room

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.

21UMA1A1

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

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

21UMA2A1

Programme Code:03		B.Sc Physics		
Course Code:21UMA2A1		Allied Paper 2 - Mathematics II		
Batch	**Semester**	**Hrs/Week**	**Total Hours**	**Credits**
2021-2024	II	7	105	5

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 K4	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 theGeneral 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.

21UMA2A1

UNIT IV **(21 hrs)**

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

UNIT V **(21 hrs)**

Total differential equations - 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

Chalk and Talk, Powerpoint presentation, Assignments, Seminar, Smart Class Room

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,V)
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

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

21UMA1A2

Programme Code:04		B.Sc Chemistry		
Course Code:21UMA1A2		Allied Paper 1 - Mathematics I		
Batch 2021-2024	**Semester** I	**Hrs/Week** **7**	**Total Hours** 105	**Credits** 5

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 K4	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.

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.

21UMA1A2

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 (α+iβ) , cos (α+iβ), tan (α+iβ)

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^nf(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

Chalk and Talk, Powerpoint presentation, Assignments, Seminar, Smart Class Room

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.

21UMA1A2

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

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

21UMA2A2

Programme Code: 04		B.Sc Chemistry		
Course Code:21UMA2A2		Allied Paper 2 - Mathematics II		
Batch	**Semester**	**Hrs/Week**	**Total Hours**	**Credits**
2021-2024	II	**7**	105	5

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 K4	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

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.

21UMA2A2

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

Chalk and Talk, Powerpoint presentation, Assignments, Seminar, Smart Class Room

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

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

21UCS1A1

Programme Code : 09		B.Sc Computer Science		
Course Code: 21UCS1A1		Allied 1 - DISCRETE MATHEMATICS AND STATISTICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	6	90	5

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 K4	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.

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.

21UCS1A1

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

Chalk and Talk, Power point Presentation, Seminar, Quiz, Assignment, Smart Class Room

Text Books :

1. V. Sunderesan, K.S.Ganapathy Subramanian and K.Ganesan- **"**Discrete Mathematics**"**.A.R publications-(UNIT I,II)

2. S.P. Gupta **"**Statistics**"** , S. Chand and Company Ltd.18th edition 2009(UNIT III, IV, V).

Reference Books :

1. J.P. Trembley and R.P. Manohar **"**Discrete Mathematical structures with applicaitions to computer science**"**. Tata MCGraw Hill-1997

2. R.S.N.Pillai and Bhagavathi- **"**Statistics**"**, 7th edition,2008

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

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

21UCT1A1

Programme Code: 11		B.Sc Computer Technology		
Course Code: 21UCT1A1		Allied 1-Discrete Mathematics and Statistics		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	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 toK4	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

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.

21UCT1A1

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

Chalk and Talk, Power point Presentations, Seminar, Quiz, Assignment, Smart Class Room

Text Books:

1. M. K. Venkataraman, N. Sridharan, N. Chandrasekaran-"Discrete Mathematics".
2. S.P.Gupta " Statistical Methods". Sultan Chand and Sons-2007.

Reference Books:

1. J.P. Trembley and R.P. Manohar "Discrete Mathematical structures with applications to computer science". Tata MCGraw Hill-1997.
2. R.S.N. Pillai and Bhagavathi- "Statistics", 7th edition,2008.

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

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

21UCA3A3

Programme Code: 10		BCA		
Course Code: 21UCA3A3		**OPERATIONS RESEARCH**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	III	6	90	5

Course Objectives

1. Toidentify 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 K4	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.

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

21UCA3A3

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

Chalk and Talk, Power point Presentations, Seminar and Assignments. Smart Class Room

Text Book:

1.Kanti Swarup, P.K Gupta & Man Mohan, "Operations Research"**,** Sultan chand publications, New Delhi.9th edition 2002

Reference Book:

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

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

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

21UBT3A3

Programme Code : 08		**B.Sc Biotechnology**		
Course Code: 21UBT3A3		Fundamentals of Mathematics		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	III	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 K4	CO1	Remember the basic concepts in mathematics.
	CO2	Demonstrating various numerical algorithms for solving simultaneous linear algebraic equations.
	CO3	Apply 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.

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.

21UBT3A3

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

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

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, 2007.
2. 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

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

21UIT1A1

Programme Code : 12		B.Sc Information Technology		
Course Code: 21UIT1A1		MATHEMATICALFOUNDATION OF COMPUTER SCIENCE		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	6	90	5

Course Objectives

1. To understand Matrices, Set theory, Mathematical logic, Relations and Graph theory.
2. To solve the problems of Eigen values and Eigen vector.
3. To solve the problems of statement calculus and predicate calculus

Course Outcomes (CO)

K1 to K4	CO1	Remembering the concepts of matrices, set theory, mathematical logic, relations and graph theory
	CO2	Understanding the basic terminology of discrete mathematics
	CO3	Applying theory inference for statement calculus and predicate calculus
	CO4	Analyzing the results through the program outputs

Syllabus

UNIT I **(18 Hours)**

Matrices – Introduction – Determinant – Inverse of a matrix – Rank of a Matrix – Eigen values and Eigen vectors of a Matrix- Cayley- Hamilton theorem (problems only).

UNIT II **(18 Hours)**

Set theory-Types of sets- Venn-Euler Diagrams- ***Set operations & Laws of set theory**- Fundamental products- partitions of sets-minsets-Algebra of sets and Duality-Inclusion and Exclusion principle.

UNIT III **(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 IV **(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.

21UIT1A1

UNIT V **(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.

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

Teaching Methods

Chalk and Talk, Power Point Presentations, Seminar, Assignment, Quiz, Smart Class Room

Text Books:

1. Dr M.K.Venkataraman **"**Engineering Mathematics Volume II**"**– NPC,2001
2. J.K.Sharma "Discrete Mathematics"**,** 2005, Macmillan India Ltd.

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**"**, AR Publication, 2000.

MAPPING

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

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

21UBB1A1

Programme Code :16		BBA		
Course Code : 21UBB1A1		MATHEMATICS FOR MANAGEMENT – I		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	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 K4	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

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.

21UBB1A1

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

Chalk and Talk, Power point Presentations, Seminar, Quiz and Assignment. Smart Class Room

Text Book:

P.Navaneetham, "Business Mathematics", Nagarathinam, Kajamalai – Trichy,1998.

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

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

21UBA1A1

Programme Code : 17		BBA CA		
Course Code : 21UBA1A1		MATHEMATICS FOR MANAGEMENT – I		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	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 K4	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

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.

21UBA1A1

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

Chalk and Talk, Power point Presentations, Seminar, Quiz , Assignment and Smart Class Room

Text Book:

P.Navaneetham, "Business Mathematics", Nagarathinam, Kajamalai – Trichy,1998.

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

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

21UCM3A3

Programme Code : 13		B.Com		
Course Code: 21UCM3A3		BUSINESS MATHEMATICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	Credits
2021-2024	III	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 K4	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.

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.

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).

21UCM3A3

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

Teaching Methods

Chalk and Talk, PowerPoint presentation, Assignment,Seminar, Smart Class Room

Text Book:

Navaneetham P. A .**"**Business Mathematics & Statistics" , Jai Publisher,2007.

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.

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

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

21UPA1A1

Programme Code : 15		B.Com PA		
Course Code: 21UPA1A1		MATHEMATICS FOR BUSINESS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	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 K4	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

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.

21UPA1A1

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

Chalk and Talk, PowerPoint presentation, Assignment, Seminar, Smart Class Room

Text Book:

P.A. Navaneetham**"**Business Mathematics and Statistics**"**, Jai Publishers, 2007.

Reference Books:

1.Sundaresan and Jayaseelan**, "Introduction to Business Mathematics**",Sultan chand Co& Ltd,New Delhi

2. Sanchetti, D.C and Kapoor, V.K**, "Business Mathematics**" , Sultan chand Co& Ltd, New Delhi

3. G.K.Ranganath, C.S.Sampamgiram and Y.Rajan –"**Business Mathematics**"- Himalaya Publishing House.

21UPA1A1

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

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

21UCC1A1

Programme Code :14		B.Com CA		
Course Code: 21UCC1A1		BUSINESS MATHEMATICS		
Batch 2021-2024	**Semester** I	**Hours / Week** 6	**Total Hours** 90	**Credits** 5

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 K4	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

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

21UCC1A1

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

Chalk and Talk, PowerPoint presentation, Seminar, Assignment, Smart Class Room

Text Book:

1. P.A. Navaneetham**"**Business Mathematics and Statistics**"**, Jai Publishers, 2007.

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.

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

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

21UCB1A1

Programme Code : 19		B.Com (Banking & Insurance)		
Course Code: 21UCB1A1		BUSINESS MATHEMATICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	I	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	CO1	Remembering the basic concepts of mathematics in business analysis
K2	CO2	Understanding the concepts of mathematics in finance
K3	CO3	Applying basic mathematical calculations in business problems
K4	CO4	Analyzing the business conditions using Linear Programming problems.

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.

21UCB1A1

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.

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

Teaching Methods

Chalk and Talk, PowerPoint presentation, Google Class room, Assignment, Seminar,Smart class room

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

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

21UPS3A3

Programme Code : 21		B.Sc Psychology		
Course Code: 21UPS3A3		**ALLIED III: PSYCHOLOGICAL STATISTICS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	III	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 K4	CO1	Select appropriate Statistical techniques for summarizing and displaying social science data.
	CO2	Interpret measures of central tendency and formulate percentile by arranging the data from smallest to largest.
	CO3	Identify and carryout variations in sociological problems.
	CO4	Analyze and interpret the variance form ANOVA output.

Syllabus

UNIT I **(15 Hours)**

Introduction: Meaning and Definition of Statistics – *__Nature and Scope of Statistics__ – Uses and Limitations of Statistics – Application of Statistics in Psychology - Meaning and Definition of variable – Dependent variable – Independent variable – Descriptive Statistics – Inferential Statistics

UNIT II **(15 Hours)**

Organization of Data: Introduction – Meaning of Enquiry – Planning and Designing of Enquiry – Primary Data – Secondary Data – Framing a schedule – Classification and Tabulation of Data – Frequency Distribution. Diagrammatic and Graphical Representation of Data.

UNIT III **(15 Hours)**

Measures of Central Tendency: Meaning and Purpose of Measures of Central Tendency - Characteristics and Types of Measures – Characteristics and Uses of Mean, Median and Mode – Computation of Mean, Median and Mode. Meaning, Purpose and Uses of Percentiles and Percentile Ranks.

21UPS3A3

UNIT IV **(15 Hours)**

Measures of Variability: Concept of Variability – Meaning and Importance of Variability – Range - Quartile Deviations – Mean Deviation – Standard Deviation – Computation and Uses – Application in Psychology.

UNIT V **(15 Hours)**

Parametric and Non-parametric Tests: Meaning, purpose and assumptions of Analysis of variance – One way ANOVA – Meaning and assumptions of distribution free statistics – Chi square.Meaning and Characteristics of Correlation – Types of Correlation – Person's Product Moment Correlation – Spearman's Rank order Correlation

*** denotes Self Study**

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

Teaching Methods

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

Text Book:

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

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

21UAF3A3

Programme Code : 20		B.Com (Accounting and Finance)		
Course Code: 21UAF3A3		BUSINESS MATHEMATICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	Credits
2021-2024	III	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 K4	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.

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.

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).

21UAF3A3

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

Teaching Methods

Chalk and Talk, PowerPoint presentation, Assignment,Seminar, Smart Class Room

Text Book:

Navaneetham P. A .**"**Business Mathematics & Statistics" , Jai Publisher,2007.

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.

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

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

21UCS2A2

Programme Code : 11		B.Sc Computer Science		
Course Code: 21UCS2A2		ALLIED 2 - OPERATIONS RESEARCH		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	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.

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.

21UCS2A2

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

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

Text Book:

Kanti Swarup, P.K Gupta & Man Mohan, **"**Operations Research**",** Sultan chand publications, 9th Edition, 2002, New Delhi.

Reference Books:

1. P.K.Gupta & ManMohan, "Problems in Operations Research" Sultan Chand Publications, 6th Edition, 1994, New Delhi.
2. Hamdy A.Taha, "Operations Research", Pearson Education,7thEdition,2002.

21UCS2A2

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

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

21UIT2A2

Programme Code :12		B.Sc Information Technology		
Course Code: 21UIT2A2		COMPUTER ORIENTED NUMERICAL& STATISTICAL METHODS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	6	90	5

Course Objectives

1. To have indepth knowledge of various advanced methods in numerical analysis and statistics.
2. To get numerical solutions of equations like transcendental and non linear differential equations when ordinary analytical methods fail.
3. To learn fundamentals and concepts of statistical methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, Correlation and Regression.

Course Outcomes (CO)

K1 to K4	CO1	Remembering the concept of numerical and statistical methods
	CO2	Understanding the concepts of numerical differentiation and integration
	CO3	Applying an appropriate numerical method for solving algebraic or transcendental equation
	CO4	Analyzing the concept of Measure of central tendency, Measures of dispersion , Correlation and Regression

Syllabus

UNIT I **(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 II **(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.

21UIT2A2

UNIT III **(18 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 rule.

UNIT IV **(18 Hours)**

Measures of central tendency: Mean, Median, Mode, Geometric mean, Harmonic mean. Measures of Dispersion: ***Range** –Quartile deviation- standard deviation-coefficient of variation.

UNIT V **(18 Hours)**

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 for examinations may be taken from this Portions also).**

Teaching Methods

Chalk and Talk, Power Point Presentations, Seminar , Assignment, Smart Class Room

Text Books:

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

Reference Book:

1. V. Rajaraman,"Computer Oriented Numerical Methods", PHI Pub,2008.
S C Gupta, V. K. Kapoor, "Fundamental Of Mathematical Statistics"**,** Sultan Chand and Sons,2010.

21UIT2A2

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

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

21UBT4A4

Programme Code : 08		B.Sc Biotechnology		
Course Code: 21UBT4A4		Bio-Statistics		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	IV	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 K4	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.

Syllabus

UNIT I **(15 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 **(15 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 **(15 Hours)**

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

21UBT4A4

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

UNIT IV **(15 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 **(15 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

Chalk and Talk / Powerpoint presentation/ Seminar/Quiz/Discussion/Assignment

Text Book

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

Reference Books

1. S.P. Gupta(2011),Statistical Methods, Sultan chand &sons,Newdelhi-2
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 , (2011),Fundamentals of Mathematical Statistics, Sultan chand &sons,Newdelhi-2
4. P.R. Vital, (2004), Mathematical statistics Margham Publications, Chennai
5. B.L. Agarwal, (2009),Basic Statistics, New Age International Publishers, Chennai.

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

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

21UBT4AL

Programme Code : 08		**B.Sc Biotechnology**		
Course Code: 21UBT4AL		Lab in Bio-Statistics		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	IV	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)

K3 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.

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.

21UBT4AL

Distribution of Marks in ESE		**CIA**	
Experiment	: 25	CIA Practical	: 10
Record	: 05	Exam	
		Attendance	: 05
Total	**30**	Observation Note Book	: 05
		Total	**20**

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

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

21UCM4A4

Programme Code : 13		B.Com		
Course Code: 21UCM4A4		BUSINESS STATISTICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	IV	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 K4	CO1	Select appropriate Statistical techniques for summarizing and displaying business data.
	CO2	Understand the measures of central tendency, symmetrical and asymmetrical distribution
	CO3	Identify and carryout basic statistical analyses used in sociological inquiry.
	CO4	Analyze and draw inferences from business data using appropriate statistical methods.

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.

21UCM4A4

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

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

Text Book:

P.A. Navaneetham **"**Business Mathematics and Statistics",Jai Publishers,2007.

Reference Books:

1. S.P. Gupta **"**Statistical Methods**"** , Sultan Chand & sons, 21st edition,2003.
2. R.S.N Pillai &V.Bagavathi **"**Statistics**"** , S. Chand & Co Ltd, 7th edition.

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

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

21UCC2A2

Programme Code :14		B.Com CA		
Course Code: 21UCC2A2		BUSINESS STATISTICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	CO1	Select appropriate Statistical techniques for summarizing and displaying business data
	CO2	Interpret correlation coefficients and Formulate regression line by identifying dependent and independent variables.
	CO3	Identify and carryout basic statistical analyses used in sociological inquiry.
	CO4	Analyze and draw inferences from business data using appropriate statistical methods.

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.

21UCC2A2

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

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

Text Book:

P.A. Navaneetham **"**Business Mathematics and Statistics",Jai Publishers,2007.

Reference Books:

1. S.P. Gupta **"**Statistical Methods**"** , Sultan Chand & sons, 21st edition,2003.
2. R.S.N Pillai &V.Bagavathi **"**Statistics**"** , S. Chand & Co Ltd, 7th edition.

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

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

21UPA2A2

Programme Code : 15		B.Com PA		
Course Code: 21UPA2A2		STATISTICS FOR BUSINESS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	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.

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.

21UPA2A2

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

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

Text Book:
Navanitham, P.A**, " Business Mathematics & Statistics**" Jai Publishers,Trichy-21

Reference Books:
1. Statistical Methods by S.P. Gupta
2. Statistics by R.S.N. Pillai and V. Bagavathi
3. Statistics-Theory, Methods & Application by D.C. Sancheti and V.K. Kapoor
4. Applied General Statistics by Frederick E.Croxton and Dudley J. Cowden

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

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

21UBB2A2

Programme Code :16		BBA		
Course Code : 21UBB2A2		MATHEMATICS FOR MANAGEMENT – II		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	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.

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.

21UBB2A2

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

Chalk and Talk, Power point Presentations, Seminar, Quiz and Assignment. Smart Class Room

Text Book:

Kanti Swarup, P.K.Gupta & Manmohan, "Operations Research," Sultan & Sons, New Delhi, 14th Edition, 2008.

Reference Book:

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

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

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

21UBA2A2

Programme Code :17		BBA CA		
Course Code : 21UBA2A2		MATHEMATICS FOR MANAGEMENT – II		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	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.

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.

21UBA2A2

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

Chalk and Talk, Power point Presentations, Seminar, Quiz and Assignment, Smart Class Room

Text Book:

Kanti Swarup, P.K.Gupta & Manmohan, "Operations Research," Sultan & Sons, New Delhi, 14th Edition, 2008.

Reference Book:

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

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

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

21UCT2A2

Programme Code :11		Computer Technology		
Course Code : 21UCT2A2		Operations Research		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	II	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 K4	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 and Queuing theory.
	CO4	Knowing the application of CPM & PERT

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.

21UCT2A2

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

Power point Presentations, Seminar, Quiz, Assignment, Smart Class Room

Text Book:

Kanti Swarup, P.K Gupta & Man Mohan, "**Operations Research**", Sultan chand publications, 9th Edition, 2002,New Delhi.

Reference Books:

1. P.K.Gupta & ManMohan, "Problems in Operations Research" Sultan Chand Publications, 6th Edition, 1994, New Delhi.
2. Hamdy A.Taha, "Operations Research", Pearson Education,7thEdition,2002.

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

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

21UCA2A2

Programme : BCA		**BCA**		
Course Code: 21UCA2A2		**COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS**		
Batch 2021-2024	Semester II	Hours / Week 6	Total Hours 90	Credits 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 K4	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.

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.

21UCA2A2

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.

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

Chalk and Talk, Power point Presentations, Seminar, Assignments, Smart Class Room

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" , Sulthan Chand & Sons 18th edition 2009.(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**"** Statistics" ,S.Chand & Company, 1st edition 1999.

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

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

21UCB2A2

Program Code :**19**		B.Com (Banking & Insurance)		
Course Code: 21UCB2A2		BUSINESS STATISTICS		
Batch 2021-2024	**Semester** II	**Hours / Week** 6	**Total Hours** 90	**Credits** 5

Course Objectives

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

Course Outcomes (CO)

K1	CO1	Select appropriate Statistical techniques for summarizing and displaying business data
K2	CO2	Understand and use the basic measure of central tendency.
K3	CO3	Identify and carryout basic statistical analyses used in sociological inquiry.
K4	CO4	Analyze and draw inferences from business data using appropriate statistical methods.

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.

21UCB2A2

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:

Chalk and Talk, Power point Presentations, Google class room, Seminar, Assignment, Smart classroom

Text Book:

Navanitham, P.A, "Business Mathematics & Statistics" Jai Publishers, 2015**.**

Reference Books:

1. Statistical Methods - S. P. Gupta
2. Fundamentals of Statistics - S. C. Gupta and V. K. Kapoor.
3. Statistics (Theory Methods and Applications) - Sancheti and Kapoor.
4. Quantitive Techniques in Business - Dr. A. B. Rao

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

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

21UPS4A4

Programme Code : 21		B.Sc Psychology		
Course Code: 21UPS4A4		**ALLIED IV: RESEARCH METHODOLOGY**		
Batch 2021-2024	**Semester** IV	**Hours / Week** 5	**Total Hours** 75	**Credits** 5

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 K4	CO1	Select and define appropriate research problem and parameters.
	CO2	Understand the concepts of sampling, error and its degress of freedom.
	CO3	Identify various sources of information for data collection.
	CO4	Analyze, explain, compare and prepare key elements of a research report.

Syllabus

UNIT I **(15 Hours)**

Introduction: Objectives – importance - characteristics and utility of research. Defining research problems - sources of research ideas - developing good research questions Ethical consideration in Psychological research.

UNIT II **(15 Hours)**

Testing of Hypothesis: Hypothesis meaning of statistical inference - Population and Sample - Sampling distribution Standard Errors of Mean - Degrees of freedom.

Computation and interpretation of t-values - Level of significance - Type I and Type II Errors.

UNIT III **(15 Hours)**

Research Design: Meaning - Need and characteristics of Good Design - Internal and External Validity: Need for sampling - Types and implications of sampling.

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21UPS4A4

UNIT IV **(15 Hours)**

Data Collection: Meaning and Importance of Data, Types of Data: Primary and Secondary Data. Methods of Data Collection: Observation Method - ***Interview Method and Questionnaire Method** - Experimental method- Collection of Secondary data.

UNIT V **(15 Hours)**

Analysis and Report Writing: Statistical techniques for Data Analysis - Uses of Statistical software packages. Techniques of Data presentation and interpretation. Steps involved in report writing - APA writing style.

*** Denotes Self Study**

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

Teaching Methods

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

Text Book:

1. Kenneth, B.S., & Bruce, A. B. (2001). Research Design and Methods: A Process Approach, 5th Edition, McGraw Hill.

2. Kothari, C. R. (2007). Research Methodology: Methods and Techniques, 2nd Edition, New Age International Publishers.

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

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21UAF4A4

Programme Code : 20		B.Com (Accounting and Finance)		
Course Code: 21UAF4A4		BUSINESS STATISTICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2021-2024	IV	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 K4	CO1	Select appropriate Statistical techniques for summarizing and displaying business data.
	CO2	Understand the measures of central tendency, symmetrical and asymmetrical distribution
	CO3	Identify and carryout basic statistical analyses used in sociological inquiry.
	CO4	Analyze and draw inferences from business data using appropriate statistical methods.

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.

21UAF4A4

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

Chalk and Talk, Power point Presentations, Seminar, Assignment, Smart Class Room

Text Book:

P.A. Navaneetham **"**Business Mathematics and Statistics",Jai Publishers,2007.

Reference Books:

1. S.P. Gupta **"**Statistical Methods**"** , Sultan Chand & sons, 21st edition,2003.
2. R.S.N Pillai &V.Bagavathi **"**Statistics**"** , S. Chand & Co Ltd, 7th edition.

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

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

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 inPython**
  - 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