KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE - 641 029

DEPARTMENT OF MATHEMATICS (UG)

CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(2026-2027 and onwards)

KONGUNADU ARTS AND SCIENCE COLLEGE(AUTONOMOUS)

Coimbatore-641029

Vision:

Developing the total personality of every student in a holistic way by adhering to the principles of Swami Vivekananda and Mahatma Gandhi.

Mission:

Imparting holistic and man-making education with emphasis on character, culture and value - moral and ethical.

Designing the curriculum and offering courses that transform its students into value added skilled human resources.

Constantly updating academic and management practices towards total quality management and promotion of quality in all spheres.

Extending the best student support services by making them comprehensive and by evolving a curriculum relevant to student community and society at large.

Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.

Moulding the teachers in such a way that they become the role models in promoting Higher Education.

DEPARTMENT OF MATHEMATICS

Vision:

1. To enrich the Mathematical and Analytical skill of the student
2. To produce quality Mathematical science researches
3. To emphasis the students to apply the theoretical Mathematics to bring out as Mathematical models

Mission:

1. To inculcate moral values and ethical values.
2. To upgrade the students knowledge to meet the academic challenges.
3. To equip the students with the necessary mathematical tools to meet the competitive global environment.

PROGRAMME OUTCOME (PO)

PO 1: Students will be well equipped with Mathematical, Analytical and Logical skills which will rack up with a thorough knowledge of the Core and Allied papers.

PO 2: Procuring innovative ideas to face global challenges which accomplish various rewarding positions in the society.

PO 3: Develop the knowledge, skills and attitude necessary to pursue higher studies in Mathematics.

PO 4: Formulate and interpret real life problems mathematically.

PO 5: Students will acquire the reasoning ability and problem solving skills to get through various competitive examinations.

PO 6: Students will be equipped to choose a prominent career in Industry, Banks, MNCs, and higher studies.

PO 7: Apply knowledge of Mathematics in the fields of Statistics, Physical Sciences, Life Sciences and Computer Science.

PO 8: Students will inculcate and develop the managing ability and critical thinking to solve business problems and take up career as an Entrepreneur.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1: Understanding the basic and the advanced concepts in Mathematics .

PSO 2: Developing manipulative and numerical skills in the various areas including Physics and Statistics.

PSO 3: Understanding the concepts of Core and the allied areas of Mathematics, provides a strong foundation for the systematic development of learning process.

PSO 4: Applying Mathematical techniques to solve the real life problems.

PSO 5: Identify, formulate and analyze Mathematical problems reaching sustained conclusions.

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

Programme Name: **B.Sc Mathematics**

Curriculum and Scheme of Examination under CBCS

(Applicable to the students admitted during the Academic Year 2026 - 2027 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	26TML101@	Language I@	6	25	75	100	3	3
	II	26ENG101	English -I	6	25	75	100	3	3
	III	26UMA101	Core Paper 1 - Classical Algebra	4	25	75	100	3	4
	III	26UMA102	Core Paper 2 - Calculus	5	25	75	100	3	4
	III	26UMA1I1	Allied Paper 1 - Statistics With Excel-Theory	5	20	55	75	3	3
	III	26UMA1IL	Allied Practical 1 - Statistics With Excel-Practical	2	10	15	25	3	2
	IV	26EVS101	Environmental Studies **	2	-	50	50	3	2
			Total	**30**	-	-	550	-	21
II	I	26TML202@	Language II@	6	25	75	100	3	3
	II	26ENG202	English –II	6	25	75	100	3	3
	III	26UMA203	Core Paper 3 - Differential Equations and Laplace Transforms	4	25	75	100	3	4
	III	26UMA204	Core Paper 4 - Trigonometry, Vector Calculus and Fourier Series	5	25	75	100	3	4
	III	26UMA2I2	Allied Paper 2 - Statistics With R Programming-Theory	5	20	55	75	3	3
		26UMA2IM	Allied Practical 2 - Statistics With R Programming -Practical	2	10	15	25	3	2
	IV	26VED201	Value Education- Moral and Ethics**	2	-	50	50	3	2
	-	-	**Total**	**30**	-	-	550	-	21

III	I	26TML303[@]	Language III@	6	25	75	100	3	3
	II	26ENG303	English –III	6	25	75	100	3	3
	III	26UMA305	Core Paper 5 - Analytical Geometry	4	25	75	100	3	4
	III	26UMA306	Core Paper 6 – Mechanics	3	25	75	100	3	3
	III	26UPH3A1	Allied Paper 3 - Physics I Theory	5	20	55	75	3	4
		-	Allied Practical 1- Physics I Practical	2	-	-	-	-	-
	IV	26UGC3S1	Skill Based Subject 1- Basics of Cyber Security	2	100	-	100	3	3
	IV	26TBT301/ 26TAT301/ 26UHR3N1	Basic Tamil* / Advanced Tamil**/ Non-major elective-I**	2	-	75	75	3	2
			Total	**30**	-	-	650	-	**22**
IV	I	26TML404 [@]	Language IV@	6	25	75	100	3	3
	II	26ENG404	English –IV	6	25	75	100	3	3
	III	26UMA407	Core Paper 7 –Number Theory and Vedic Mathematics	3	25	75	100	3	3
	III	26UMA408	Core Paper 8 – Mathematical Modelling	4	25	75	100	3	4
	III	26UPH4A2	Allied Paper 4 - Physics II – Theory	5	20	55	75	3	4
		26UPH4AL	Allied Practical 1- Physics I Practical	2	20	30	50	3	2
	IV	26UMA4SL	**Skill Based Subject 2-** Fundamentals of LaTeX- Practical	2	25	75	100	3	3
	IV	26TBT402/ 26TAT402/ 26UWR4N2	Basic Tamil* / Advanced Tamil**/ Non-Major Elective- II**	2	-	75	75	3	2
			Total	**30**	-	-	700	-	**24**

V	III	26UMA509	Core Paper 9 - Real Analysis I	5	25	75	100	3	4
	III	26UMA510	Core Paper 10 - Complex Analysis	6	25	75	100	3	4
	III	26UMA511	Core Paper 11 – Abstract Algebra	6	25	75	100	3	4
	III	26UMA512	Core Paper 12 - Programming in C- Theory	4	25	75	100	3	4
	III	26UMA5CL	Core Paper - Programming in C- Practical	2	40	60	100	3	2
	III	26UMA5E1	Major Elective Paper 1	5	25	75	100	3	5
	IV	-	**EDC**	2	100	-	100	3	3
	-	**26UMA5IT**	**Internship Training ******	Grade					
			Total	**30**	-	-	700	-	**26**
VI	III	26UMA613	Core Paper 13 - Real Analysis II	6	25	75	100	3	4
	III	26UMA614	Core Paper 14 - Optimization Techniques	6	25	75	100	3	4
	III	26UMA615	Core Paper 15 – Linear Algebra	6	25	75	100	3	4
	III	26UMA 6E2	Major Elective Paper 2	6	25	75	100		5
	III	26UMA6Z1	Project and viva voce***	4	20	80	100	-	5
	IV	**26UBI6S3**	**Skill Based Subject 3- Basics of IPR**	2	100	-	100	3	3
			Total	**30**	-	-	600	-	25
	V	26NCC **$**/NSS/YRC /PYE/ECC/RRC/ WEC101#	Co-Curricular Activities*	-	50	-	50	-	1
Grand Total				**-**	**-**	**-**	**3800**	**-**	**140**

Note :

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

ESE– End of Semester Examinations

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

@ Hindi/Malayalam/ French/ Sanskrit – 26HIN/MLM/FRN/SAN101 - 404

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

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

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

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

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

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

1. Mathematics for Machine Learning
2. Numerical Methods with MATLAB
3. Graph Theory
4. Astronomy
5. Fuzzy Mathematics
6. Combinatorics

Non-Major Elective Papers

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

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

26UMA5X1 - Introduction to LaTeX - Lab Course

 # List of Cocurricular Activities:

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

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

Tally Table:

S.No.	Part	Subject	Marks	Credits
1.	I	Language – Tamil/Hindi/Malayalam/ French/ Sanskrit	400	12
2.	II	English	400	12
3.	III	Core – Theory/Practical	1600	60
	III	Allied	400	20
		Electives/Project	300	15
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major electives	150	4
		Skill Based subject	300	9
		EDC	100	3
		Environmental Studies	50	2
		Value Education	50	2
5.	V	Co-curricular Activities	50	1
		Total	**3800**	**140**

- 100 % CIA for Basics of Cyber Security, EDC and Basics of IPR.

- The students should complete **Health and Wellness Programme (26UHW401)**[###] in the **4th semester** and the completion marks should be submitted through the HoD to the Controller of Examinations. Extra credits will be given to the candidates who have successfully completed.
- The students may be encouraged to complete any **MOOC course available for Online learning platforms like SWAYAM, NPTEL, Coursera**[$$]**, IIT Bombay Spoken Tutorial, e-Pathshala etc.,** before the completion of the **5th semeste**r and the course completion certificate should be submitted through the HoD to the Controller of Examinations. Appropriate credits will be given to the candidates who have successfully completed.

[$$]**Note:**One course to be taken from coursera for all the under graduate students **Appropriate extra credits**[@@@] and certification as applicable shall be awarded to the students who have completed the course.

[@@@]**Note :** Course Duration :

Duration	Extra Credits
< 10 hours	0
> =10 hours and < = 20 hours	1
> 20 hours	2

- An **Onsite Training** preferably relevant to the course may be undertaken as per the discretion of the HoD.

- Extra credits shall be awarded for innovative products/ individual paper presentations and publications in reputed national/ international proceedings and in indexed journals by the UG students for their original research contributions.

- **Product development through Technology Readiness Levels**:
  - Phase 1 Level (TRL 1-3) : Basic research: 1 credits
  - Phase 2 Level (TRL 4 -6) : Development and validation : 2 credits
  - Phase 3 Level (TRL 7-9) : Deployment : 3 credits
- **National / International level paper presentation in conferences and publications of full papers in reputed Scopus/ web of Science indexed journals**
  - National Level : 1 credit/ paper
  - International Level : 2 credits/ paper
  - Open access Journals are not included

- Extra credits shall be awarded to students who prefer to opt any course out of their programme on self learning mode. No internal components. 100% ESE.

Teaching Pedagogy

Smart ClassRoom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Classroom/ Peer Learning/Experimental Learning/Blended learning

Flipped Classroom

Preamble:

- Under flipped classroom model, students review foundational content before class, with class time dedicated to practice, discussion, and problem – solving where the role of the teachers will be facilitating discussions and enabling students to embark on a holistic learning perspectives

Work instructions:

- One flipped session / unit is made mandatory and the course In-charge shall identify and specify the topic to be covered in the flipped session in the lesson plan.
- Detailed session plans must be intimated to all students at least one week in advance.
- Curated content such as LORs, video lectures, animations, and other relevant digital content shall be provided to students in advance to facilitate effective preparation for the flipped classroom session.

Peer Learning

Preamble:

- Peer Assisted learning enables students to learn from each other sharing knowledge in a collaborative learning environment.
- Development of leadership skills and student engagement through student to student academic support.
- Reduce drop out/failure rates of the students and create a supportive academic culture where a high performing or trained student assists peers academically.

Work Instructions:

- Course In-charge shall supervise the programme by periodically reviewing its implementation, conducting review meetings, and monitoring the progress reports.
- Course In-charge shall identify 5 to 6 fast learners based on their academic performance in internal and external examinations.
- Course In-charge shall also identify students who require additional academic support and assign 4 to 5 such students to each fast learner to facilitate peer learning.
- This team will operate remedial classes on a peer learning mode as per the following:
  a) One session / week / course and each session shall be for 30 minutes in duration, with follow-up learning activities.

b) The faculty In-charge shall review attendance records and monitor the academic progress of the students.

Blended learning

Preamble:

- Blended learning integrates traditional in class instruction with digital tools exposing students to a myriad options for learning from subject experts across the globe
- It is provided with online learning sessions on recorded videos, lecture captured sessions (included under guided library hours), digital resources, and guided sessions facilitated by internal faculty members and external experts through Zoom meets etc.,

Work Instructions:

- For every course, students will be motivated to attend additional webinar/online courses through any interactive learning tools such as, telepresence systems, podcasts, interactive videos etc. with minimum of 2 sessions/course and maximum of 3 sessions/course.

Components of Continuous Internal Assessment

<table>
<tr><th colspan="2">Components</th><th>Marks</th><th>Total</th></tr>
<tr><td colspan="4">Theory</td></tr>
<tr><td>CIA I</td><td>75</td><td rowspan="2">(75+75 = 150/10)
15</td><td rowspan="3">25</td></tr>
<tr><td>CIA II</td><td>75</td></tr>
<tr><td colspan="2">Objective Capacity Testing */Seminar</td><td>5</td></tr>
<tr><td colspan="2">Attendance</td><td>5</td><td></td></tr>
<tr><td colspan="4">Practical</td></tr>
<tr><td colspan="2">CIA Practical</td><td>25</td><td rowspan="3">40</td></tr>
<tr><td colspan="2">Observation Notebook</td><td>10</td></tr>
<tr><td colspan="2">Attendance</td><td>5</td></tr>
<tr><td colspan="4">Project</td></tr>
<tr><td colspan="2">Review</td><td>15</td><td rowspan="2">20</td></tr>
<tr><td colspan="2">Regularity</td><td>5</td></tr>
<tr><td colspan="4">Theory (Allied) (External : 55 marks)</td></tr>
<tr><td>CIA I</td><td>55</td><td rowspan="2">(55+55)
Converted to 10</td><td rowspan="4">20(Internal)</td></tr>
<tr><td>CIA II</td><td>55</td></tr>
<tr><td colspan="2">Objective Capacity Testing */Seminar</td><td>5</td></tr>
<tr><td colspan="2">Attendance</td><td>5</td></tr>
<tr><td colspan="4">Practical (Allied) (External : 30 marks)</td></tr>
<tr><td colspan="2">CIA Practical</td><td>10</td><td rowspan="3">20(Internal)</td></tr>
<tr><td colspan="2">Observation Notebook</td><td>5</td></tr>
<tr><td colspan="2">Attendance</td><td>5</td></tr>
</table>

Practical (Allied) (External : 15 marks)		
CIA Practical	3	10
Observation Notebook	2	
Attendance	5	

*** Objective Capacity Testing:**

For the first assessment, questions shall be set from 2 ½ units (25 questions) and evaluation for 5 marks. The assessment shall be conducted through any authentic online platform, one week prior to the commencement of I CIA theory examinations.

For the second assessment, questions shall be set from 2 ½ units (25 questions) and evaluation for 5 marks. The assessment shall be conducted through any authentic online platform, one week prior to the commencement of II CIA theory examinations.

The average of the first and second assessment scores shall be considered for the final **5 marks** allocation.

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

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

1. ESE Theory Examination:

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

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

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

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 – K4 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K2 – K5 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. ESE Practical Examination:

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

(For Allied papers)			
Knowledge Level	Section	Marks	Total
K3	Experiments	25	30
K4	Record Work	05	
K5			

Distribution of Marks (15)

End Semester Examinations	
Experiment	**10**
Record	**5**
Total	**15**

3. ESE Project Viva Voce:

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

Scheme of Evaluation - Health and Wellness Programme (26UHW401)###

Part	**Description**	**Mark**
A	Report	40
B	Attendance	20
C	Activities (Observation during Practice)	40
Total		**100**

26UMA101

Programme Code: 02	**B.Sc Mathematics**			
Title of the paper	Core Paper 1 - Classical Algebra			
Batch 2026-2029	**Hours / Week** 4	**Total Hours** 60	**Credits** 4	Skill development

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

26UMA101

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.

e-Resources

1. https://www.youtube.com/watch?v=7tpR8z-EuLo
2. https://www.youtube.com/watch?v=Q7WrEF2qH8g
3. https://www.youtube.com/watch?v=67B71RG5V34
4. https://www.youtube.com/watch?v=ESJqFbm6BHY
5. https://www.youtube.com/watch?v=0Zva38Uhr-U&list=PLalyoy-ONhAHvGCyy3akpRMFKn4L8Ap6L

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA102

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 2 –CALCULUS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Employability
2026-2029	5	75	4	

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(15 Hours)**

Curvature –Radius of curvature in Cartesian and Polar forms –Evolutes and Envelopes - Pedal equations –**Total differentiation*** –Euler's theorem on homogeneous functions.

UNIT II **(15 Hours)**

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

UNIT III **(15 Hours)**

Double integrals – Evaluation - Change of order of integration in double Integral – Applications to calculate areas – Areas in polar coordinates - Evaluate double integral 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 – Evaluate triple integral using MATLAB.

26UMA102

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)**

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.

e-Resources

1. https://www.youtube.com/watch?v=p6VLNpvXjC0
2. https://www.youtube.com/watch?v=ZllfoqZi5ns
3. https://www.youtube.com/watch?v=DsSycBwj9NM
4. https://www.youtube.com/watch?v=WQxo3gJw0X0
5. https://www.youtube.com/watch?v=LLX0UjUGL5w&list=PLELyD9hiZ4kjTqFvhtfb0tkSS8pdopqvx

26UMA102

MAPPING

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

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

Content prepared by (Based on Inputs) L.VIDYARANI Signature of the Course in-charge	 Signature of the HOD

26UMA1I1

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Allied Paper 1- Statistics with Excel - Theory		
Batch 2026-2029	**Hours / Week** 5	**Total Hours** 75	**Credits** 3	Skill development , Employability

Course Objectives

1. It explains the important concepts of statistics and statistical data.

2. It provides to formulate the measure the averages and dispersions.

3. Estimate and predict the unknown and future values.

Course Outcomes (CO)

K1 to K5	CO1	Describe the scope, functions, applications and limitations of Statistics
	CO2	To explain the statistical survey, collection of data, sampling and presentation of data
	CO3	Discuss the importance and uses of central values and dispersions for the various types of data
	CO4	Estimate the measures of central values, dispersions, skewness and kurtosis through the generating function.
	CO5	Ability to apply the data

Unit-I **(15 Hrs)**

Introduction - Origin and Growth of Statistics - Statistics Defined - Statistics: Science or Art - Functions of Statistics - Application of Statistics - Limitations of Statistics. Primary and Secondary Data - Methods of Collecting Primary Data - **Drafting the Questionnaire**. Significance of Diagrams and Graphs - General Rules for Constructing Diagrams - Types of Diagrams.

Unit-II **(15 Hrs)**

Introduction - Objectives of Averaging - Requisites of A Good Average - Types of Averages. Median, Computation of Quartilie, Percentile – Mode - Geometric Mean -Harmonic

26UMA1I1

Mean - Measures of Dispersion – Introduction - Significance of Measuring Variation - The Quartile Variation - Properties of A Good Measure of Variation - Methods of Studying Variation.

Unit-III **(15 Hrs)**

Introduction - Types of Skewness - Measures of Skewness - Moments.

Unit-IV **(15 Hrs)**

Introduction - **Significance of the Study of Correlation** - Correlation and Causation - Types of Correlation - Methods of Studying Correlation - Graphic Method - Karl Pearson's Coefficient of Correlation - Rank Correlation Coefficient - Regression Analysis – Introduction - Uses of Regression Analysis - Difference Between Correlation and Regression Analysis - Regression Lines - Regression Equations.

Unit-V **(15 Hrs)**

Introduction - Uses of Index Numbers - Problems in the Construction of Index Numbers - Methods of Constructing Index Numbers - Quantiity or Volume Index Numbers -Analysis of Time Series – Introduction - Utility of Time Series Analysis - Components of Time Series - Preliminary Adjustments Before Analysing Time Series - Measurement of Trend – Method of Semi Average - Method of Moving Average.

*** denotes Self study**

Text Book

Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons, 45th Edition, Reprint 2018.

Units	Chapters	Page No.
I	1,3,6	1-19, 40-47, 128-145
II	7,8	178-187, 196-218, 222-225, 232-235, 272-280
III	9	338-387
IV	10,11	390-406, 416-422, 452-459
V	13,14	536-558, 612-633

26UMA1I1

Reference Books

1. Dr. B.N. Gupta, Business Mathematics & Statistics, Shashibhawan publishing house, Chennai

2. P.R. Vittal, Business Mathematics & Statistics, Margham Publications, Chennai

3. J.K. Sharma, Fundamentals of business statistics, Vikas publishing, Noida

4. R.S. Bhardwaj, Business Mathematics & Statistics, Excel Books Publisher, New Delhi

5. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand

6. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII

7. Elements of Statistics - Mode . E.B. - Prentice Hall

e-Resources

1.https://www.youtube.com/watch?v=EA3JjvB8Z_U

2.https://www.youtube.com/watch?v=xTpHD5WLuoA

3.https://www.youtube.com/watch?v=BBoUJYT0jxY

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA1IL

Programme Code : 02	**B.Sc Mathematics**			
Title of the paper	Allied Paper 1- Statistics with Excel – Practical			
Batch 2026-2029	**Hours / Week** 2	**Total Hours** 30	**Credits** 2	Skill development , Employability

Course Objectives

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

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic concepts of Excel.
	CO2	Understanding the importance of tools in Excel
	CO3	Applying the concepts of average and statistical test using Excel Tools
	CO4	Analyzing the various features available in Excel
	CO5	Evaluating the mathematical problems using Various Tools in Excel

List of Practical Using Excel

1. Creating Students Details.
2. Creating Bar and Pie Diagram.
3. Calculate the Arithmetic Mean.
4. Calculate the Geometric Mean.
5. Calculate the Harmonic Mean.
6. Calculate the median.
7. Calculate the mode.
8. Calculate the correlation co-efficient .
9. Calculate Rank Correlation.
10. Calculate the regression.

26UMA1IL

Distribution of Marks (25)

End Semester Examinations		**CIA**	
Experiment	**10**	CIA Practical	**3**
Record	**5**	Observation	**2**
Total	**15**	Attendance	**5**
		Total	**10**

To be awarded jointly by the internal and external examiners.

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA203

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 3 - Differential Equations And Laplace Transforms		
Batch 2026-2029	**Hours / Week** 4	**Total Hours** 60	**Credits** 4	Entrepreneurship

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

26UMA203

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

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

26UMA203

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.

e-Resources

1. https://www.youtube.com/watch?v=Im242eBqaxw&list=PL1NfrYudrrMpHBoLgJYZU-F_hgV0jmIPr
2. https://www.youtube.com/watch?v=UI7VVBM46Tg
3. https://www.youtube.com/watch?v=Odb6QcLB-oU
4. https://www.youtube.com/watch?v=E8gYp5WsFSw&list=PLQtV9njJ9uynESm6u-cWMHV8Y9p-NeU-e
5. https://www.youtube.com/watch?v=XU5hUrh618&list=PLyqSpQzTE6M8gnapvdLN92hs_4F75OSuH&index=2

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA204

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 4 - Trigonometry, Vector Calculus and Fourier Series		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Employability
2026-2029	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 K5	CO1	Defining the expansion of trigonometric, hyperbolic and inverse hyperbolic functions.
	CO2	Illustrating the Fourier co-efficient for Periodic functions.
	CO3	Applying the differential operator to find Gradient, Divergence and Curl
	CO4	Examining the multiple integrals by applying Gauss divergence theorem, Stoke's theorem and Green's theorem.
	CO5	Evaluating the double and triple integral.

Syllabus

UNIT I **(15 Hours)**

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

UNIT II **(15 Hours)**

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

UNIT III **(15 Hours)**

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

UNIT IV **(15 Hours)**

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

26UMA204

UNIT V **(15Hours)**

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

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

Text Books

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

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

Reference Books

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

26UMA204

e-Resources

1. https://www.youtube.com/watch?v=UxClYnal2KA
2. https://www.youtube.com/watch?v=FXTt6Sa79mI
3. https://www.youtube.com/watch?v=Ce7Vwx1UWk0
4. https://www.youtube.com/watch?v=DRWfHYiXnBs
5. https://www.youtube.com/watch?v=MV0iuBtEtQU

MAPPING

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

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

Content prepared by (Based on Inputs) L.VIDYARANI Signature of the Course in-charge	 Signature of the HOD

26UMA2I2

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Allied Paper 2 - Statistics with R Programming – Theory		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2026-2029	5	75	3	

Course Objectives

1. To describe the importance and scope of probability theory and to predict the chance of an experimental outcomes.
2. It provides the study of random variable, distribution function, mathematical expectation,
3. To understand Distributions generated from mathematical functions

Course Outcomes (CO)

K1 to K5	CO1	Understand concepts of probability and Identify the different approaches of probability theory
	CO2	Define the random variable and its respective probability values and to compare a discrete and continuous random variable
	CO3	Calculate the expected value of a random variable variance, covariance, moments
	CO4	Understand binomial, poisson and normal distribution and its properties
	CO5	Identify probability models in real data and estimate population parameters

Unit-I **(15 Hrs)**

Exploring R Basis: Introduction – Getting started – R Features – R Studio – Starting R – R Basic Data Types – R Basic Operators – R Objects.

Unit-II **(15 Hrs)**

Probability and Expected Value: Introduction – Probability – Importance of the concept of Probability – Calculation of Probability – Theorems of Probability – Conditional Probability – Baye's Theorem – Mathematical Expectation.

Unit-III **(15 Hrs)**

Binomial Distribution - Obtaining Coefficients of the Binomial - Understanding Pascal's Triangle – Properties - Constants (without proof) – **Importance -** Fitting a Binomial

26UMA2I2

Distribution-Poisson Distribution – Constants (without proof) – Roles - Fitting a Poisson Distribution.

Normal Distribution – Graph - Relation Between Binomial, Poisson, Normal Distribution – Impotance – Properties - Conditions for Normality - Area Under the Normal Curve – Significance - Fitting a Normal Curve - Methods of Fitting.

Unit-IV **(15 Hrs)**

Statistical Inference: Introduction - Procedure of Testing Hypothesis - Two Types of Error in Testing of Hypothesis - Test of Significance for Large Samples – Two tailed test for difference between the means of two samples - Test of Significance for Small Samples - The Assumption of Normality - Student's t-Distribution - Application of the t – Distribution.

Unit-V **(15 Hrs)**

χ^2 Test and Goodness of Fit: Introduction - χ^2- Defined - The Chi-Square – Distribution – Constants - The χ^2 test when the degrees of freedom exceed 30 - Uses of χ^2 test. The F – test or the variance Ratio test - Applications of F-test.

Analysis of Variance – Assumptions - Technique – one way classification – two way classification model.

Text Books

1. Data Analysis with R Programming – V. Bhuvaneswari, Scitech Publications, Reprint April 2023. (Unit – I)

2. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons, 45th Edition, Reprint 2018. (Unit – II, III, IV & V)

26UMA2I2

Units	Chapters	Sections/Page Nos.
I	3	3.1-3.3, 3.6-3.9
II	Vol. II – 1	Page No. 776-798
III	2	Page No. 833-848, 850-858, 860-882
IV	3	Page No. 906-912, 925-946
V	4,5	Page No. 978-993, 1030-1059.

Reference Books

1. Dr. B.N. Gupta, Business Mathematics & Statistics, Shashibhawan publishing house, Chennai

2. P.R. Vittal, Business Mathematics & Statistics, Margham Publications, Chennai

3. J.K. Sharma, Fundamentals of business statistics, Vikas publishing, Noida

4. R.S. Bhardwaj, Business Mathematics & Statistics, Excel Books Publisher, New Delhi

5. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII

6. Elements of Statistics - Mode . E.B. - Prentice Hall

e-Resources

1. https://www.youtube.com/watch?v=_hfniOyPvKg
2. https://www.youtube.com/watch?v=80YzzIm8NK8
3. https://www.youtube.com/watch?v=q48uKU_KWas

26UMA2I2

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA2IM

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Allied Practical 2 - Statistics with R Programming – Practical		
Batch 2026-2029	**Hours / Week** 2	**Total Hours** 30	**Credits** 2	Employability

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

List of Practical Using R – Programming

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

26UMA2IM

Distribution of Marks (25)

End Semester Examinations		**CIA**	
Experiment	**5**	Experiment	**3**
Record	**5**	Observation Note Book	**2**
Attendance	**5**	Attendance	**5**
Total	**15**	Total	**10**

To be awarded jointly by the internal and external examiners.

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA305

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 5 - Analytical Geometry		
Batch 2026-2029	**Hours / Week** 4	**Total Hours** 60	**Credits** 4	Skill development

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(10 Hours)**

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

UNIT II **(16 Hours)**

Analytical geometry of three dimensions: - The Straight lines – Plane and the Straight line – Coplanar lines - Shortest distance between two given lines – Intersection of three planes - Shortest distance between two lines using MATLAB..

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

Cone and Cylinder: Cone whose vertex is at the origin – right circular Cone – Tangent plane and normal – Quadratic cone – equation of a cylinder – right circular cylinder – Enveloping Cylinder - Visualizing cylinder using MATLAB.

UNIT V **(10 Hours)**

Centralquadrics – The intersection of a line and quadric – Tangents and tangent planes – Plotting 3D curves and surfaces using MATLAB.

26UMA305

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

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. T.K.M.Pillai & T.Natarajan, Analytical Geometry 3D, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 2012.
   Unit II Chapter 3 Sections 1 to 8 (omit 8.1 &8.2), 10
   Unit III Chapter 4 Sections 1 to 8
   Unit IV Chapter 5 Sections 1 to 8
   Unit V Chapter 5 Sections 9 to 12
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 & Others, Analytical Geometry 3D, Emerald Publishers, Chennai – 2, 1998.
3. P. Duraipandian and Kayalal Pachaiyappa, Analytical Geometry (2-D), Muhil Publishers, 2010.

e-Resources

1. https://brilliant.org/wiki/3d-coordinate-geometry-equation-of-a-plane/
2. https://www.youtube.com/watch?v=W1Vz5qpNLNk
3. https://www.cuemath.com/learn/mathematics/conics-in-real-life/
4. https://www.youtube.com/watch?v=6vpXM1dskmY
5. https://www.youtube.com/watch?v=HupllksOfdA

26UMA305

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA306

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 6 –Mechanics		
Batch 2026-2029	**Hours / Week** 3	**Total Hours** 45	**Credits** 3	Skill development

Course Objectives

1. To remember the notions of resultant and components.
2. To understand the concepts of energy.
3. To solve the problems under projectile and impact of two smooth spheres**.**

Course Outcomes (CO)

K1 to K5	CO1	Remembering the concepts of forces in finding the resultant of any number of forces
	CO2	Understanding the concepts of two like and unlike parallel forces
	CO3	Applying the concepts of Newtons Law in solving problems
	CO4	Analyzing the notions of impact between two smooth spheres in different ways.
	CO5	Evaluating the path of projectiles.

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

UNIT II **(9 Hours)**

Parallel forces: 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

UNIT III **(9 Hours)**

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.

UNIT IV **(9 Hours)**

Introduction – Definitions – two fundamental 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.

26UMA306

UNIT V **(9 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 (Related problems)-Oblique impact of two smooth spheres.(Related problems)

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

Text Books

1. M.K.Venkataraman, Statics, 14th Edition, Agasthiar Publications, Trichy, 2011.

Unit I	Chapter 2	Sections 1-9
Unit II	Chapter 3	Sections 1-12

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

Unit III	Chapter 4	Sections 4.1 to 4.12, 4.17, 4.18, 4.24, 4.26 to 4.28, 4.30 to 4.35
Unit IV	Chapter 6	Sections 6.1 to 6.9
Unit V	Chapter 8	Sections 8.1 to 8.5, 8.7

Reference Books

1. A.V.Dharmapadam, Statics , S.Viswanathan Printers and Publishing Pvt., Ltd,2011.
2. P.Duraipandian and Laxmi Duraipandian, Mechanics, S.Chand and Company Ltd, Ram Nagar, New Delhi -55, 1985.
3. K.Viswanatha Naik, M.S.Kasi, Dynamics, Emerald Publishers,2004.

e-Resources

1. https://youtu.be/0Qw0iqEgC8I?si=f8VaofvL386t5izb
2. https://youtu.be/Wr0uMjdC0GE?si=SleVyYTJB-LmcnKH
3. https://youtu.be/FdyWpAuitbY?si=4kGFAMZtyARGJPT9
4. https://youtu.be/Fudcc0JoXdo?si=lf0ofdWI6k9TBy-C
5. https://www.youtube.com/watch?v=WGRJEDCBwVA

26UMA306

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA407

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 7 - Number Theory and Vedic Mathematics		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Skill Development ,
2026-2029	3	45	3	Employability

Course Objectives

1. To expose the basics of number theory to the students.
2. To enable the students to learn the usage of prime numbers and factors.
3. To enhance the computational skill using Vedic Mathematics

Course Outcomes (CO)

K1 to K5	CO1	Remembering the concepts of divisibility, congruence, GCD and prime numbers.
	CO2	Explaining various divisibility tests.
	CO3	Identifying the Euler number and solving the linear congruence.
	CO4	Analyzing the nature of numbers.
	CO5	Evaluating the expression using Vedic Mathematics.

Syllabus

UNIT-I **(9 Hours)**

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

UNIT-II **(9 Hours)**

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

UNIT-III **(9 Hours)**

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

UNIT-IV **(9 Hours)**

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

UNIT-V **(9 Hours)**

Basic Level: Miscellaneous Simple Method. Criss-Cross System of Multiplication - Squaring numbers.

26UMA407

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

Text Books

1. 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

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

Unit V	Chapter I	Page No 13 to 33
	Chapter II	Page No 35 to 43

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

26UMA407

e-Resources

1. https://youtu.be/qj3_0nlyxrQ?si=ggpM5AeVAviiD7G4
2. https://youtu.be/yYAjrpJSwZg?si=_AbNHgxJNmgEwGWs
3. https://youtu.be/-bh6pTQmZrA?si=cRgG3TPHJ_EiFzk6
4. https://youtu.be/8zv-CU8Yk1c?si=Lr5SmYiMODBJYJqS
5. https://youtu.be/6cwN9HUGxVc

Mapping

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

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

Content prepared by (Based on Inputs) M. Vivek Prabu Signature of the Course in-charge	 Signature of the HOD

26UMA408

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 6 –Mathematical Modeling		
Batch 2026-2029	**Hours / Week** 4	**Total Hours** 60	**Credits** 4	Skill development

Course Objectives

1. Construction and Analysis of Mathematical models found in real life problems.
2. Modelling through differential equations
3. Modelling through and difference equations

Course Outcomes (CO)

K1 to K5	CO1	Remembering the situations to be required for Mathematical Modelling and to Determine the characteristics of such models
	CO2	Understanding Mathematical Modelling using differential equations in-terms of linear growth and Decay models
	CO3	Applying the systems of ordinary differential equations of first order, to discuss about various Mathematical Modelling under the categories 'Epidemics' and 'Medicine'
	CO4	Elucidate the concepts of difference equations
	CO5	Evaluate the Mathematical Modelling using difference equations

Syllabus

UNIT I **(9 Hours)**

Mathematical Modelling: **Simple situations requiring mathematical modeling*-** characteristics of mathematical models - The technique of Mathematical modeling – Classification of Mathematical models.

UNIT II **(9 Hours)**

Mathematical Modelling through differential equations: Linear Growth and Decay Models - Non-Linear growth and decay models - Compartment models.

UNIT III **(9 Hours)**

Mathematical Modelling through system of Ordinary differential equations of first order: Prey-predator models - Competition models - Multi species models - Age Structured population models.

Epidemics: simple epidemic model - Susceptible-infected- susceptible (SIS) model - SIS model with constant number of carriers - Model with Removal - Model with Removal and immigration. Medicine: Model for Diabetes Mellitus, Richardson's Model for Arms Race – Lanchester's Combat model – International trade model.

26UMA408

UNIT IV **(9 Hours)**

The need for Mathematical modeling through difference equations: Some simple models – Basic theory of linear Difference equations with constant co-efficients

UNIT V **(9 Hours)**

Mathematical Modelling through difference equations: Harrod Model - Cob web model – Samuelson's Interaction models - application to Actuarial Science.

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

Text Book

J N Kapur, Mathematical Modeling, New Age International publishers (2009).

Unit I	Chapter 1	Sections 1.1-1.4
Unit II	Chapter 2	Sections 2.1-2.4
Unit III	Chapter 3	Sections 3.1 – 3.2, 3.6
Unit IV	Chapter 5	Sections 5.1 to 5.2
Unit V	Chapter 5	Sections 5.3

Reference Books

1. Mathematical Modeling by Bimalk. Mishra and Dipak K.Satpathi. Ane Books Pvt. Ltd(1 Janauary 2009)
2. Mathematical Modeling Models, Analysis and Applications, by Sandip Banerjee, CRC Press, Taylor & Francis group, 2014
3. Mathematical Modeling applications with Geogebra by Jonas Hall & Thomas Ligefjard, John Wiley & Sons, 2017
4. Mark M. Meerschaert: Mathematical Modeling, Elsevier Publ., 2007.
5. Edward A. Bender: An introduction to mathematical Modeling, CRC Press,2002
6. Walter J. Meyer, Concepts of Mathematical Modeling, Dover Publ., 2000

26UMA408

e-Resources

1. https://youtu.be/VzlBEcs1fj4?si=TpFze3WRiro1tmeU
2. https://www.youtube.com/watch?v=mkcosMRgRvc
3. https://www.youtube.com/watch?v=yjviTDxNXQM
4. https://www.youtube.com/watch?v=jf_XHCTQlfc
5. https://www.youtube.com/watch?v=-wVCKOvceok

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA509

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core paper 9 - Real Analysis-I		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Skill
2026-2029	5	75	4	development

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(15 Hours)**

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

UNIT II **(15 Hours)**

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

UNIT III **(15 Hours)**

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

26UMA509

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 **(15 Hours)**

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)**

Text Book:

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

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

Reference Books:

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

26UMA509

e-Resources

1. https://youtu.be/vtn8rCk9xJw?si=2JXeIoUFdBfk_G_G
2. https://youtu.be/p0bKyR9fjFI?si=ulTX_aB69W8DlSBS
3. https://youtu.be/6KwxQb11v78?si=Ll3LX4RUy4OqlScO
4. https://youtu.be/MHDUCp4OAcg?si=F08n6Rgb_JW5Xy8E
5. https://youtu.be/dgmjCl76pBo?si=p1-POE64q4jlIZCF
6. https://youtu.be/eEMVGIoINpE?si=8dniNMCjZ0Cmx_0l

MAPPING

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

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

Content prepared by (Based on Inputs) Dr.D.Vijayalakshmi Signature of the Course in-charge	 Signature of the HOD

26UMA510

Programme Code: 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 10 - Complex Analysis		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Skill development
2026-2029	6	90	4	

Course Objectives

1. Apply concept and consequences of analyticity and C-R equations.
2. Understand the concept of mappings and transformations.
3. Compute complex contour integrals and applying Cauchy‘s integral in various versions.
4. Understand zeros and singularities of an analytic function, apply their properties in the evaluation of definite integral.

Course Outcomes (CO)

K1 to K5	CO1	Explain about analytic functions, their differentiation and continuity and to verify the Harmonic functions using analyticity conditions
	CO2	Explain the concept of Conformal mappings and mappings by linear transformations and linear fractional transformations
	CO3	Explain about the integrations of functions over simply and multiply connected domains and to derive the Cauchy integral formula, Liouvlle’s theorem, Fundamental theorem of Algebra and Maximum Module Principle
	CO4	Find the convergence the sequences and series, to derive Taylor’s and Laurent’s series
	CO5	Find the nature of singularities, to find the residue of a given function at a given singular point, to Explain about zeros and poles and to evaluate real improper integrals (Excluding poles on the real axis)

Syllabus

UNIT I **(18 Hours)**

Analytic functions: Functions of a Complex variable –Limits –Theorem on limits – Continuity – Derivatives – Differentiation formulas – Cauchy Riemann equation – conditions for differentiability – Polar coordinates***–** Analytic functions– Harmonic functions.

26UMA510

UNIT II **(18 Hours)**

Conformal mapping: Mappings – Mapping by exponential function – Linear transformation – The transformation w= $\frac{1}{z}$ – Mappings by $\frac{1}{z}$ – Linear fractional transformations (bilinear)

UNIT III **(18 Hours)**

Complex Integration: Contour integrals– Some examples – Simply and Multiply connected domains– Cauchy integral formula – Formula for derivatives– Liouville's theorem –Fundamental theorem of Algebra*– Maximum modulus principle.

UNIT IV **(18 Hours)**

Sequences and Series: Convergence of sequences – Convergence of series– Taylor's series – Laurent series– Absolute and uniform convergence of power Series – Continuity of sums of power series–Integration & differentiation of power series

UNIT V **(18 Hours)**

Residues and Poles: Isolated singular points – Residues – Cauchy Residue theorem – Residue at infinity – The three types of isolated singular points – Residues at poles – Zeros of analytical functions – Zeros and poles – Evaluation of real improper integrals (excluding poles on the real axis).

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

Text Book

Complex variables and application, Seventh Edition by James Ward Brown and Ruel V. Churchill, Mc-Graw Hill Book Co., International Edition, 2009.

Reference Books

1. Theodore W. Gamelan, Complex Analysis, Springer Verlag, 2008
2. Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

3. Richard A. Silverman, Introductory Complex Analysis. Dover Publications, 1972.

4. S. Ponnusamy and H. Silverman, Complex variables with applications, Birkhauser, 2006.

e-Resources

1. https://www.youtube.com/watch?v=jm0JLx9cT5c
2. https://www.youtube.com/watch?v=CCMnwZHcW6w
3. https://www.youtube.com/watch?v=yTocvaQTeGI
4. https://www.youtube.com/watch?v=qZ4OMmOE67Q&list=PLyqSpQzTE6M_fDgY78f5lAT5zR6xHAajo&index=9
5. https://www.youtube.com/watch?v=ASxJJ_5kcvQ&list=PLyqSpQzTE6M_fDgY78f5lAT5zR6xHAajo&index=18

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA511

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core Paper 11 - Abstract Algebra		
Batch 2026-2029	**Hours / Week** 6	**Total Hours** 90	**Credits** 4	Skill development

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(16 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(19 Hours)**

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

UNIT IV **(18 Hours)**

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

26UMA511

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).**

Text Book

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

Unit I	Chapter 1	Sections 1.1 to 1.2
	Chapter 2	Sections 2.1 to 2.3
Unit II	Chapter 2	Sections 2.4 to 2.6
Unit III	Chapter 2	Section 2.7 (Omit Application 2 and its Corollary) and Section 2.8 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.

e-Resources

1. https://nptel.ac.in/courses/111106113
2. https://nptel.ac.in/courses/104101094
3. https://youtube.com/playlist?list=PLEAYkSg4uSQ1Yhxu2U-BxtRjZElrfVVcO&si=XrWpkVXyqrBgC-Yl
4. https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ma76

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA512

Programme Code : 02		**B.Sc Mathematics**		
Title of the paper		Core paper 12 - Programming in C Theory		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Employability
2026-2029	4	60	4	

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(12 Hours)**

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

Constants, Variables and Data types : Character set – C tokens – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants.

Operators: Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operators- Increment and Decrement Operators – Conditional Operator – Bitwise Operators- Special Operators.

UNIT II **(12 Hours)**

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

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

26UMA512

.

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)**

Text Book

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

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

26UMA512

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.

e-Resources

1. https://www.geeksforgeeks.org/c/c-programming-language/
2. https://www.w3schools.com/c/c_intro.php
3. https://www.youtube.com/watch?v=xND0t1pr3KY
4. https://www.youtube.com/watch?v=wKoGImLA2KA
5. https://youtu.be/JpN0GTJOxTk?si=fFqeE3WmE71iI9Nz

Mapping

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

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

Content prepared by (Based on Inputs) M. Vivek Prabu Signature of the Course in-charge	 Signature of the HOD

26UMA5CL

Programme Code : 02		**B.Sc Mathematics**		
Course Code: 26UMA5CL		Core Practical 1 - Programming in C Practical		
Batch 2026-2029	**Hours / Week** 2	**Total Hours** 30	**Credits** 2	Employability

Course Objectives

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

Course Outcomes (CO)

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

List of Practical

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

26UMA5CL

Distribution of Marks in ESE

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

CIA

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

To be awarded jointly by the internal and external examiners.

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA613

Programme Code : 02		**B.Sc Mathematics**		
Title of the Paper		Core Paper 13 - Real Analysis-II		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Skill
2026-2029	6	90	4	development

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

26UMA613

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)**

Text Book

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

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

Reference Books

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

e-Resources

1. https://youtu.be/R3yqx0wpQoc?si=EioNCZt3lwHHyDIq
2. https://youtu.be/Guua2mvqiFI?si=eK-Jkhk-ngwL1Ymp
3. https://youtu.be/lFitqxhRIcE?si=MpxVzBMYAzMfjdyf
4. https://youtu.be/K140qeRhZLA?si=zzlX6_34COPyse21
5. https://youtu.be/ebs61QcZ9Eg?si=S6dtkOCYHjBCRhCa

26UMA613

Mapping

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

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

Content prepared by (Based on Inputs) Dr.D.Vijayalakshmi Signature of the Course in-charge	 Signature of the HOD

26UMA614

Programme Code : 02	**B.Sc Mathematics**			
Title of the Paper	Core paper 14 **– Optimization Techniques**			
Batch 2026-2029	**Hours / Week** 6	**Total Hours** 90	**Credits** 4	Entrepreneurship

Course Objectives

1. To introduce certain OR techniques such as LPP, Transportation problems, Assignment problems and network techniques.
2. To help the students to develop logical reasoning.
3. To apply mathematical tools to managerial and real life problems.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the rules to construct an LPP.
	CO2	Understanding the rules of artificial variables and summarizing the concept of replacement problems.
	CO3	Applying the notions of linear programming in solving transportation problems and Assignment Problem.
	CO4	Analyzing the concept of CPM & PERT
	CO5	Determining the solution for various real time decision making problems.

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

Advanced Techniques: Introduction – Revised Simplex Method

UNIT III **(18 Hours)**

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

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

UNIT IV **(18 Hours)**

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

26UMA614

UNIT V **(18 Hours)**

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

*** Self Study**

Questions for examinations may be taken from the self study portions also.

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.

e-Resources

1. https://nptel.ac.in/courses/126105663
2. https://www.youtube.com/watch?v=a2QgdDk4Xjw&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX
3. https://www.youtube.com/watch?v=o4tWXl0HIHI&list=PLWoXNEI-KK1mCvEL4OdF-6FXryaZ11N&index=27
4. https://www.youtube.com/watch?v=pzbSURDWluA&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=2
5. https://www.youtube.com/watch?v=vUMGvpsb8dc&list=PLabr9RWfBcnpRfJuZWcEOthynn1Smu5_S

26UMA614

Mapping

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

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

Content prepared by (Based on Inputs) DR.S.P.R.PRIYALATHA Signature of the Course in-charge	 Signature of the HOD

26UMA615

Programme Code : 02		**B.Sc Mathematics**		
Title of the Paper		Core Paper 15 – Linear Algebra		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Skill
2026-2029	6	90	4	development

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(16 Hours)**

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

UNIT II **(16 Hours)**

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

UNIT III **(20 Hours)**

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

26UMA615

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)**

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.

26UMA615

e-Resources

1. https://nptel.ac.in/courses/111106135
2. https://www.youtube.com/watch?v=LsqAW-Fth3Y
3. http://digimat.in/nptel/courses/video/111106051/L08.html
4. https://www.youtube.com/watch?v=kYB8IZa5AuE
5. https://www.youtube.com/watch?v=is1cg5yhdds

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA6Z1

Programme Code : 02		**B.Sc Mathematics**		
Title of the Paper		Project and Viva voce		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Employability
2026-2029	4	60	5	

Course Objectives

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

Course Outcomes (CO)

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

Distribution of Marks in ESE

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

Internal

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

To be awarded jointly by the internal and external examiners

26UMA6Z1

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD



MAJOR ELECTIVE PAPERS



Programme Code: 02	**B.Sc Mathematics**			
Title of the paper	**Major Elective Paper - MATHEMATICS FOR MACHINE LEARNING**			
Batch	**Hours / Week**	**Total Hours**	**Credits**	
2026-2029	5	90	5	Skill development

Course Objectives

1. To provide a strong foundation in linear algebra concepts essential for machine learning applications.
2. To develop an understanding of matrix operations and decomposition techniques for efficient data representation and analysis.
3. To introduce fundamental concepts of probability theory and statistical distributions used in modeling uncertainty.
4. To familiarize students with machine learning frameworks including model formulation, parameter estimation and regression techniques.
5. To equip learners with techniques for dimensionality reduction and density estimation, including Principal Component Analysis and Gaussian Mixture Models.

Course Outcomes (CO)

K1 to K5	CO1	Apply concepts of linear algebra such as vector spaces, linear independence, basis, rank, and linear mappings to solve systems relevant to machine learning
	CO2	Analyze matrix properties and perform decompositions including Eigen decomposition and singular value decomposition for data representation and approximation
	CO3	Interpret probability spaces and distributions, and apply Bayesian reasoning and Gaussian models in uncertain environments.
	CO4	Formulate machine learning problems using data, models, and learning frameworks, and implement parameter estimation techniques including Bayesian linear regression.
	CO5	Evaluate dimensionality reduction techniques such as Principal Component Analysis and apply density estimation methods using Gaussian Mixture Models and the EM algorithm

Syllabus

UNIT I **(18 Hours)**

LINEAR ALGEBRA

System of Linear equations – Solving system of Linear equations – Vector spaces – Linear Independence – Basis and Rank – Linear mappings – Affine spaces.

UNIT II **(18 Hours)**

MATRIX DECOMPOSITION

Determinant and Trace – Eigen Values and Eigen vectors – Cholesky Decomposition – Eigen Decomposition and Diagonalization – Singular value Decomposition – Matrix Approximation.

UNIT III **(18 Hours)**

PROBABILITY AND DISTRIBUTIONS

Construction of a probability space – Discrete and Continuous Probabilities – Baye's Theorem – Gaussian Distribution – Inverse Transform.

UNIT IV **(18 Hours)**

MODEL SELECTION & LINEAR REGRESSION

Data, Models and Learning – Empirical Risk Minimization – Parameter Estimation – Probabilistic Modeling and inference – Problem Formulation – Parameter Estimation – Bayesian Linear Regression.

UNIT V **(18 Hours)**

DIMENSIONALITY REDUCTION WITH PRINCIPAL COMPONENT ANALYSIS

Problem setting – Maximum Variance perspective – Projection Perspective – Eigen vector computation and Low-rank Approximations.

DENSITY ESTIMATION WITH GAUSSIAN MIXTURE MODELS

Gaussian Mixture model – Parameter Learning via Maximum Likelihood – EM Algorithm.

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

Text Book:

Marc Peter Deisenroth, A. Aldo Faisal and Cheng Soon Ong, "Mathematics for Machine Learning", Cambridge University Press, 2020.

UNIT	CHAPTER	SECTIONS
1	2	2.1 - 2.8 (omit 2.2)
2	4	4.1 - 4.6
3	6	6.1 -6.7
4	8	8.1 – 8.6
	9	9.1 – 9.3
5	10	10.1 – 10.4
	11	11.1 – 11.3

Reference Books:

1. Tivadar Danka and Santiago Valdarrama, “Mathematics of Machine Learning: Master linear algebra, calculus, and probability for machine learning”.
2. Ganesh Kumar Thakur, Bandana Priya, “Mathematics for Machine Learning and AI”, Springer, 2025.

e-Resources

1. https://www.youtube.com/watch?v=rSjt1E9WHaQ

2. https://www.youtube.com/watch?v=8onB7rPG4Pk

3. https://www.youtube.com/watch?v=Cob_1B9TIlA

4. https://www.youtube.com/watch?v=1VSZtNYMntM

5.https://www.youtube.com/watch?v=4b4MUYve_U8&list=PLoROMvodv4rMiGQp3WXShtMGgzqpfVfbU&index=2

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

Programme Code : 02		**B.Sc Mathematics**		
Title of the Paper		**Major Elective Paper**- Graph Theory		
Batch	**Hours / Week**	**Total Hours**	**Credits**	Skill Development
2026-2029	5	75	5	

Course Objectives

1. To understand about the fundamental definitions and properties of graphs.
2. To Know more about directed and undirected graphs.
3. To enable to know the numerous applications of graph theory.

Course Outcomes (CO)

K1 to K5	CO1	Remembering the basic concepts of graph theory
	CO2	Understanding about the operations of graphs, trees, cut sets and network flows
	CO3	Interpreting the matrix representation of graphs
	CO4	Analyzing real time problems using the concept of graph theory
	CO5	Evaluate fundamental circuits in digraphs.

Syllabus

UNIT I **(15 Hours)**

Introduction : Application of graphs – **Finite and infinite graphs*** – incidence and degree – isolated vertex, pendant vertex and null graph.

Paths and Circuits – isomorphism – subgraphs – walks, paths and circuits – connected graphs, disconnected graphs and components – Euler graphs – operations on graphs – more on Euler graphs – Hamiltonian paths and circuits – the travelling salesman problem.

UNIT II **(15 Hours)**

Trees and fundamental circuits : **Trees – some properties of trees*** – pendant vertices in a tree – distance and centres in a tree – rooted and binary trees – on counting trees – spanning trees – fundamental circuits.

UNIT III **(15 Hours)**

Cut sets and Cut vertices : cut sets – some properties of a cut set – all cut sets in a graph – fundamental circuits and cut sets – connectivity and separability – network flows – 1 – isomorphism – 2- isomorphism.

UNIT IV **(15 Hours)**

Matrix representation of graphs : incidence matrix – submatrices of A(G) – circuit matrix – fundamental circuit matrix and rank of B – an application to a switching network – cut -set matrix - relationships among A_f, B_f and C_f – path matrix – adjacency matrix.

UNIT V **(15 Hours)**

Directed graphs : some types of digraphs – digraphs and binary relations – directed paths and connectedness – fundamental circuits in digraphs – matrices A, B and C of digraphs – adjacency matrix of a digraph.

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

Text Books

Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India (P) Ltd, New Delhi, 1997.

Unit I	Chapter 1	Sections 1.1 to 1.5
	Chapter 2	Sections 2.1 to 2.2, 2.4 to 2.10
Unit II	Chapter 3	Sections 3.1 to 3.8
Unit III	Chapter 4	Sections 4.1 to 4.8
Unit IV	Chapter 7	Sections 7.1 to 7.9
Unit V	Chapter 9	Sections 9.1 to 9.4, 9.7 to 9.9.

Reference Books

1. S.Arumugam and S.Ramachandran , Invitation to graph theory, Scitech Publications of India Pvt., Ltd, Chennai, 2001.

2. Frank Harary, Graph Theory, Narosa Publishing House, New Delhi, 2001.

e-Resources

1.https://www.youtube.com/watch?v=la7b2jWFuhQ&list=PLEHGYFbPuuMGWI1vTAEynekaEsk6O1yPn

2.https://www.youtube.com/watch?v=piirMOJ3ePw&list=PLEHGYFbPuuMGWI1vTAEynekaEsk6O1yPn&index=2

3.https://www.youtube.com/watch?v=BDAvYrextrY&list=PLEHGYFbPuuMGWI1vTAEynekaEsk6O1yPn&index=3

4.https://www.youtube.com/watch?v=0wtpSpcoRFs&list=PLEHGYFbPuuMGWI1vTAEynekaEsk6O1yPn&index=7

5.https://www.youtube.com/watch?v=Nn7ct_jevGM&list=PLEHGYFbPuuMGWI1vTAEynekaEsk6O1yPn&index=11

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

Programme Code: 02	**B.Sc Mathematics**			
Title of the Paper	**Major Elective Paper-** NUMERICAL METHODS WITH MATLAB			
Batch 2026-2029	**Hours / Week** 5	**Total Hours** 75	**Credits** 5	Employability

Course Objectives

1. To solve algebraic and transcendental equations for finding roots using numerical methods.
2. To solve simultaneous linear algebraic equations using various numerical methods
3. To know about finite differences and its uses to interpolate the values for equal and unequal intervals.

Course Outcomes (CO)

K1 to K5	CO1	Remembering various numerical methods for finding the solution of algebraic and transcendental equations.
	CO2	Demonstrating various numerical algorithms for solving simultaneous linear algebraic equations.
	CO3	Applying finite difference methods for interpolation.
	CO4	Analyzing the various methods of interpolation for equal and unequal intervals.
	CO5	Evaluating the solutions of the algebraic and transcendental equations using MATLAB.

Syllabus

UNIT I **(15 Hours)**

The numerical solution of algebraic and transcendental equations : The bisection method – Method of successive Approximation –The method of false position - **Newton-Raphson method*.**

UNIT II **(15 Hours)**

Simultaneous linear algebraic equations: Direct methods: **Gauss elimination method*** - Gauss Jordan method, Method of triangularisation. Inverse of a matrix using Gauss elimination method. Indirect method: Jacobi method of iteration – Gauss- Seidel method of iteration .

UNIT III **(15 Hours)**

Finite differences: First difference –Higher differences- Operators- Forward difference table- Backward difference table- Expression of any value of y in terms of y_n and the backward differences of y_n- Differences of a polynomial- Factorial polynomial.

UNIT IV **(15 Hours)**

Interpolation with equal intervals: Gregory – Newton's forward interpolation formula – Gregory –Newton's backward interpolation formula. Central difference interpolation: Gauss's forward interpolation formula – Gauss's backward interpolation formula -Stirling's formula. Interpolation with unequal intervals: Divided differences - Newton's interpolation formula for unequal intervals - Lagrange's interpolation formula –Inverse interpolation.

UNIT V **(15 Hours)**

Basic Operations of MATLAB: Input/Output of Data from MATLAB Command Window - Input/Output of Data Through Files - Input/Output of Data Using Keyboard - 2-D Graphic Input/Output - 3-D Graphic Output - Mathematical Functions - Operations on Vectors and Matrices - Random Number Generators - Flow Control Solving a System of Linear Equations: Gauss Elimination – Partial Pivoting – Gauss–Jordan Elimination - Inverse Matrix - LU Decomposition (Factorization): Triangularization Iterative Methods to Solve Equations: Jacobi Iteration - Gauss–Seidel Iteration – Problems

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

Text Books

1. P.Kandasamy, K.Thilagavathi and K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, New Delhi, 2012.

Unit I	Chapter III	Sections 3.1 - 3.4
Unit II	Chapter IV	Sections 4.1- 4.4, 4.7- 4.9
Unit III	Chapter V	Sections 5.1 -5.4
Unit IV	Chapter VI	Sections 6.1-6.3
	Chapter VII	Sections 7.1-7.5
	Chapter VIII	Sections 8.1 -8. 5, 8.7-8.8

2. Won Young Yang, Wenwu Cao, Tae-Sang Chung, John Morris, Applied Numerical Methods Using Matlab, Wisley-Interscience, A John Wiley & Sons, Inc., Publication 2005.

Unit V	Chapter 1	Sections 1.1.1-1.1.9
	Chapter 2	Sections 2.2.1-2.4.1 and 2.5.1- 2.5.2

Reference Books

1.M.K. Venkataraman, Numerical Methods in Science and Engineering, NPC, 5th Edition, 2001.

2.M.K.Jain, S.R.K. Iyengar and R.K.Jain , Numerical Methods for Scientific and Engineering Computations, New Age International publishers, New Delhi, 2004.

3. A.Singaravelu, Numerical Methods , Meenakshi Publications, Arpakkam, 2002.

4.Numerical Methods using MATLAB, John H. Mathews and Kurtis D. Fink, Prentice Hall Publication (1999), 3rd Edition.

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

e-Resources

1.https://www.youtube.com/watch?v=fCKUOWiM6s&list=PLgzdggUFmFVwfo7pDvethv_bT86zhMar0

2. https://www.youtube.com/watch?v=T4c1YCU3xr8

3. https://www.youtube.com/watch?v=A1voit-xBN0

4. https://www.youtube.com/watch?v=_1GTPKIehEY

5.https://www.youtube.com/watch?v=r6z9wTMlwV8&list=PLgzdggUFmFVwfo7pDvethv_bT86zhMar0&index=12

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

Programme Code : 02	**B.Sc Mathematics**			
Title of the Paper	**Major Elective Paper**-ASTRONOMY			
Batch 2026-2029	**Hours / Week** 5	**Total Hours** 75	**Credits** **5**	Skill development

Course Objectives

1. To acquire the knowledge about the celestial objects and planets.
2. Develop skills to design observing projects with research telescopes and projects drawing upon data in the literature and in archives.
3. To be familiar with the appearance of a range of common astronomical objects, such as asteroids, comets, satellites, planets, stars, and galaxies.

Course Outcomes(CO)

K1 to K5	CO1	Defining about the observed properties of physical systems that comprise the known universe.
	CO2	Demonstrate their ability to read, understand, and critically analyze the astronomical/physical concepts
	CO3	Applying their physics and mathematical skills to problems in the areas of planetary science.
	CO4	Analyzing for valid scientific conclusions and communicate those conclusions in a clear and articulate manner.
	CO5	Demonstrating eclipse of moon

Syllabus

UNIT I **(15 Hours)**

Celestial sphere, Diurnal Motion – Celestial Co-ordinates.

UNIT II **(15 Hours)**

The Earth: **Zones of Earth*** – Terrestrial Latitudes and Longitudes – Dip of Horizon – Twilight.

UNIT III **(15 Hours)**

Refraction.

UNIT IV **(15 Hours)**

Kepler's laws*, seasons – calendar.

UNIT V **(15 Hours)**

The moon – eclipses.

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

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 Book

1. V.B.Bhatia , Text book for Astronomy and Astrophysics with elements of Cosmology, 2nd Edition, Narosa Publishing House, New Delhi, 2001.

e-Resources

1. https://www.youtube.com/watch?v=9ybVfkrRsjg
2. https://www.youtube.com/watch?v=eDt3vI8zzKM
3. https://www.youtube.com/watch?v=zarxpu43-ls
4. https://www.youtube.com/watch?v=pdst6HQkdrc
5. https://www.youtube.com/watch?v=ntsczkygeYo

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

Programme Code : 02	**B.Sc Mathematics**			
Title of the Paper	**Major Elective Paper FUZZY MATHEMATICS**			
Batch 2026-2029	**Hours / Week** 5	**Total Hours** 75	**Credits** **5**	Skill development

Course Objectives

1. To know the basic definitions of fuzzy set theory.
2. To know the fundamentals of fuzzy Algebra.
3. To know the applications of fuzzy Technology.

Course Outcomes(CO)

K1 to K5	CO1	Remembering the basic concepts of Boolean algebra.
	CO2	Understanding the concepts of fuzzy sets.
	CO3	Identifying the concepts of Algebra of fuzzy relations and logic connectives.
	CO4	Analyzing fuzzy subgroup and Preimage of subgroupoid.
	CO5	Evaluating the fuzzy invariant for subgroup.

Syllabus

UNIT I **(15 Hours)**

Introduction- Fuzzy subsets- Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy – ***level sets** – properties of fuzzy subsets.

UNIT II **(15 Hours)**

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-Cartesian product of fuzzy subsets

UNIT III **(15 Hours)**

Introduction- Algebra of fuzzy relations-logic-connectives.

UNIT IV **(15 Hours)**

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Preimage of subgroupoid.

UNIT V **(15 Hours)**

Fuzzy invariant subgroups-fuzzy subrings.

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

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

e-Resources

1.https://www.youtube.com/watch?v=_evDAN0YUlE&list=PLep340oM2dkBXG2ot0C02ysyhD14W9GCT

2.https://www.youtube.com/watch?v=EwtplXYVaZc&list=PL4gu8xQu0_5Ix4FzEQkMzi46sPu-8-7tM&index=3

3.https://www.youtube.com/watch?v=JKOtnYFnEMU&list=PL4gu8xQu0_5Ix4FzEQkMzi46sPu-8-7tM

4.https://www.youtube.com/watch?v=BgsCP0a0RXg&list=PL4gu8xQu0_5Ix4FzEQkMzi46sPu-8-7tM&index=17

5. https://www.youtube.com/watch?v=bGdK0kT3syk

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

Programme Code : 02	**B.Sc Mathematics**			
Title of the Paper	Major Elective Paper **COMBINATORICS**			
Batch 2026-2029	**Hours / Week** 5	**Total Hours** 75	**Credits** **5**	Skill development

Course Objectives

1. To learn about recurrence relation.
2. To have knowledge about permutation.
3. To be familiar with assignment problems.

Course Outcomes(CO)

K1 to K5	CO1	Remembering the basic concepts of Fibonacci sequence.
	CO2	Understanding the concepts of Permutation and Fibonacci type relation.
	CO3	Identifying the concepts of counting simple electrical networks.
	CO4	Analyzing inclusion and Exclusion principle.
	CO5	Evaluating Fibonacci relation using generating function.

Syllabus

UNIT I **(15 Hours)**

Introduction to Basic ideas – General formula for f(n,k) – Recurrence Relation – boundary condition – Fibonacci sequence – *__generating function__ .

UNIT II **(15 Hours)**

Permutation – Ordered selection – unordered selection – further remarks on Binomial theorem.

UNIT III **(15 Hours)**

Passing within a set – Pairing between set and optimal assignment problem – Gala's optimal assignment problem.

UNIT IV **(15 Hours)**

Fibonacci type relation – using generating function – Miscellaneous method – counting simple electrical networks.

UNIT V **(15 Hours)**

The inclusion – Exclusion principle – Rook polynomial.

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

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.

e-Resources

1. 1.https://www.youtube.com/watch?v=QbnGBYxE2jo
2. 2.https://www.youtube.com/watch?v=t64qSXe6CaM
3. https://www.youtube.com/watch?v=nKsC70MtzkY
4. https://www.youtube.com/watch?v=RwRESxPSUUc
5. https://www.youtube.com/watch?v=A2YCz5QM-f4

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

SKILL BASED SUBJECTS

26UGC3S1

Programme Code:		For B.A., BBA., B.Com., BCA. and B.Sc. Degree Students			
Title of the Paper: Skill Based Subject1– Basics of Cyber Security					
Batch 2026 - 2029	**Semester: III**	**Hours / Week 2**	**Total Hours 30**	**Credits 3**	**Skill Development**

COURSE OBJECTIVES

➢ To provide fundamental knowledge of cyber security concepts and the digital environment.

➢ To create awareness about cyber threats, cybercrimes, and common online frauds.

➢ To develop the ability to identify risks associated with internet, mobile, and online transactions.

➢ To familiarize students with safe practices in email, social media, and digital communication.

➢ To introduce basic cyber laws, ethics, and responsible digital behavior.

COURSE OUTCOMES

On successful completion of the course, the students will be able to:

K Level	CO Code	Course Outcome
K1 ↕ K5	CO1	Apply the fundamental concepts of cyber security and digital safety at appropriate place
	CO2	Identify various cyber threats, cybercrimes, and online frauds
	CO3	Enable safe practices while using internet, mobile, and e-commerce platforms
	CO4	Interpret security issues related to email and social media usage
	CO5	Comprehend cyber laws, ethics, and legal responses to cybercrime

SYLLABUS

UNIT I **6 Hours**

Foundations of Cyber Security: Cyberspace and Digital Environment -Evolution of Cyber Security- Basic Concepts and terminology in Cybersecurity –Cybersecurity Threat – Defense in

26UGC3S1

Depth concept in Cyber Security- Information Literacy – Types of False Information — Digital footprint — Cyber Frauds- Basic Safety Practices and Password Awareness - Multi-Factor Authentication (MFA)- Zero Trust Security Model.

UNIT II **6 Hours**

Cyber Crimes & Threat Landscape: Introduction to AI in Cyber Security- Cyber Crimes- Important of Cybercrime- Types of Cyber Crime- CIA Triad – Tools for Confidentiality, Integrity, Availability -Cyber Crime & Digital Evidence Indian Perspective- Recent Cyber Crime Incidents- Social Engineering Frauds- Financial Frauds using Social Media Platforms- Ransomware Attacks -Deep fake based frauds -Cryptocurrency scams -Dark Web basics - Preventive Measures for individuals and Organizations – Awareness and Safe Online Behavior- Incident Response Process.

UNIT III **6 Hours**

Internet, Mobile & Digital Transaction Security:Browser Security Tools – Mobile phone security and privacy settings – E-commerce concepts and risks – UPI Fraud Awareness -QR Code Scams - App permissions & Data Tracking – Malware Types and Cyber Attacks- Secure browsing and Data Theft &Public Wi-Fi Precautions – Symmetric vs Asymmetric Encryption.

UNIT IV **6 Hours**

Communication & Social Media Security: Basics of email usage and Communication – Email threats: Spam, Phishing, Malicious links- Fake News – Fake profiles, Cyber Bullying and Data Misuse –Computer Viruses – Antivirus and Firewall concepts – Safe sharing practices and Digital responsibility. Ethical Hacking.

UNIT V **6 Hours**

Cyber Laws, Ethics & Digital Responsibility: Introduction to Cyber Law – IT Act 2000 and Amendments– Data Protection Laws (India DPDP Act 2023). Intellectual Property in Digital Space-Cybercrime and legal provisions – User rights and responsibilities in cyberspace – Digital footprint and online identity – Personal data protection and privacy – Cyber ethics and responsible usage – Cyber safety awareness programs and best practices.

Case Study: Case studies of cyber law enforcement in India

Work Book

1. *Basics of Cyber Security*, prepared by Kongunadu Arts and Science College, Coimbatore

Reference Books

1. Data Security Council of India (DSCI), in collaboration with Seqrite, presents the second edition of the India Cyber, Threat Report 2025.
2. Green, J., Smith, A., & Brown, T. (2024). Information security management principles. Routledge.
3. Armstrong-Smith, S. (2024). Understand the cyber attacker mindset: Build a strategic security program. Kogan Page.
4. Ismail, Y., Lacy, F., &Belu, R. (Eds.). (2024). Cybersecurity: Threats, technologies, and emerging solutions. IntechOpen.
5. Rais, R., Morillo, C., Gilman, E., & Barth, D. (2023). Zero trust networks: Building secure systems in untrusted networks (2nd ed.). O'Reilly Media.
6. Shapiro, S. J. (2023). Fancy bear goes phishing: The dark history of the information age. Farrar, Straus and Giroux.
7. Tamil Nadu Fact Check Unit, Training Handbook
8. James Graham (2011), Cyber Security Essentials, CRC Press, Auerbach Publications, Taylor & Francis Group.
9. Kathryn Knerler (2022), 11 Strategies of a World-Class Cybersecurity Operations Center, MITRE Corporation.
10. Dr. Jeetendra Pande (2017), Introduction to Cyber Security, Uttarakhand Open University.
11. Rohas Nagpal (2008), Real world cyber crime cases, Cyber Crime & Digital Evidence – Indian Perspective, Asian School of Cyber Laws
12. Prof. (Dr.) Nilesh K. Modi (2021), Cyber Security Techniques, Dr. Babasaheb Ambedkar Open University.
13. Cyber Security Awareness Handbook (2020), CisoJil information Technology Limited.
14. Jeff Kosseff (2020), Cybersecurity Law, John Wiley & Sons, Inc.
15. Cyber Crime Law and Practice, The Institute of Company Secretaries of India, 2016
16. Yuri Diogenes (2018), Cybersecurity Attack and Defense Strategies, Packt Publishing.
17. Cybersecurity Handbook, Ministry of Digital Governance, National Cybersecurity Authority, June 2021.
18. Justin Hutchens (2024), The Language of Deception: Weapon zing Next Generation AI– Explores
    AI in social manipulation, deep fakes, and malware.
19. D.R. Halston (2025), Cyber Security Mastery Covers AI-driven attacks, cloudsecurity, and career preparation.

Web References

- https://safety.google/
- https://safety.google/security/security-tips/
- https://www.simplilearn.com/tutorials/cyber-security-tutorial
- https://www.getcybersmart.org/for-students
- https://www.techbuddies.io/cyber-security-basics
- https://www.geeksforgeeks.org/ethical-hacking/what-is-cyber-security/
- https://www.drishtiias.com/daily-updates/daily-news-editorials/india-s-cybersecurity-challenge-threats-and-strategies
- https://www.dsci.in/resource/content/india-cyber-threat-report-2025
- https://www.eimt.edu.eu/25-major-cyber-attacks-in-india-threats-and-strategies
- https://www.coursera.org/in/articles/types-of-cyber-attacks
- https://eventussecurity.com/cybersecurity/india/cyber-attacks/
- www.heimdalsecurity.com

CIA EXAMINATION MARK BREAKUP

The CIA Examination mark breakup for the course **Basics of IPR** is given below:

S.No.	Distribution Component	Marks
1	CIA I – 75 Marks Converted to 30	30
2	CIA II – 75 Marks Converted to 30	30
3	Seminar/Objective Capacity Testing I	10
4	Seminar/Objective Capacity Testing II	10
5	Attendance	05
6	Any Case Study related to IPR (as a Group)	15
	Total	**100**

QUESTION PAPER PATTERN

The following question paper pattern will be followed for the above said courses:

Section A - Multiple Choice (10 × 1 = 10 Marks)

Section B - Either or Type (5 × 5 = 25 Marks)

Section C - Either or Type (5 × 8 = 40 Marks)

Maximum Marks : 75 Duration : 3 Hours

26UMA4SL

Programme Code : 02		**B.Sc Mathematics**		
Title of the Paper		Skill Based Subject 2 Fundamentals of LaTeX-Practical		
Batch 2026-2029	**Hours / Week** 2	**Total Hours** 30	**Credits** 3	Skill development/Employability

Course Objectives

1. LaTeX is a typewriting system that is extremely useful for typing and formatting scientific documents.
2. Typing Mathematical equations is very intuitive and easy in LaTeX.
3. This practical subject is Job and Skill oriented for the students.

Course Outcomes (CO)

K3 to K5	CO1	Choosing LaTeX software to prepare letters, dissertation, curriculum vitae and other documents
	CO2	Illustrate model question papers, matrix, case statements and tables using LaTeX software
	CO3	Select LaTeX software for preparing research papers as per the journal's template.
	CO4	Construct molecular orbital diagrams for Homo and Hetro diatomic molecules by using MO diagram package in LaTeX software
	CO5	Recommending R software to merge the coding of R with the LaTeX documents

List of Practical

1. Using LaTeX, type a document in different ways (Left, Right, Center, Justify)
2. Using LaTeX environment, type the following text

   (a) Numbering 1
   - Bullet 1
   - Bullet 2

   (b) Numbering 2
   i. Type 3
   ii. Type 4

3. Using LaTeX environment, type the following text

   1 Modern Algebra

   1.1 Group

   1.1.1 Subgroup

   1.2 Ring

   1.2.1 Homomorphism

4. Using LaTeX, type the following equation

$$\sqrt{\sqrt{n!+\sqrt{45}}}+\int_0^x\int_{\sqrt{\sqrt{16}}}^x\sqrt{\sqrt{e^x}}dx+\frac{d^2y}{dx^2}$$

5. Using LaTeX, type the following equation

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

6. Using LaTeX, type your own Curriculum Vitae.

7. Using LaTeX, type a question paper for the subject Modern Algebra as per the following pattern.

Kongunadu Arts and Science College(Autonomous)
Coimbatore-641029
Department of Mathematics
CIA TEST-II

Class & Major:	II B.Sc. Mathematics
Title of the Paper:	Algebra
Date & Session:	DD/MM/YYYY 2.00pm - 5.00pm AN
Time: 3hrs	Max.marks:75

Answer ALL Questions

SECTION-A(10×1=10 Marks)

Choose the correct answer:

1.

a) b) c) d)

SECTION - B (5×5=25 Marks)

11.a).

(or)

b).

SECTION - C(5×8=40 Marks)

16.a).

(or)

b).

8. Using LaTeX, type the following table.

	Item	Budget			(in Rupees)
		1st Year	2nd Year	3rd Year	Total
A	Recurring	JRF	JRF	SRF	
1	Salaries/Wages	1,65,600	1,65,600	1,93,200	5,24,400
2	Consumables	50,000	50,000	50,000	1,50,000
3	Travel	75,000	75,000	75,000	2,25,000
4	Other costs				
(i)	Books/Journals	75,000	75,000	75,000	2,25,000
(ii)	Contingency	50,000	50,000	50,000	1,50,000
B	Equipments	1,50,000	-	-	1,50,000

	Grand Total (A+B)				14,24,400
	Total FEC*				NIL
	Over head Charge (20% of the grand total)				2,84,880
	Total				17,09,280

9. Using LaTeX, type the following Case Statements.

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

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

10. Using LaTeX, type the following Matrices

(a) $$\begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{pmatrix}$$

(b) $$B = \begin{matrix} \\ s_1 \\ s_2 \\ s_3 \\ s_4 \\ s_5 \end{matrix} \begin{matrix} d_1 & d_2 & d_3 \end{matrix} \begin{pmatrix} (0.6,0.2) & (0.6,0.2) & (0.3,0.4) \\ (0.3,0.5) & (0.2,0.6) & (0.7,0.2) \\ (0.1,0.8) & (0.2,0.7) & (0.7,0.2) \\ (0.4,0.5) & (0.7,0.2) & (0.3,0.4) \\ (0.1,0.7) & (0.1,0.8) & (0.2,0.7) \end{pmatrix}$$

(c) $$\begin{Bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{Bmatrix}$$

11. Using LaTeX, type the following complicated mathematical structures.

$$(a) \binom{m+n}{m} = \frac{(m+n)!}{m!n!} = \frac{\overbrace{(m+n)(m+n-1)\ldots(n+1)}^{m\,factors}}{\underbrace{m(m-1)\ldots1}_{m\,factors}}$$

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

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

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

12. Create a frame environment with title LaTeX Beamer presentation and include author name, institute, current date and footnote.
13. Include few figures in documents.
14. Create references using bibliography environment and cite the references in a document.

Distribution of Marks in ESE

Experiment	:	35
Record	:	05
Total		**40**

CIA

CIA Practical	:	45
Exam		
Attendance	:	5
Observation Note Book	:	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
CO4	S	H	S	M	S
CO5	H	S	S	H	M

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UBI6S3

Programme Code :		For B.A., BBA, B.Com, BCA and B.Sc., Degree Students			
Skill Based Subject III - BASICS OF INTELLECTUAL PROPERTY RIGHT'S					
Batc **2026-2029**	**Semester** **VI**	**Hours / Week** **2**	**Total Hours** **30**	**Credits** **3**	**Skill Development**

COURSE OBJECTIVES

- To create awareness about recent trends in IPR and Innovation
- To explore the basic concepts IPR
- To focus upon trademarks, copyrights, patents, industrial designs and traditional knowledge.
- To learn more about managing IP rights and legal aspects.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1 ↑	CO1	Know about basic concepts of IPR and patent
	CO2	Understand copyrights, industrial designs and geographical indication of goods.
	CO3	Differentiate between trademarks and trade secrets
	CO4	Acquire knowledge on parotection of traditional knowledge and plant varieties.
↓ K5	CO5	Manage and protect IP Rights

UNIT – I **(6 hours)**

Introduction -origin and development of Intellectual Property Rights (IPR), need for protecting IP, **Patents:** Foundation of patent law, patent searching process, basic criteria of patentability. Patentable and non - patentable subject matters in India. Patent prior art search, drafting the patent specification and filing procedure

26UBI6S3

UNIT – II **(6 hours)**

Copyrights: Fundamentals of copyright law, originality of material, right of reproduction, right to perform the work publicly, copyright ownership issues, notice of copyright. **Industrial Designs:** Kind of protection provided in Industrial design. **Geographical Indication of Goods:** Basic aspects and need for the registration.

UNIT – III **(6 hours)**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, transfer of rights, selecting and evaluating trademark, registration of trademarks, claims. **Trade Secrets:** Trade secret law, determination of trade secret status, liability form is appropriation of trade secrets, trade secret litigation.

UNIT – IV **(6 hours)**

Protection of traditional knowledge - Objectives, concept of traditional knowledge, issues concerning, bioprospecting and biopiracy. **Protection of Plant Varieties** - Objectives, international position, plant varieties protection in India. Rights of farmers, breeders and researchers.

UNIT- V **(6 hours)**

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, protecting IP Rights: non-disclosure agreement, cease and desist letter, settlement memorandum. **Transferring IP Rights:** Assignment contract, license agreement, deed of assignment. Infringement and enforcement.

TEXT BOOKS

1. Ramakrishna Chintakunta and M. Geethavani (2022). A Textbook of Intellectual Property Rights. Blue Hills publications.
2. N.K Acharya (2021).Intellectual property rights(8thEdn). Asia Law House.

26UBI6S3

3. Craig Allen Nard, Michael J. Madison, and Mark P. McKenna. (2017). Law of Intellectual Property (5thEdn). New York Aspen publishers.
4. Barrett and Margreth (2009). Intellectual Property. New York Aspen publishers.
5. Deborah E.Bouchoux(2013). Intellectual property:The Law of Trademarks, Copyrights, Patents, and Trade Secrets. Publisher: Cengage India

REFERENCE BOOKS

1. B.Ramakrishna and H.S.Anil Kumar (2017). Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers.Notion Press.
2. V. K. Ahuja(2013). Law relating to Intellectual Property rights (2nd Edn). LexisNexis.
2. R. Radhakrishnan and S. Balasubramanian(2008).Intellectual property rights: Text and Cases. Excel Books India.
4. D. Goeland S. Parashar (2013). IPR Biosafety and Bioethics. Pearson Education India.

26UBI6S3

CIA EXAMINATION MARK BREAKUP

The CIA Examination mark breakup for the course **Basics of IPR** is given below:

S.No.	Distribution Component	Marks
1	CIA I – 75 Marks Converted to 30	30
2	CIA II – 75 Marks Converted to 30	30
3	Seminar/Objective Capacity Testing I	10
4	Seminar/Objective Capacity Testing II	10
5	Attendance	05
6	Any Case Study related to IPR (as a Group)	15
	Total	**100**

QUESTION PAPER PATTERN

The following question paper pattern will be followed for the above said courses:

Section A - Multiple Choice (10 × 1 = 10 Marks)

Section B - Either or Type (5 × 5 = 25 Marks)

Section C - Either or Type (5 × 8 = 40 Marks)

Maximum Marks : 75 Duration : 3 Hours



EXTRA DEPARTMENTAL COURSE (EDC)



26UMA5X1

Programme Code : 02		**For UG STUDENTS**		
Title of the Paper		Extra Departmental Course (EDC) - Introduction to LaTeX - Lab Course		
Batch 2026-2029	**Hours / Week** 2	**Total Hours** 30	**Credits** 3	Skill development/Employability

Course Objectives

1. Introduce LaTeX as a powerful typesetting system for preparing and formatting scientific and academic documents with precision.
2. Enable students to efficiently create and manage mathematical equations and expressions using LaTeX's intuitive syntax.
3. Provide practical, skill-oriented training in LaTeX to enhance students' employability and professional competence

Course Outcomes (CO)

K3 to K5	CO1	Choosing LaTeX software to prepare letters, dissertation, curriculum vitae and other documents
	CO2	Illustrate model question papers, matrix, case statements and tables using LaTeX software
	CO3	Select LaTeX software for preparing research papers as per the Journal's template.
	CO4	Construct professional-quality scientific and academic documents using LaTeX, integrating text, equations, and diagrams with appropriate packages.
	CO5	Recommending www.overleaf.com to use the templates of Beamer presentation and Curriculum Vitae.

List of Practical

1. Using LaTeX, type a document in different ways (Left, Right, Center, Justify)

2. Using LaTeX environment, type the following text

    1 Modern Algebra

        1.1 Group

            1.1.1 Subgroup

        1.2 Ring

            1.2.1 Homomorphism

3. Using LaTeX, type the following equation

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

4. Using LaTeX, type the following equation

26UMA5X1

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

5. Using LaTeX, type the following equation

$$|x| = \begin{cases} x & if\ x \geq 0 \\ -x & if\ x < 0 \\ 0 & \text{otherwise} \end{cases}$$

6. Using LaTeX, type a question paper for the subject Modern Algebra as per the following pattern.

Kongunadu Arts and Science College(Autonomous)
Coimbatore-641029
Department of Mathematics
CIA TEST-II

Class & Major:	II B.Sc. Mathematics
Title of the Paper:	Algebra
Date & Session:	DD/MM/YYYY 2.00pm - 5.00pm AN
Time: 3hrs	Max.marks:75

Answer ALL Questions

SECTION-A(10×1=10 Marks)

Choose the correct answer:

1.

a) b) c) d)

SECTION - B (5×5=25 Marks)

11.a).

(or)

b).

SECTION - C(5×8=40 Marks)

16.a).

(or)

b).

7. Using LaTeX, type the following table.

S.No.	Item	Budget
1	Salaries/Wages	1,00,000
2	Consumables	50,000
3	Travel	50,000
4	Books/Journals Contingency	75,000
5	Equipments	1,25,000
	Grand Total	**4,00,000**

26UMA5X1

8. 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) $\begin{Bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{Bmatrix}$

9. Create a frame environment with title LaTeX Beamer presentation and include author name, institute, current date and footnote using www.overleaf.com LaTeX Platform Templates.
10. Using LaTeX, type your own Curriculum Vitae using www.overleaf.com LaTeX Platform Templates.
11. Include few figures in documents.
12. Create references using bibliography environment and cite the references in a document.

CIA EXAMINATION MARK BREAKUP
(For Practical Only)

S.No.	Component Distribution	Marks
1.	CIA Practical I – 60 marks converted to 30	30
2.	CIA Practical II – 60 marks converted to 30	30
3.	Continuous assessment of practical (Observation to be submitted*) (15 Experiments/Programs x 2 = 30 marks)	30
4.	Record	05
5.	Attendance	05
Total		**100**

* In case a student is absent for an Experiment/Program conducted on a particular day, the student will not be allowed to compensate that Experiment/Program and will be awarded zero for that particular Experiment/Program and shall be marked absent. In case any student has an attendance lack; the concerned faculty handling the course in consultation with HoD may permit the student who has an attendance lack to compensate one or two Experiment/Programs as the case may be to enable them to become eligible with mandate of 75% attendance to appear for the Continuous Internal Practical Examinations. However the compensated Experiment/Programs will not be awarded any marks whatsoever.

26UMA5X1

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD



GENERAL PAPERS



26EVS101

Programme Code :	**For B.A., BBA, B.Com, BCA and B.Sc., Degree Students**			
PART IV-ENVIRONMENTAL STUDIES				
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2026-2027	**I**	**2**	**30**	**2**

COURSE OBJECTIVES

- Toprovide a fundamental understanding of natural resources, environmental ethics, and the impact of modern practical conservation and sustainability.
- To inculcate knowledge and create awareness about concepts, components and function of ecosystems
- To appraise on the importance of biodiversity, its values, threats, indigenous and Traditional knowledge systems, conservation strategies, and modern identification tools, and cultivate conscious responsibility and awareness for biodiversity conservation and sustainability.
- To understand the environment threats and pollution, its impacts and mitigation strategies
- To develop an understanding of disasters (natural and man-made) and its preparedness

COURSE OUTCOMES

On Successful completion of the course, the students will be able to

K1 ↑	CO1	Formulate genetic resource conservation strategies and assess India's SDG performancethrough AI/ML tools.
	CO2	Evaluate and predict the impact of humans on web of life, global economy and quality
	CO3	Think critically an develop strategies for biodiversity conservation, sustenance and environmental equity through eco conscious approach
	CO4	Demonstrate values and have compassion towards complex environmental issues and take part in mitigating current environment challenges through sustainable solutions
↓ K5	CO5	Apply basic safety and preparedness measures in disaster situations in society, household and workplace

26EVS101

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND ITS SOCIAL ETHICS AND VALUES (6 HOURS)

Introduction to environment; Historical Development of Human–environment interaction; Industrial revolution, Economic development and its impact on the environment;**Overview of resources:**Definition, Classification of natural resources – biotic and abiotic, renewable and non-renewable.**Renewable Resources:**Water Resources- Rainwater Harvesting, Reservoirs managements,AI & ML tools for water resource management. Sustainable Development goals - Agricultureand Environment. Revisiting traditional agricultural practices- Biodynamic Farming, Physical and Biological soil factors.**Non-renewable Resources**- fossil fuel, nuclear fuel, Energy Resources: Conventional and non-conventionalResources- solar, wind, clean energy- hydrogen, Biomass energy-coir pith, charcoal; Use of exotic/invasive weed biomass for alternative energy/economy.Eg: *Lantana camara, EichhorniaSp,* Genetic Resources and conservation, strategies.

***Activity:**(i) Analyze your department and its practices towards compliance to SDG's. List out the compliances towards SDG's with justification.

(ii) Examine your campus' current resource conservation strategies and provide recommendations to improve its sustainability and resource efficiency.

* Students can take up any one of the above.

UNIT II ECOSYSTEMS (6 HOURS)

Ecosystem- Definition, Components (producers, consumers and decomposers) and functions- Energy flow, Food chains and its types, food web, Disturbances to food chain and food web due to anthropogenic intrusions Eg: Diclofenac Case, Ecological pyramids: types and importance of ecological pyramids, **Types of Ecosystems**: Natural ecosystem- Aquatic Ecosystem (Pond, River, Marine and Estuarine), Terrestrial Ecosystem (Forest, Grassland and Desert). Artificial Ecosystem (Crop land).

Activity: Develop a working model for an ecosystem through building a Terrarium or Suseum.

UNIT IIIBIODIVERSITY (6 HOURS)

Concept of Biodiversity: Definition, Types-Genetic, Species and Ecosystem diversity. Indigenous Knowledge Systems on Biodiversity – Traditional knowledge and legal framework for

26EVS101

bioprospecting and Biomimicry. Biodiversity- Values, uses and threats, sustainable use of bioresources for value additions, Conservation strategies of Biodiversity- *In-situ* - National Parks, Wildlife Sanctuaries, Community Reserve and Conservation Reserves, *Ex-situ* – Zoological Park, Aquarium, Botanical garden.***Case Study**-NilgiriTahr Conservation Project.

Activity:(i) Applications for plant and animal identificationby software-*iNaturalist* and Merlin Bird ID

(ii) Field observation and documentation of the campus biodiversity.

UNITIV ENVIRONMENTAL THREATS AND POLLUTION (6 HOURS)

Introduction and Classification of Pollution- physical, chemical and biological; major types of pollution- air, water, soil/land, noise, thermal, radioactive, solid waste, electronic waste (e-waste), plastic, biomedical waste.**Assessment and Monitoring:** Pollution impact assessment/health risk assessment & monitoring techniques, Biological indicators of pollution – Dissolved Oxygen (DO), Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Impact of pollution and incidence of Life style disorders like Diabetes, Cardio Vascular Disease, Cancer, PCOS etc.**Waste Management** – concept of 3R (Reduce, Recycle and Reuse) and sustainability.***Case studies:**DyeIndustrial pollution from tanneries, paper and pulp industrial effluents inNoyyal and Cauvery rivers.

Activity: Prepare an Audit report for:

(i) Water usage in your department/house

(ii) Magnitude of solid waste generation and its management at your department/house.

UNIT V: DISASTER MANAGEMENT AND PREPAREDNESS (6 HOURS)

Definition and Classification of Disaster (Natural and Man-made disasters). **Natural Disaster:** Earthquakes, Landslides, Tsunami, Floods, Volcanic eruptions, Cyclones.Wayand-landslides, Joshimath- The sinking Village, Forest fires: causes, spread, control measures. **Man-made Disasters**: Industrial and chemical accidents (Bhopal disaster, oil spills), Nuclear hazards (Chernobyl and Fukushima).Kasargod- Impact of Endosulfan spraying on cashew farms.**Preparedness and safety measures:** Early warning system, response, recovery, mitigation, vulnerability, risk, resilience and capacity building. **Forecasting methods:** Conventional – cloud formation & wind, wave patterns, behaviours of animals & plants,Modern methods–remote

26EVS101

sensing, drone and AI tools for impact assessment.***Case studies**: Chennai flood 2015, causes and control measures.

Activity: Prepare (i) Personal/Class emergency plan

(ii) Risk identification checklist like loose heavy furniture, poor wiring, blocked exits

(iii) A document using Mobile technology to map local resources or identify safer locations.

Field Study: Visit to eco parks'/conservation sites and report.

* Case studies are not for examination purposes.

Text book

1. Workbook on Environmental Science (2026), published by Kongunadu Arts and Science College, Coimbatore-641029.

Reference Books:

1. Fundamentals of Ecology, Odum E.P, Odum H.T & Andrews- Saunders publications
2. Ecology, Environmental science and Conservation. Singh J.S & Gupta SR, S Chand Publishing (2017).
3. This Fissured Land: An Ecological History of India; Gadgil M & Guha R (1993), University of California Press, 1st Edition.
4. Environment (8th Ed.) by Raven PH, Gift, Bary LR, Hassenzahl DM, 2015, Wiley publishing house.
5. R. S. Ambasht, A Text Book of Plant Ecology, Students Friends & Company, 1990 - Plant ecology - 373 pages
6. A.Ravikrishnan (2019), Environmental Science and Engineering (Forth Edition) by Sri Krishna Hitech Publishing Company Pvt.Ltd,Velappanchavadi, Chennai.
7. Yadav, P. (2021). Applied and Economic Zoology. Kedar Nath Ram Nath
8. Krishnamurthy, K. V. (2023). An advanced textbook on biodiversity: Principles and practice. Oxford and IBH Publishing.
9. Anonymous (2003) Professional's The Wildlife (Protection) Act, 1972. Professional Book Publications.
10. National Disaster Management Guidelines - National Disaster Management Information and Communication System (NDMICS) (2011). A publication of the National Disaster Management Authority, Government of India. ISBN: 978-93-80440-12-5, February 2012, New Delhi.

26EVS101

11. Disaster Risk Management Systems Analysis: A Guide Book, Food and Agriculture Organization of the United Nations, Rome (2008). ISBN 978-92-5106056-8.

Web Reference Sources

1. https://egyankosh.ac.in/bitstream/123456789/77368/1/Unit-4.pdf
2. https://agritech.tnau.ac.in/pdf/sustainableagriculture.pdf
3. https://www.dev-practitioners.eu/media/key_documents/SDGs_Booklet_Web_En.pdf
4. https://www.pmfias.com/environment-ecosystem-components-ecosystem/
5. https://www.ugc.gov.in/oldpdf/modelcurriculum/Chapter3.pdf
6. https://mjcollege.kces.in/pdf/download_documents/study_material_env_studies/ch3.pdf
7. https://www.deshbandhucollege.ac.in/pdf/resources/1587401626_BA(H)-Psc-Eco-Eng-BA(P)-II-Ecosystem.pdf
8. http://www.tezu.ernet.in/denvsc/IDC/biodiversity.pdf
9. https://egyankosh.ac.in/bitstream/123456789/86424/1/Unit-11.pdf
10. https://utkaluniversity.ac.in/wp-content/uploads/2022/05/Environmental-Pollution.pdf
11. https://cdn.visionias.in/value_added_material/d6c24-disaster_management.pdf
12. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SCIA4001.pdf
13. https://mrcet.com/downloads/MBA/Disaster%20and%20Crisis%20Management_Digital%20Notes.pdf

---

QUESTION PAPER PATTERN

Maximum Marks :50 Duration : 3 Hours

Answer all Questions (5×10=50 Marks)

Essay type, Either or type questions from each unit.

26VED201

Programme Code :	**For B.A., BBA, B.Com, BCA and B.Sc., Degree Students**		
VALUE EDUCATION – Moral and Ethics			
Batch **2026-2027**	**Hours / Week** **2**	**Total Hours** **30**	**Credits** **2**

Course Objectives

- To impart Value Education in every walk of life
- To help the students to reach excellence and reap success
- To impart the right attitude by practicing self introspection
- To portray the life and messages of Great Leaders
- To insist the need for universal brotherhood, patience and tolerance
- To help the students to keep them fit
- To educate the importance of Yoga and Meditation

Course Outcomes (CO)

After completing the course the students:

K1 to K5	CO1	will be able to recognize Moral values, Ethics, contribution of leaders, Yoga and its practice
	CO2	will be able to differentiate and relate the day to day applications of Yoga and Ethics in real life situations
	CO3	can emulate the principled life of great warriors and take it forward as a message to self and the society
	CO4	will be able to Analyse the Practical outcome of practicing Moral values in real life situation
	CO5	could Evaluate and Rank the outcome of the pragmatic approach to further develop the skills

Syllabus

UNIT I: **4 Hours**

Moral and Ethics: Introduction – Meaning of Moral and Ethics – Social Ethics – Ethics and Culture – Aim of Education.

UNIT II: **6 Hours**

Life and Teachings of Swami Vivekananda: Birth and Childhood days of Swami Vivekananda – At the Parliament of Religions – Teachings of Swami Vivekananda

26VED201

UNIT III: **4 Hours**

Warriors of our Nation: Subhas Chandra Bose – Sardhar Vallabhbhai Patel – Udham Singh – V. O. Chidambaram Pillai – Bhagat Singh – Tiruppur Kumaran – DheeranChinnamalai – ThillaiaadiValliammai – VeluNachiyar – Vanchinathan

UNIT IV: **8 Hours**

Fundamentals of Yoga**: Introduction to Yoga – Benefits of Yoga - Principles of Yoga Practice– Yoga for Health and Well Being – Yoga for Peace – Yoga for Success – Brain Yoga Benefits – The Science of Yoga - Importance of Yoga in Modern Life**

UNIT V: **8 Hours**

Yoga Practices**:Warm-Up Exercises in Yoga : Neck, Shoulder, Wrist, Hip, Knee and Ankle Rotations - Basic Yoga Asanas: Tadasana, Vrikshasana, Bhujangasana, Vajrasana , Shavasana and Ardhasiddhasana–Surya Namaskar - Pranayama - Meditation and Relaxation**

.

Text Books:

Value Based Education – Moral and Ethics – compiled by Kongunadu Arts and Science College (Autonomous), 3rd Edition (2024).

Reference Books:

1. Swami Vivekananda - A Biography, Swami Nikhilananda, Advaita Ashrama, India, 24th Reprint Edition (2010).
2. Gandhi, Nehru, Tagore and other eminent personalities of Modern India, Kalpana Rajaram, Spectrum Books Pvt. Ltd., revised and enlarged edition(2004).
3. Freedom Fighters of India, Lion M.G. Agrawal, Isha Books Publisher, First Edition (2008).
4. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication(2000).

Web References:

1.https://youtu.be/4UXFb7Cs3PU?si=6c50D1IfFvxTXdX_
2. https://youtu.be/zCaq6hbDlQw?si=kNWsrIxQXvOKfacp
3. https://youtu.be/_2GgRQJ9IbU?si=Xp_YEcCSR8mvMEG-
4. https://youtu.be/ZkyN4Dy4kO0?si=BkctTS1W3jDS886v
5. https://youtu.be/TWbiDzi-rQc?si=92crHrzoNq_0jrU-

26VED201

Value Education – Moral & Ethics

Question Paper Pattern

(External only)

Duration: 3 hours Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.



NON MAJOR ELECTIVE PAPERS



26UHR3N1

Programme Code :	For B.A., BBA, B.Com, BCA and B.Sc., Degree Students		
PART IV –NON MAJOR ELECTIVE –I HUMAN RIGHTS			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2026-2027	**2**	**30**	**2**

COURSE OBJECTIVES

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

COURSE OUTCOMES

After Completion of the Course the student will be able to

K1	CO1	To understand the hidden truth of Human Rights by studying various provisions in the Constitution of India.
↑	CO2	To acquire overall knowledge regarding the Feminist perspectives in the Liberative Empowerment of Women.
↕	CO3	To gain knowledge about various gender roles and stereotypes involved in the comprehension of gender equality and women's rights.
↓	CO4	To comprehend the legal provisions and policies that foreground the safety of children in the society and to promote awareness.
K5	CO5	To gain enhanced knowledge about sexual and gender minorities to recognize, celebrate and acknowledge the diversified forms of gender expressions and rights.

SYLLABUS

UNIT I **(6 Hours)**

HUMAN RIGHTS HUMANS RIGHTS CONSTITUTION OF INDIA: Humans Rights - Constitution Of India

26UHR3N1

UNIT II **(6 Hours)**

WOMEN EMPOWERMENT IN INDIA: Feminism And Sexual Violence - Women And Liberation

UNIT III **(6 Hours)**

GENDER EQUALITY AND WOMEN'S RIGHTS: Stereotype Gender Roles - Women's Education, Power And Science

UNIT IV **(6 Hours)**

RIGHTS OF THE CHILD IN INDIA: Status of child in contemporary Indian society - Special Laws and Policies for protection of children

UNIT V **(6 Hours)**

SOGIESC RIGHTS: Understanding SOGIESC- basic Definitions- inclusivity of SOGIESC- importance of studying SOGIESC- presence of SOGIESC in Indian Traditions- temples and cultural practices that exemplify SOGIESC in India- Genetics of Sex determination- Genetics of Intersex community- Successful SOGIESC Personalities and achievers – Alan Turing- Sally Ride- Leonardo da vinci- Alan Hart- Virginia -Woolf- Bayard Rustin- Padmini Prakash- Akkai Padmashali- K Prithika Yashini- Laxmi Narayan Tripati- Madhu Bai Kinnar-Manabi Bandhopadhyay- SOGIESC Rights and laws

Books for Study:

1. Human Rights (2024) Compiled by Kongunadu Arts and Science College, Coimbatore –29.

REFERENCES:

1. Human Rights, (2018) by Jaganathan, MA.,MBA.,MMM.,ML.,ML., (Humanitarian Law) and J.P. Arjun Proprietor: Usha Jaganathan, Refugee Law series, 1st floor, Narmatha Nanthi Street, Magathma Gandhi Nagar, Madurai – 625014.
2. Country Report on SOGIESC Rights In India: An Unfinished Agenda.
Weblink: https://www.ilgaasia.org/publications/india-country-report-an-unfinished-agenda
3. Intersex.
Weblink: https://my.clevelandclinic.org/health/articles/16324-intersex
4. SOGIESC Personalities:
https://www.bbc.com/news/world-asia-india-29357630

26UHR3N1

https://en.wikipedia.org/wiki/Laxmi_Narayan_Tripathi

https://en.wikipedia.org/wiki/Akkai_Padmashali

https://www.indiatoday.in/india/story/prithika-yashini-india-first-transgender-police-officer-tamil-nadu-969389-2017-04-04

https://yourstory.com/2018/03/first-transgendre-college-principal-west-bengal

5. SOGIESC Rights and laws

https://www.openglobalrights.org/lgbtqia-to-sogiesc-reframing-sexuality-gender-human-rights/

https://static1.squarespace.com/static/5a84777f64b05fa9644483fe/t/625ead0484f9005d75b92 dd0/1650371887436/ILGA+Asia+India+Report+2021.pdf

---

Question Paper Pattern

Duration: 3 hrs **Max: 75 marks**

Choose the correct answer

Section - A (5x5=25)

Short answer questions, either or type, one question from each unit.

Section - B (5x10=50)

Essay answer questions, either or type, one question from each unit.

26UWR4N2

Programme Code:	**For B.A., BBA, B.Com, BCA and B.Sc., Degree Students**		
	Part IV -NON- MAJOR ELECTIVE – II WOMEN'S RIGHTS		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2026-2027	**2**	**30**	**2**

COURSE OBJECTIVES

- To know about the laws enacted to protect Women against violence.
- To impart awareness about the hurdles faced by Women.
- To develop a knowledge about the status of all forms of Women to access to justice.
- To create awareness about Women's rights.
- To know about laws and norms pertaining to protection of Women.
- To understand the articles which enables the Women's rights.
- To understand the Special Women Welfare laws.
- To realize how the violence against Women puts an undue burden on healthcare services.

COURSE OUTCOMES

After Completion of the Course the student will be able to

K1	CO1	Appraise the importance of Women's Studies and incorporate Women's Studies with other fields
↕	CO2	Analyze the realities of Women Empowerment, Portrayal of Women in Media, Development and Communication
	CO3	Interpret the laws pertaining to violence against Women and legal consequences
	CO4	Contribute to the study of the important elements in the Indian Constitution, Indian Laws for Protection of Women
K5	CO5	Spell out and implement Government Developmental schemes for women and create awareness on modernization and impact of technology on Women

26UWR4N2

Syllabus

Unit I **(6 Hours)**

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

Unit II **(6 Hours)**

Socio-Economic Development of Women: Family welfare measures, role of Women in economic development, representation of Women in media, status of Women land rights, Women Entrepreneurs, National policy for the empowerment of women.

Unit III **(6 Hours)**

Women's Rights – Access to Justice: Crime against Women, domestic violence – physical abuse- verbal abuse – emotional abuse - economic abuse – minorities, dowry- harassment and death, code of conduct for work place, abetment of suicide.

Unit IV **(6 Hours)**

Women Protective acts: Protective legislation for Women in the Indian constitution- Anti dowry, SITA, PNDT, and Prevention Sexual Harassment at Workplace (Visaka case), Domestic violence (Prevention) Act.

Unit V **(6 Hours)**

Women and Child welfare: Safety provisions - various forms of mass media, radio, visual, internet, cyber space, texting, SMS and smart phone usage. Healing measures for the affected Women and child society by private and public sector, NGO and society.

26UWR4N2

Text Book:

1. **Women's Rights** (2021), compiled by Kongunadu Arts & Science College, Coimbatore – 641 029.

Reference Books:

1. **"Rights of Indian Women"** by Vipul Srivatsava. Publisher: Corporate Law Advisor, 2014.
2. **"Women's security and Indian law"** by Harsharam Singh. Publisher: Aabha Publishers and Distributors, 2015.
3. **"Women's Property Rights in India"** by Kalpaz publications, 2016.

****

QUESTION PAPER PATTERN

Duration: 3 Hours **Max. Marks: 75**

SECTION A (5 x 5 = 25 marks)

Short answers, either or type, one question from each unit.

SECTION B (5 x 10 = 50 marks)

Essay type questions, either or type, one question from each unit.

Programme Code :	For B.A., B.Sc., and BCA Degree Students		
PART IV - NON- MAJOR ELECTIVE III - CONSUMER AFFAIRS			
Batch	**Hours/Week**	**Total Hours**	**Credits**
2026-2029	**2**	**30**	**2**

COURSE OBJECTIVES

- To familiarize the students with their rights and responsibilities as a consumer.
- To understand the procedure of redress of consumer complaints.
- To know more about decisions on Leading Cases by Consumer Protection Act.
- To get more knowledge about Organizational set-up under the Consumer Protection Act
- To impart awareness about the Role of Industry Regulators in Consumer Protection
- To understand Contemporary Issues in Consumer Affairs

COURSE OUTCOMES

K1	CO1	Able to know the rights and responsibility of consumers.
↑	CO2	Understand the importance and benefits of Consumer Protection Act.
↕	CO3	Applying the role of different agencies in establishing product and service standards.
↓	CO4	Analyse to handle the business firms' interface with consumers.
K5	CO5	Assess Quality and Standardization of consumer affairs

SYLLABUS

UNIT I **(6 Hours)**

Conceptual Framework - Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000suite.

UNIT II **(6 Hours)**

The Consumer Protection Law in India - Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

UNIT III **(6 Hours)**

Grievance Redressal Mechanism under the Indian Consumer Protection Law - Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNIT IV **(6 Hours)**

Role of Industry Regulators in Consumer Protection

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance Ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI
v. Electricity Supply: Electricity Regulatory Commission
vi. Real Estate Regulatory Authority

UNIT V **(6 Hours)**

Contemporary Issues in Consumer Affairs - Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer

protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

Note: Unit 2 and 3 refers to the Consumer Protection Act, 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 Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
7. E-books :-www.consumereducation.in
8. Empowering Consumers e-book,www.consumeraffairs.nic.in
9. ebook,www.bis.org
10. The Consumer Protection Act, 1986 and its later versions.

Question paper pattern

Duration: 3 hrs **Max: 75 Marks**

Section A (5 x 5=25)

Short notes

Either – or / type – question from each unit.

Section B (5 x 10=50)

Essay type

Either – or / type – question from each unit.



EXTRA CREDIT COURSE



26UHW401

ALL UG COURSES		
Title of the paper : **HEALTH AND WELLNESS**		
Batch 2026 – 2029	Semester IV	Credits 2

Skill Areas:

Physical Fitness, Nutrition, Mental Health, Awareness on Drug addiction and its effects

Purpose:

The Health & Wellness course focuses on teaching the elements of physical, mental, emotional, social, intellectual, environmental well-being which are essential for overall development of an individual. The course also addresses the dangers of substance abuse and online risks to promote emotional and mental health.

Learning Outcomes:

Upon completion of the Health & Wellness course, students will be able to:

1. Demonstrate proficiency in sports training and physical fitness practices.
2. Improve their mental and emotional well-being, fostering a positive outlook on health and life.
3. Develop competence and commitment as professionals in the field of health and wellness.
4. Awareness on drug addiction and its ill effects

Focus:

During the conduct of the Health & Wellness course, the students will benefit from the following focus areas:

1. Stress Management.
2. Breaking Bad Habits.
3. Improving Interpersonal Relationships.
4. Building Physical Strength & Inner Strength.

Role of the Facilitator:

The faculty plays a crucial role in effectively engaging with students and guiding them towards achieving learning outcomes. Faculty participation involves the following areas:

26UHW401

1. **Mentorship & Motivation:** The Facilitator mentors students in wellness and self-discipline while inspiring a positive outlook on health. Faculty teach stress management, fitness, and daily well-being.
2. **Promoting a Safe and Inclusive Environment:** The facilitator ensures a safe, inclusive, and respectful learning environment for active student participation and benefit.
3. **Individualised Support and Monitoring Progress:** The facilitator plays a crucial role in providing personalized support, monitoring and guidance to students.

Guided Activities:

In this course, several general guided activities have been suggested to facilitate the achievement of desired learning outcomes. They are as follows:

1. Introduction to Holistic Well-being.
2. Holistic Wellness Program- Nurturing Body and Mind
3. Breaking Bad Habits Workshop.
4. Improving the elements of physical, emotional, social, intellectual, environmental and mental well-being.
5. Creating situational awareness, digital awareness.
6. Understanding substance abuse, consequences and the way out.

Period Distribution

The following are the guided activities suggested for this Audit course.

The Physical Director should plan the activities by the students.

Arrange the suitable Mentor / Guide for the wellness activities.

Additional activities and programs can be planned for Health and Wellness.

S.No	Guided Activities	Period
1	**Introduction to Holistic Well-being** 1. Introduce the core components of Health & Well-being namely Physical, mental and emotional well-being 2. Provide worksheets on all the four components individually and explain the interconnectedness to give an overall understanding.	
2	**Wellness Wheel Exercise (Overall Analysis)**	

26UHW401

	• Guide students to assess their well-being in various life dimensions through exercises on various aspects of well – being, and explain the benefits of applying wellness wheel. • Introduce Tech Tools: • Explore the use of technology to support well-being. • Introduce students to apps for meditation, sleep tracking, or healthy recipe inspiration.	
3	**Breaking Bad Habits (Overall Analysis)** • Open a discussion on bad habits and their harmful effects. • Provide a worksheet to the students to identify their personal bad habits. • Discuss the trigger, cause, consequence and solution with examples. • Guide them to replace the bad habits with good ones through worksheets.	
4	**Physical Well-being** **1. Fitness** Introduce the different types of fitness activities such as basic exercises, cardiovascular exercises, strength training exercises, flexibility exercises, so on and so forth. (Include theoretical explanations and outdoor activity). **2. Nutrition** Facilitate students to reflect on their eating habits, their body type, and to test their knowledge on nutrition, its sources and the benefits. **3. Yoga & Meditation** Discuss the benefits of Yoga and Meditation for one's overall health. Demonstrate different yoga postures and their benefits on the body through visuals (pictures or videos)	

26UHW401

	4. Brain Health Discuss the importance of brain health for daily life. Habits that affect brain health (irregular sleep, eating, screen time). Habits that help for healthy brains (reading, proper sleep, exercises). Benefits of breathing exercises and meditation for healthy lungs. **5. Healthy Lungs** Discuss the importance of lung health for daily life. Habits that affect lung health (smoking, lack of exercises). Benefits of breathing exercises for healthy lungs. **6. Hygiene and Grooming** Discuss the importance of hygienic habits for good oral, vision, hearing and skin health. Discuss the positive effects of grooming on one's confidence level and professional growth. **Suggested Activities (sample):** **Nutrition:** Invite a nutritionist to talk among the students on the importance of nutrition to the body or show similar videos shared by experts on social media. Organize a 'Stove less/fireless cooking competition' for students where they are expected to prepare a nutritious dish and explain the nutritive values in parallel.	
5	**Emotional Well-being** **1. Stress Management** Trigger a conversation or provide self-reflective worksheets to identify the stress factors in daily life and their impact on students' performance. Introduce different relaxation techniques like deep breathing, progressive muscle relaxation, or guided imagery. (use audio recordings or visuals to guide them through these techniques). After practicing the techniques, have them reflect on how these methods can help manage stress in daily life. **2. Importance of saying 'NO'.**	

26UHW401

	Explain the students that saying 'NO' is important for their Physical and mental well-being, Academic Performance, Growth and Future, Confidence, Self-respect, Strong and Healthy Relationships, building reputation for self and their family (avoid earning a bad name). Factors that prevent them from saying 'NO'. How to practice saying 'NO". **3. Body Positivity and self-acceptance** Discuss the following with the students. • What is body positivity and self-acceptance? • Why is it important? • Be kind to yourself. • Understand that everyone's unique. **Suggested Activities(Sample):** (Importance of saying 'NO') Provide worksheets to self-reflect on... ...how they feel when others say 'no' to them ...the situations where they should say 'no' Challenge students to write a song or rap about the importance of saying no and how to do it effectively. Students can perform their creations for the class.	
6	**Social Well-Being** **1. Practicing Gratitude** Discuss the importance of practicing gratitude for building relationships with family, friends, relatives, mentors and colleagues. Discuss how one can show gratitude through words and deeds. Explain how practicing gratitude can create 'ripple effect'. **2. Cultivating Kindness and Compassion** Define and differentiate between kindness and compassion. Explore practices that cultivate these positive emotions. Self-Compassion as the Foundation.	

	The power of small gestures. Understanding another's perspective. The fruits of compassion. **3. Practising Forgiveness** Discuss the concept of forgiveness and its benefits. Forgiveness: What is it? and What it isn't? Benefits of forgiveness. Finding forgiveness practices. **4. Celebrating Differences** Appreciate the value of individual differences and foster inclusivity. The World: A Tapestry of Differences (cultures, backgrounds, beliefs, abilities, and appearances). Finding strength in differences (diverse perspectives and experiences lead to better problem-solving and innovation). Celebrating differences, not ignoring them (respecting and appreciating the unique qualities). Activities for celebrating differences (share culture, learn about others, embrace new experiences). **5. Digital Detox** **Introduce the students to:** The concept of a digital detox and its benefits for social well-being. How to disconnect from devices more often to strengthen real-world connections. **Suggested Activities (sample)**: (Practicing Gratitude) Provide worksheets to choose the right ways to express gratitude. Celebrate 'gratitude day' in the college and encourage the students to honour the house keeping staff in some way to express gratitude for their service.	
7.	**Intellectual Well-being** **1. Being a lifelong Learner** **Give students an understanding on:** The relevance of intellectual well-being in this 21st century to meet	

26UHW401

	the expectations in personal and professional well-being The Importance of enhancing problem-solving skills Cultivating habits to enhance the intellectual well-being (using the library extensively, participating in extra-curricular activities, reading newspaper etc.) **2. Digital Literacy** **Discuss:** The key aspects of digital literacy and its importance in today's world. It is more than just liking and sharing on social media. The four major components of digital literacy (critical thinking, communication, problem-solving, digital citizenship). Why is digital literacy important? Boosting one's digital skills. **3. Transfer of Learning** Connections between different subjects – How knowledge gained in one area can be applied to others. **Suggested Activities(sample):** Intellectual Well-being. Provide worksheets to students for teaching them how to boost intellectual well-being. Ask the students to identify a long-standing problem in their locality, and come up with a solution and present it in the classroom. Also organize an event like 'Idea Expo' to display the designs, ideas, and suggestions, to motivate the students to improve their intellectual well-being.	
8	**Environmental Well-being** 1.The Importance of initiating a change in the environment. **The session could be around:** Defining Environmental well-being (physical, chemical, biological, social, and psychosocial factors) – People's behaviour, crime, pollution, political activities, infra-structure, family situation etc. Suggesting different ways of initiating changes in the environment (taking responsibility, creating awareness, volunteering,	

	approaching administration). **Suggested Activities (sample):** Providing worksheets to self-reflect on how the environment affects their life, and the ways to initiate a change. Dedicate a bulletin board or wall space (or chart work) in the classroom for students to share their ideas for improving environmental well-being. Creating a volunteers' club in the college and carrying out monthly activities like campus cleaning, awareness campaigns against noise pollution, (loud speakers in public places), addressing anti-social behaviour on the campus or in their locality.	
9	**Mental Well-being** **1. Importance of self-reflection** **Discuss:** Steps involved in achieving mental well-being (self-reflection, self-awareness, applying actions, achieving mental well-being). Different ways to achieve mental well-being (finding purpose, coping with stress, moral compass, connecting for a common cause). The role of journaling in mental well-being. **2. Mindfulness and Meditation Practices** Benefits of practicing mindful habits and meditation for overall well-being. **1. Connecting with nature** Practising to be in the present moment – Nature walk, feeling the sun, listening to the natural sounds. Exploring with intention – Hiking, gardening to observe the nature. Reflecting on the emotions, and feeling kindled by nature. **2. Serving people** Identifying the needs of others. Helping others. Volunteering your time, skills and listening ear. Finding joy in giving. **3. Creative Expressions**	

26UHW401

	Indulging in writing poems, stories, music making/listening, creating visual arts to connect with inner selves. **Suggested Activities(Sample):** (Mindfulness and Meditation) – Conducting guided meditation every day for 10 minutes and directing the students to record the changes they observe.	
10	**Situational Awareness (Developing Life skills)** **1. Being street smart** **Discuss:** Who are street smarts? Why is it important to be street smart? Characteristics of a street smart person: Importance of acquiring life skills to become street smart – (General First-aid procedure, CPR Procedure, Handling emergency situations like fire, flood etc). **2. Digital Awareness** **Discuss:** Cyber Security Information Literacy Digital Privacy Fraud Detection **Suggested Activities** (sample): (Street Smart) Inviting professionals to demonstrate the CPR Procedure Conducting a quiz on Emergency Numbers	
11	**Understanding Addiction** **Plan this session around:** Identifying the environmental cues, triggers that lead to picking up this habit. Knowing the impact of substance abuse – Adverse health conditions, social isolation, ruined future, hidden financial loss and damaging the family reputation. Seeking help to get out of this addiction. **Suggested Activities**:	

26UHW401

	Provide Worksheets to check the students' level of understanding about substance addiction and their impacts. Share case studies with students from real-life. Play/share awareness videos on addiction/de-addiction, experts talk. *Conduct awareness programmes on Drugs and its ill effects. (Arrange Experts from the concerned government departments and NGOs working in drug addiction issues) and maintain the documents of the program.	

Closure:

Each student should submit a Handwritten Summary of their Learnings & Action Plan for the future.

Assessments:

- Use Self-reflective worksheets to assess their understanding.
- Submit the worksheets to internal audit/external audit.
- Every student's activities report should be documented and the same have to be assessed by the Physical Director with the mentor. The evaluation should be for 100 marks. No examination is required.

Scheme of Evaluation

Part	Description	Marks
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
Total		100

26UHW401

References/Resource Materials:

The course acknowledges that individual needs for references and resources may vary. However, here are some general reference materials and resources that may be helpful:

1. **The Well-Being Wheel:**



2. **Facilities & Spaces:** Some activities may require access to specific facilities, resources or spaces. Students may need to coordinate with the college administration to reserve these as required.
3. **Online Resources:**
    1. United Nations Sustainable Development Goals - Goal 3 - Good Health & Well-Being: https://www.un.org/sustainabledevelopment/health/
    2. Mindfulness and Meditation: Stanford Health Library offers mindfulness and meditation resources: https://healthlibrary.stanford.edu/books-resources/mindfulness-meditation.html

26UHW401

3. Breaking Bad Habits: James Clear provides a guide on how to build good habits and break bad ones: https://jamesclear.com/habits
4. 6 Ways to Keep Your Brain Sharp https://www.lorman.com/blog/post/how-to-keep-your-brain-sharp
5. What Is Social Wellbeing? 12+ Activities for Social Wellness https://positivepsychology.com/social-wellbeing/
6. How Does Your Environment Affect Your Mental Health? https://www.verywellmind.com/how-your-environment-affects-your-mental-health-5093687
7. How to say no to others (and why you shouldn't feel guilty) https://www.betterup.com/blog/how-to-say-no



ALLIED PAPERS



26UMA1A1

Programme Code: 03		B.Sc Physics		
Title of the paper		Allied Paper 1 - Mathematics I		
Batch **2026-2029**	**Hrs/Week** 7	**Total Hours** 105	**Credits** 5	Skill development

Course Objectives

1. To provide the basic knowledge of Matrices and Trigonometry.
2. To give basic knowledge about Mathematical concepts in Calculus.
3. To get the ability of solving simultaneous linear algebraic equations using Numerical Methods.

Course Outcomes (CO)

K1 to K5	CO1	Understanding the concept of Characteristic equations to find Eigen Values and Eigen Vector.
	CO2	Analyzing the function to find the maxima and minima.
	CO3	Evaluating multiple integrals to find the area and volume.
	CO4	Applying finite difference methods for interpolation.
	CO5	Defining hyperbolic and inverse hyperbolic functions.

SYLLABUS

UNIT I **(21 hrs)**

Matrices: Fundamental concepts – Operations – Matrix Multiplication – Properties of Matrix Multiplication – Adjoint of a square matrix – Inverse of a matrix – Characteristics roots and Characteristics vectors – Cayley – Hamilton theorem (Statement only) – Unitary and Orthogonal matrix. (No proof is needed for properties and theorem).

UNIT II **(21 hrs)**

Differential Calculus: Successive Differentiation – Standard Results – Jacobians –Curvature – Radius of curvature in Cartesian and Polar forms – Maxima and minima of a function of two variables.

UNIT III **(21 hrs)**

Methods of Integration: Integration by substitution – **Definite integrals*-** Integration by parts – Bernoulli's Formula. Multiple Integrals: Double integral – Change of order of Integration – Change by variables – Triple integral – Applications.

26UMA1A1

UNIT IV **(21 hrs)**

Numerical Methods: **Solution of simultaneous linear algebraic equations by Gauss elimination method***, Gauss Jordan method, Gauss Jacobi method, Gauss Seidal method. Interpolation for equal intervals: Newton's forward interpolation formula – Newton's backward interpolation formula. Lagrange's interpolation for unequal intervals –
Inverse interpolation.

UNIT V **(21 hrs)**

Trigonometry: Expansion in Series – Expansions of $\cos n\theta$, $\sin n\theta$, when n is a positive integer – Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ in powers of θ – Exponential Series and Hyperbolic functions: Hyperbolic functions – Inverse hyperbolic functions.

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

Text Books

1. P. Kandsamy and K. Thilagavathi, Allied Mathematics, S. Chand & Company Ltd, New Delhi, 2012.
   Unit I Page No: 72 to 95, 114 to 143
   Unit II Page No: 229 to 235, 246 to 251, 261 to 283
2. P. Kandsamy and K. Thilagavathi, Allied Mathematics Vol. II, S. Chand & Company Ltd, New Delhi, 2012.
   Unit III Page No: 1 to 18, 46 to 52, 83 to 123.
3. P. Kandasamy, K. Thilagavathi and K. Gunavathi, Numerical Methods, S. Chand & Company Ltd, New Delhi, 2012.
   Unit IV Page No: 112 to 121, 145 to 159.
4. S. Narayanan, Trigonometry, S. Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 2010.
   Unit V Page No: 61 to 66, 77 to 82, 93 to 108.

References Books

1. S.Narayanan and T.K. Manickavasagam Pillai, Calculus Vol. I, Vol. II, S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1999.
2. M.K.Venkataraman , Numerical methods in Science and Engineering , NPC, Chennai, 1999.
3. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd., 2003.

4. Dr.J.K.Goyal and G.P.Gupta, Laplace and Fourier Transforms, 16th Edition, Pragati Prakashan, Meerut, 2003.
5. Dr.S.Arumugam, A.Thangapandi Isaac and A.Somasundaram, Numerical Methods, 2nd reprint, Scitech Publication India Pvt, Ltd., 2004.

e-Resources

1. https://www.youtube.com/watch?v=P5GJJ02OG08
2. https://theengineeringmaths.com/wp-content/uploads/2017/09/Radius-of-curvature.pdf
3. https://tutorial.math.lamar.edu/problems/calci/computingindefiniteintegrals.aspx
4. https://home.iitk.ac.in/~pranab/ESO208/Gauss-Siedel-Jacobi.pdf
5. https://mathworld.wolfram.com/HyperbolicFunctions.html

Mapping

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

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

Content prepared by (Based on Inputs) M. Vivek Prabu Signature of the Course in-charge	 Signature of the HOD

26UMA2A2

Programme Code:03		B.Sc Physics		
Title of the paper		Allied Paper 2 - Mathematics II		
Batch 2026-2029	**Hrs/Week** 7	**Total Hours** 105	**Credits** 5	Skill development

Course Objectives

1. To get the ability to solve Partial differential equations.
2. To understand basic knowledge in Vector Calculus.
3. To provide the basic knowledge of Laplace transforms and Fourier series.

Course Outcomes (CO)

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

SYLLABUS

UNIT I **(21 Hrs)**

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 **(21 hrs)**

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).

UNIT III **(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.

26UMA2A2

UNIT IV **(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.

UNIT V **(21 hrs)**

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

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

Text Books

1. S. Narayanan and T. K. Manickavachagom Pillay, "Differential Equations and its Applications", S. Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 2014.

Unit I	Chapter V	Sections 1 to 6
Unit II	Chapter XII	Sections 1 to 3
Unit IV	Chapter IX	Sections 1 to 9

2. P.Duraipandian and Laxmi Duraipandian ,Vector Analysis, Emerald Publishers, 2008.

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

3. S.Narayanan and T.K.M.Pillai, Calculus Vol. III (Major), S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 1997.

Unit V	Chapter VI	Sections 1 to 5

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.
   S. Narayanan and T. K. Manickavachagam Pillay, "Differential Equations and its Applications", S. Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 2014.
4. S. Narayanan, Trigonometry, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 1997.
5. J. N. Sharma and R. K. Gupta, Special Functions, Krishna Prakashan Mandir, Fifteenth edition, 1992.

26UMA2A2

e-Resources

1. https://tutorial.math.lamar.edu/classes/de/Definitions.aspx
2. https://www.youtube.com/watch?v=CYYsmrk2zts
3. https://tutorial.math.lamar.edu/problems/calciii/divergencetheorem.aspx
4. https://www.mechfamily-ju.com/storage/images/files/file_1731431227E32gM.pdf
5. https://mathworld.wolfram.com/FourierSeries.html

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA1AA

Programme Code:04		B.Sc Chemistry		
Title of the paper		Allied Paper 1 - Mathematics I		
Batch	**Hrs/Week**	**Total Hours**	**Credits**	Skill
2026-2029	**7**	105	5	development

Course Objectives

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

Course Outcomes (CO)

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

SYLLABUS

UNIT I **(21hrs)**

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

UNIT II **(21hrs)**

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

UNIT III **(21hrs)**

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

26UMA1AA

UNIT IV **(21hrs)**

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

UNIT V **(21hrs)**

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

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

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 Books

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.

26UMA1AA

e-Resources

1.https://www.youtube.com/watch?v=7JrMHsiSNWA&list=PLpklqhIbn1jrSjYUb1uR8uLskBZTV3ba
2.https://www.youtube.com/watch?v=AMr5etyUEL8&list=PLhSp9OSVmeyJUJH0kaIjylaJvxaylI64O&index=1
3. https://www.youtube.com/watch?v=ZFVFtVbeerI
4. https://www.youtube.com/watch?v=vKSVXxND180
5. https://www.youtube.com/watch?v=opvPkDuu4bU

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UMA2AB

Programme Code: 04		B.Sc Chemistry		
Title of the paper		Allied Paper 2 - Mathematics II		
Batch	**Hrs/Week**	**Total Hours**	**Credits**	Skill
2026-2029	**7**	105	5	development

Course Objectives

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

Course Outcomes (CO)

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

SYLLABUS

UNIT I **(21 Hours)**

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

UNIT II **(21 Hours)**

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

UNIT III **(21 Hours)**

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

26UMA2AB

UNIT IV **(21 Hours)**

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 **(21 Hours)**

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)**

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.

e-Resources

1. https://www.youtube.com/watch?v=BR_9Jq-4mVU
2. https://www.youtube.com/watch?v=JoyvDWZ0aMY
3. https://www.youtube.com/watch?v=JZIYpp50jKY
4. https://www.youtube.com/watch?v=3pSiqLvLbos
5. https://www.youtube.com/watch?v=gzE8t4FY5DE

26UMA2AB

MAPPING

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	 Signature of the HOD

26UCS1A1 / 26USC1A1

ProgrammeCode :09		B.Sc Computer Science		
Title of the paper		Allied Paper 1 - Discrete Mathematics and Statistics		
Batch 2026-2029	**Hours/Week** 6	**Total Hours** 90	**Credits** 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

26UCS1A1 / 26USC1A1

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).**

Text Books :

1. V. Sunderesan, K.S.Ganapathy Subramanian and K.Ganesan, Discrete Mathematics, A.R Publications, 2000. (UNIT I,II)
2. S.P. Gupta, Statistical Methods, S. Chand and Company Ltd., 46th edition, 2021, (UNIT III, IV, V).

Reference Books :

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

26UCS1A1 / 26USC1A1

e- Resources:

1. http://kcl.digimat.in/nptel/courses/video/111106052/L22.html
2. https://mrcet.com/downloads/digital_notes/IT/Formal%20Languages%20Automata%20Thery.pdf
3. https://www.youtube.com/watch?v=1MiT06JFNo4
4. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8
5. https://egyankosh.ac.in/bitstream/123456789/33587/1/Unit-13.pdf

MAPPING

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

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

Content prepared by Name of the Faculty : Signature of the Course in - charge	 Signature of the HOD

26UCS2A2 / 26USC2A2

ProgrammeCode: 9		B.Sc Computer Science		
Title of the Paper		ALLIED PAPER 2 – OPERATIONS RESEARCH		
Batch 2026-2029	**Hours / Week** 6	**Total Hours** 90	**Credits** 5	Skill Development/ Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

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.

26UCS2A2 / 26USC2A2

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).**

Text Book:

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

Reference Books:

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

26UCS2A2 / 26USC2A2

e - Recourses:

1. https://www.youtube.com/watch?v=a2QgdDk4Xjw
2. https://www.youtube.com/watch?v=Q31jKiEXxdc
3. https://www.youtube.com/watch?v=BUGIhEecipE
4. https://www.youtube.com/watch?v=9tJv5COGkD0
5. https://www.youtube.com/watch?v=H58TPQNr2kM
6. https://www.youtube.com/watch?v=xGkpXk-AnWU

MAPPING

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

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

Content prepared by Name of the Faculty: Signature of the Course in - charge	 Signature of the HOD



ALLIED PAPERS (SF)



26UCS1A1 / **26USC1A1**

Programme Code : 09		**B.Sc Computer Science**		
Title of the paper		**Allied 1 - Discrete Mathematics and Statistics**		
Batch 2026-2029	**Hours/Week 6**	**Total Hours 90**	**Credits 5**	**Employability**

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

26UCS1A1 / **26USC1A1**

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).**

Text Books :

1. V. Sunderesan, K.S.Ganapathy Subramanian and K.Ganesan, Discrete Mathematics, A.R Publications, 2000. (UNIT I,II)
2. S.P. Gupta, Statistical Methods, S. Chand and Company Ltd., 46th edition, 2021, (UNIT III, IV, V).

Reference Books :

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

26UCS1A1 / **26USC1A1**

e- Resources:

1. http://kcl.digimat.in/nptel/courses/video/111106052/L22.html
2. https://mrcet.com/downloads/digital_notes/IT/Formal%20Languages%20Automata%20Thery.pdf
3. https://www.youtube.com/watch?v=1MiT06JFNo4
4. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8
5. https://egyankosh.ac.in/bitstream/123456789/33587/1/Unit-13.pdf

MAPPING

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

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

Content prepared by Name of the Faculty : Mrs. R. Nesarajithamani Signature of the Course in - charge	 Signature of the HOD

26UCT1A1

Programme Code: 11		B.Sc Computer Technology		
Title of the paper		Allied 1-Discrete Mathematics and Statistics		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

26UCT1A1

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).**

Text Books:

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

Reference Books:

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

e- Resources:

1. http://kcl.digimat.in/nptel/courses/video/111106052/L22.html
2. https://mrcet.com/downloads/digital_notes/IT/Formal%20Languages%20Automata%20Thery.pdf
3. https://www.youtube.com/watch?v=1MiT06JFNo4
4. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8
5. https://egyankosh.ac.in/bitstream/123456789/33587/1/Unit-13.pdf

26UCT1A1

MAPPING

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

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

Content prepared by Name of the Faculty : K.Baby Signature of the Course in - charge	 Signature of the HOD

26UCA1A1

Programme Code: 10		BCA		
Title of the paper		COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS		
Batch **2026-2029**	**Hours / Week** **6**	**Total Hours** **90**	**Credits** **5**	**Employability**

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

26UCA1A1

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).**

Text Books:

1. M.K.Venkataraman, Numerical methods for Science and Engineering, The National Publishers & Co, 5th Edition, 2007. (Units I , II)
2. S.P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021.(Units III, IV & V)

Reference Books:

1. P. Kandasamy , K. Thilagavathi, K. Gunavathi, Numerical Methods, S.Chand & company Ltd., New Delhi Revised Edition 2005.
2. R.S.N. Pillai and Bhagavathi, Statistics, S.Chand and Sons Pvt Ltd., New Delhi, Reprint 2014.
3. S.C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi-2, 2011.
4. P.R. Vittal, Mathematical Statistics, Margham Publications, Chennai, 2004.

e – Resources:

1. https://www.youtube.com/watch?v=XLCEpW2A5wo
2. https://www.youtube.com/watch?v=1jf_RIZuI3g
3. https://www.youtube.com/watch?v=1MiT06JFNo4
4. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8
5. https://egyankosh.ac.in/bitstream/123456789/33587/1/Unit-13.pdf

26UCA1A1

Mapping

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

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

Content prepared by Name of the Faculty: 1. Mrs. R. Nesarajithamani 2. Dr. M. Rathika Signature of the Course in - charge	Signature of the HOD

26UBT3A3

Programme Code: 08		B.Sc Biotechnology		
Title of the paper		Fundamentals of Mathematics		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 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 **(18 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 **(18 Hours)**

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

UNIT IV **(18 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.

26UBT3A3

UNIT V **(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 $3/8^{th}$ rule.

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

Text Books:

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

Reference Books:

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

e – Resources:

1. https://www.youtube.com/watch?v=h5urBuE4Xhg
2. https://www.youtube.com/watch?v=IvLpN1G1Ncg
3. https://www.youtube.com/watch?v=NcoRlvM1dmg
4. https://www.youtube.com/watch?v=XLCEpW2A5wo
5. https://www.youtube.com/watch?v=1jf_RIZuI3g

26UBT3A3

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. M. Rathika Signature of the Course in - charge	 Signature of the HOD

26UIT1A1

Programme Code: 12		B.Sc Information Technology		
Title of the paper		Allied 1-Mathematical Foundation for Computer Science		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II (**18 Hours)**

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

UNIT III **(18 Hours)**

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

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

26UIT1A1

UNIT IV **(18 Hours)**

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

UNIT V **(18 Hours)**

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

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

Text Books:

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

Reference Books:

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

e – Resources:

1. https://www.youtube.com/watch?v=jZXHzpq-vmM
2. http://kcl.digimat.in/nptel/courses/video/111106052/L22.html
3. https://www.youtube.com/watch?v=XLCEpW2A5wo
4. https://www.youtube.com/watch?v=9D9--St_wFE
5. https://www.youtube.com/watch?v=1MiT06JFNo4
6. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8

26UIT1A1

MAPPING

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

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

Content prepared by Name of the Faculty: Mrs. R. Nesarajithamni Signature of the Course in – charge	 Signature of the HOD

26UBA1A1

Programme Code: 17		BBA CA		
Title of the paper		MATHEMATICS FOR MANAGEMENT – I		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2026-2029	**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 Analysisof time series. Also understand the applications of these concepts in real world problems.
3. To use mathematical knowledge to analyze and solve problems.

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

26UBA1A1

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)**

Text Book:

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

Reference Books:

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

e – Resources:

1. https://www.youtube.com/watch?v=-JSYBYjuxTM
2. https://www.youtube.com/watch?v=S-x6d1tTyKs
3. https://www.youtube.com/watch?v=9cdvotT5INU
4. https://www.youtube.com/watch?v=JMbkd-ANjK0
5. https://www.youtube.com/watch?v=1Q7x7UmlORs

26UBA1A1

MAPPING

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

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

Content prepared by Name of the Faculty : Mrs. S. Selvi Celin Prabha Signature of the Course in – charge	 Signature of the HOD

26UCM3A3

Programme Code: 13		B.Com		
Title of the paper		BUSINESS MATHEMATICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2026-2029	**6**	**90**	**5**	

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

26UCM3A3

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).**

Text Book:

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

Reference Books:

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

e – Resources:

1. https://byjus.com/maths/business-mathematics/
2. https://mpbou.edu.in/uploads/files/BUSINESS_MATHS.pdf
3. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
4. https://www.youtube.com/playlist?list=PLwdnzlV3ogoV8Y6vl3JmdoaEM5Fb1n2us
5. https://www.youtube.com/playlist?list=PLJtJvO3aaWe0l3iyGsgWPnNrDVWs_quVO

26UCM3A3

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. A. Amuthalakshmi Signature of the Course in – charge	Signature of the HOD

26UPA1A1

Programme Code : 15		B.Com PA		
Title of the Paper		MATHEMATICS FOR BUSINESS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 hours)**

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

UNIT II **(18 hours)**

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

UNIT III **(18 hours)**

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

26UPA1A1

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).**

Text Book:

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

Reference Books:

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

e – Resources:

1. https://byjus.com/maths/business-mathematics/
2. https://mpbou.edu.in/uploads/files/BUSINESS_MATHS.pdf
3. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
4. https://www.youtube.com/playlist?list=PLwdnzlV3ogoV8Y6vl3JmdoaEM5Fb1n2us
5. https://www.youtube.com/playlist?list=PLJtJvO3aaWe0l3iyGsgWPnNrDVWs_quVO

26UPA1A1

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. K. Baby Signature of the Course in – charge	 Signature of the HOD

26UCC1A1

Programme Code: 14		B.Com CA		
Title of the paper		BUSINESS MATHEMATICS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

26UCC1A1

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).**

Text Book:

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

Reference Books:

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

e – Resources:

1. https://byjus.com/maths/business-mathematics/
2. https://mpbou.edu.in/uploads/files/BUSINESS_MATHS.pdf
3. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
4. https://www.youtube.com/playlist?list=PLwdnzlV3ogoV8Y6vl3JmdoaEM5Fb1n2us
5. https://www.youtube.com/playlist?list=PLJtJvO3aaWe0l3iyGsgWPnNrDVWs_quVO

26UCC1A1

MAPPING

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

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

Content prepared by Name of the Faculty: 1.Mrs. S.Selvi Celin Prabha 2. Dr. A. Amuthalakshmi Signature of the Course in - charge	Signature of the HOD

26UCB1A1

Programme Code : 19		B.Com (Banking & Insurance)		
Title of the paper		BUSINESS MATHEMATICS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 hours)**

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

UNIT II **(18 hours)**

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

UNIT III **(18 hours)**

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

26UCB1A1

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).**

Text Book:

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

Reference Books:

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

e – Resources:

1. https://byjus.com/maths/business-mathematics/
2. https://mpbou.edu.in/uploads/files/BUSINESS_MATHS.pdf
3. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
4. https://www.youtube.com/playlist?list=PLwdnzlV3ogoV8Y6vl3JmdoaEM5Fb1n2us
5. https://www.youtube.com/playlist?list=PLJtJvO3aaWe0l3iyGsgWPnNrDVWs_quVO

26UCB1A1

MAPPING

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

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

Content prepared by Name of the Faculty : Dr. A. Singaravelan Signature of the Course in - charge	 Signature of the HOD

26UPS3A3

Programme Code: 21		B.Sc Psychology		
Title of the paper		ALLIED III: PSYCHOLOGICAL STATISTICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2026-2029	**5**	**75**	**4**	

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNITI **(15 Hours)**

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

UNIT II **(15 Hours)**

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

UNIT III **(15 Hours)**

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

UNIT IV **(15 Hours)**

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

26UPS3A3

UNIT V **(15 Hours)**

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

*** denotes Self Study**

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

Text Book:

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

Reference Books:

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

e – Resources:

1. https://byjus.com/maths/business-mathematics/
2. https://mpbou.edu.in/uploads/files/BUSINESS_MATHS.pdf
3. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
4. https://www.youtube.com/playlist?list=PLwdnzlV3ogoV8Y6vl3JmdoaEM5Fb1n2us
5. https://www.youtube.com/playlist?list=PLJtJvO3aaWe0l3iyGsgWPnNrDVWs_quVO

26UPS3A3

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. A. Amuthalakshmi Signature of the Course in - charge	 Signature of the HOD

26UAF3A3

Programme Code: 20		B.Com (Accounting and Finance)		
Title of the paper		BUSINESS MATHEMATICS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

26UAF3A3

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).**

Text Book:

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

Reference Books:

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

e – Resources:

1. https://byjus.com/maths/business-mathematics/
2. https://mpbou.edu.in/uploads/files/BUSINESS_MATHS.pdf
3. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
4. https://www.youtube.com/playlist?list=PLwdnzlV3ogoV8Y6vl3JmdoaEM5Fb1n2us
5. https://www.youtube.com/playlist?list=PLJtJvO3aaWe0l3iyGsgWPnNrDVWs_quVO

26UAF3A3

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. A. Singaravelen Signature of the Course in - charge	 Signature of the HOD

26UAI1A1

Programme Code: 24		B.Sc Artificial Intelligence and Machine Learning		
Title of the paper		ALLIED 1: Discrete Mathematics and Statistics		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

26UAI1A1

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

UNIT V **(18 Hours)**

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

TEXT BOOK

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

REFERENCE BOOKS

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

26UAI1A1

e-Resources:

1. http://kcl.digimat.in/nptel/courses/video/111106052/L22.html
2. https://mrcet.com/downloads/digital_notes/IT/Formal%20Languages%20Automata%20Thery.pdf
3. https://www.youtube.com/watch?v=9yLBiWnbJTs
4. https://www.youtube.com/watch?v=1MiT06JFNo4
5. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. M. Rathika Signature of the Course in - charge	 Signature of the HOD

26UDA1A1

Programme Code: 23		B.Sc Computer Science with Data Analytics		
Title of the paper		ALLIED 1: Discrete Mathematics and Statistics		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

26UDA1A1

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

UNIT V **(18 Hours)**

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

TEXT BOOK

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

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

REFERENCE BOOKS

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

26UDA1A1

e-Resources:

1. http://kcl.digimat.in/nptel/courses/video/111106052/L22.html
2. https://mrcet.com/downloads/digital_notes/IT/Formal%20Languages%20Automata%20Thery.pdf
3. https://www.youtube.com/watch?v=9yLBiWnbJTs
4. https://www.youtube.com/watch?v=1MiT06JFNo4
5. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. K. Baby Signature of the Course in - charge	 Signature of the HOD

26UCI1A1

Programme Code : 22		B.Com IT		
Title of the paper		ALLIED I- BUSINESS MATHEMATICS		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2026-2029	**6**	**90**	**5**	

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

26UCI1A1

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://byjus.com/maths/business-mathematics/
2. https://mpbou.edu.in/uploads/files/BUSINESS_MATHS.pdf
3. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
4. https://www.youtube.com/playlist?list=PLwdnzlV3ogoV8Y6vl3JmdoaEM5Fb1n2us
5. https://www.youtube.com/playlist?list=PLJtJvO3aaWe0l3iyGsgWPnNrDVWs_quVO

26UCI1A1

MAPPING

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

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

Content prepared by Name of the Faculty: Mrs. S. Selvi Celin Prabha Signature of the Course in - charge	 Signature of the HOD

26UBU1A1

Programme Code : 28		B.Com BA		
Title of the paper		ALLIED I- BUSINESS STATISTICS - I		
Batch 2026-2029	**Hours / Week 6**	**Total Hours 90**	**Credits 5**	**Skill Development/ Employability**

Course Objectives

1. To enrich the knowledge in statistics and to solve the statistical problems in analysis of business problems.
2. To be familiar with data collection, graphical presentation and classification of tables.
3. To inculcate the knowledge of relationship between measures of variation and value deviation.

Course Outcomes (CO)

K1 to K5	CO1	Produce appropriate graphical and numerical descriptive statistics for different types of data.
	CO2	Apply statistical concepts to analyze the business problems
	CO3	Explain the concepts of average and range of data collection.
	CO4	Examine the relationship between the variations.
	CO5	Outline the preparation of graph and table.

Syllabus

UNIT I **(18 Hours)**

Introduction of Business Statistics: Functions, ***Scope and Limitations of Statistics**- Meaning of Data and information - Classification and Collection of Primary and Secondary Data- - Sampling and its method.

UNIT II **(18 Hours)**

Presentation of Data: Formation of Frequency distribution table – Classification and Tabulation- Diagrammatic (1D, 2D) and graphical presentation- Graphs of Frequency Distribution – frequency curves – Ogive curve.

UNIT III **(18 Hours)**

Measures of Central tendency: Calculation of Mean, Median, mode, Geometric Mean and Harmonic Mean – Empirical Relation.

UNIT IV **(18 Hours)**

Measures of Dispersion: Range, Quartile deviation, Mean Deviation, Standard deviation (Grouped and Ungrouped data), Coefficient of Variation –Skewness – Meaning – Measures of skewness- Pearson's and Bowley's coefficient of skewness.

26UBU1A1

UNIT V **(18 Hours)**

Correlation- Meaning and Definition- scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank correlation. Regression Analysis: - Regression lines- Regression equation - Regression coefficients.

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

Text Book:

S.P. Gupta and M.P. Gupta, Business Statistics– Sultan Chand & Sons Educational Publishers – New Delhi., 18th Edition.

Reference Books:

1. Dr. P R Vittal, Business Mathematics & Statistics, Margham Publications, Chennai, 6th edition, 2006.
2. S..P.Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021.

e – Resources:

1. https://nptel.ac.in/courses/110107114
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
3. https://www.youtube.com/playlist?list=PLOzRYVm0a65ctyxZGjO_0Vrzp-aUlPejI
4. https://www.youtube.com/watch?v=DVpoCWZwEfE
5. https://tnou.ac.in/eslm/UG/B.COM/SEM%20III/BCOSE%2031%20Business%20Statistics.pdf

MAPPING

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

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

Content prepared by Name of the Faculty: 1. Dr. A. Amuthalakshmi 2.Dr. M. Rathika Signature of the Course in - charge	 Signature of the HOD

26UCS2A2 / **26USC2A2**

Programme Code: 9		**B.Sc Computer Science**		
Title of the Paper		**ALLIED 2 – OPERATIONS RESEARCH**		
Batch 2026-2029	**Hours / Week 6**	**Total Hours 90**	**Credits 5**	**Skill Development/ Employability**

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

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.

26UCS2A2 / **26USC2A2**

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).**

Text Book:

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

Reference Books:

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

26UCS2A2 / **26USC2A2**

e - Resources:

1. https://www.youtube.com/watch?v=a2QgdDk4Xjw
2. https://www.youtube.com/watch?v=Q31jKiEXxdc
3. https://www.youtube.com/watch?v=BUGIhEecipE
4. https://www.youtube.com/watch?v=9tJv5COGkD0
5. https://www.youtube.com/watch?v=H58TPQNr2kM
6. https://www.youtube.com/watch?v=xGkpXk-AnWU

MAPPING

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

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

Content prepared by Name of the Faculty: Mrs. R. Nesarajithamani Signature of the Course in - charge	 Signature of the HOD

26UIT2A2

Programme Code :12		B.Sc. Information Technology		
Title of the Paper		Operations Research		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2026-2029	**6**	**90**	**5**	

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

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

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

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

UNIT IV **(18 Hours)**

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

26UIT2A2

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://www.youtube.com/watch?v=a2QgdDk4Xjw
2. https://www.youtube.com/watch?v=Q31jKiEXxdc
3. https://www.youtube.com/watch?v=BUGIhEecipE
4. https://www.youtube.com/watch?v=9tJv5COGkD0
5. https://www.youtube.com/watch?v=H58TPQNr2kM
6. https://www.youtube.com/watch?v=xGkpXk-AnWU

UMA 201

26UIT2A2

MAPPING

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

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

Content prepared by Name of the Faculty: Mrs. R. Nesarajithamani Signature of the Course in - charge	Signature of the HOD

UMA 202

26UCA2A2

Programme Code :10		BCA		
Title of the Paper		Operations Research		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

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

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.

26UCA2A2

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://www.youtube.com/watch?v=a2QgdDk4Xjw
2. https://www.youtube.com/watch?v=Q31jKiEXxdc
3. https://www.youtube.com/watch?v=BUGIhEecipE
4. https://www.youtube.com/watch?v=9tJv5COGkD0
5. https://www.youtube.com/watch?v=H58TPQNr2kM
6. https://www.youtube.com/watch?v=xGkpXk-AnWU

26UCA2A2

MAPPING

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

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

Content prepared by Name of the Faculty: 1. Mrs. R. Nesarajithamani 2. Dr. M.Rathika Signature of the Course in - charge	 Signature of the HOD

26UBT4A4

Programme Code :08		B.Sc Biotechnology		
Title of the Paper		Bio-Statistics		
Batch 2026-2029	Hours / Week 4	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(12 Hours)**

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

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

UNIT II **(12 Hours)**

Measures of Central Tendency: Mean- Median- Mode- Geometric mean- Harmonic mean. Measures of dispersion: Range- Quartile deviation- Standard deviation- Coefficient of variation.

26UBT4A4

UNIT III **(12 Hours)**

Correlation Analysis**:** Types of correlation- Methods of studying correlation: Karl Pearson's coefficient of correlation-Rank correlation. Regression Analysis: Regression line- Regression equation of X on Y and Y on X – Properties of Regression lines.

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Text Book

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

Reference Books

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

26UBT4A4

e-Resources:

1. https://www.youtube.com/watch?v=Vz5jztR6QFM&list=PLpzJaHvb0AatXVAY6mUl3M8hvL7noS-jR
2. https://www.youtube.com/watch?v=2FdhaofDkJg&list=PLpzJaHvb0AatXVAY6mUl3M8hvL7noS-jR&index=2
3. https://www.youtube.com/watch?v=1MiT06JFNo4
4. https://www.youtube.com/watch?v=uPE2jSaAUB0&list=PLkCr_5zEdK8n5yLOg1JXhLlq90j2OWsTB&index=8
5. https://egyankosh.ac.in/bitstream/123456789/33587/1/Unit-13.pdf
6. https://www.youtube.com/watch?v=OXIpBKpOHxk

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. M. Rathika Signature of the Course in - charge	 Signature of the HOD

26UBT4AL

Programme Code :08		B.Sc Biotechnology		
Title of the Paper		Bio-Statistics Practicals		
Batch 2026-2029	Hours / Week 2	Total Hours 30	Credits 2	Employability

Course Objectives

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

Course Outcomes (CO)

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

List of Practical

Using R – Programming

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

26UBT4AL

Distribution of Marks in ESE		**CIA**	
Experiment	: 25	CIA Practical Exam	: 30 (Converted to 10)
Record	: 05	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
CO4	S	H	S	M	S
CO5	S	H	M	S	H

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

Content prepared by Name of the Faculty: Dr. M. Rathika Signature of the Course in - charge	 Signature of the HOD

26UCM4A4

Programme Code :13		B.Com		
Title of the Paper		BUSINESS STATISTICS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

26UCM4A4

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://nptel.ac.in/courses/110107114
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
3. https://www.youtube.com/playlist?list=PLOzRYVm0a65ctyxZGjO_0Vrzp-aUlPejI
4. https://www.youtube.com/watch?v=DVpoCWZwEfE
5. https://tnou.ac.in/eslm/UG/B.COM/SEM%20III/BCOSE%2031%20Business%20Statistics.pdf

26UCM4A4

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. A. Amuthalakshmi Signature of the Course in - charge	 Signature of the HOD

26UCC2A2

Programme Code :14		B.Com CA		
Title of the Paper		BUSINESS STATISTICS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

26UCC2A2

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://nptel.ac.in/courses/110107114
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
3. https://www.youtube.com/playlist?list=PLOzRYVm0a65ctyxZGjO_0Vrzp-aUlPejI
4. https://www.youtube.com/watch?v=DVpoCWZwEfE
5. https://tnou.ac.in/eslm/UG/B.COM/SEM%20III/BCOSE%2031%20Business%20Statistics.pdf

26UCC2A2

MAPPING

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

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

Content prepared by Name of the Faculty: 1.Mrs. S. Selvi Celin Prabha 2. Dr. A. Amuthalakshmi Signature of the Course in - charge	 Signature of the HOD

26UPA2A2

Programme Code :15		B.Com PA		
Title of the Paper		STATISTICS FOR BUSINESS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 hours)**

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

UNIT II **(18 hours)**

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

UNIT III **(18 hours)**

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

26UPA2A2

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://nptel.ac.in/courses/110107114
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
3. https://www.youtube.com/playlist?list=PLOzRYVm0a65ctyxZGjO_0Vrzp-aUlPejI
4. https://www.youtube.com/watch?v=DVpoCWZwEfE
5. https://tnou.ac.in/eslm/UG/B.COM/SEM%20III/BCOSE%2031%20Business%20Statistics.pdf

26UPA2A2

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. K. Baby Signature of the Course in - charge	 Signature of the HOD

26UBA2A2

Programme Code :17		BBA CA		
Title of the Paper		MATHEMATICS FOR MANAGEMENT – II		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

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

UNIT III **(18 Hours)**

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

26UBA2A2

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)**

Text Book:

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

Reference Book:

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

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

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

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

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

e-Resources:

1. https://www.youtube.com/watch?v=fgoaGxzwLqI
2. https://www.youtube.com/watch?v=-YBlR1UF-UY
3. https://www.youtube.com/watch?v=fSuqTgnCVRg
4. https://www.youtube.com/watch?v=vKVkOpNDZ2s
5. https://www.youtube.com/watch?v=iuFa9qJH_r0

26UBA2A2

MAPPING

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

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

Content prepared by Name of the Faculty: Mrs. Selvi Celin Prabha Signature of the Course in - charge	 Signature of the HOD

26UCT2A2

Programme Code :11		B.Sc. Computer Technology		
Title of the Paper		Operations Research		
Batch	**Hours / Week**	**Total Hours**	**Credits**	**Employability**
2026-2029	**6**	**90**	**5**	

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

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

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

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

UNIT IV **(18 Hours)**

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

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

26UCT2A2

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://www.youtube.com/watch?v=fgoaGxzwLqI
2. https://www.youtube.com/watch?v=-YBlR1UF-UY
3. https://www.youtube.com/watch?v=fSuqTgnCVRg
4. https://www.youtube.com/watch?v=vKVkOpNDZ2s
5. https://www.youtube.com/watch?v=iuFa9qJH_r0

26UCT2A2

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. K. Baby Signature of the Course in - charge	 Signature of the HOD

26UCB2A2

Program Code :19		B.Com (Banking & Insurance)		
Title of the Paper		BUSINESS STATISTICS		
Batch 2026-2029	**Hours / Week 6**	**Total Hours 90**	**Credits 5**	**Employability**

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

26UCB2A2

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://nptel.ac.in/courses/110107114
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
3. https://www.youtube.com/playlist?list=PLOzRYVm0a65ctyxZGjO_0Vrzp-aUlPejI
4. https://www.youtube.com/watch?v=DVpoCWZwEfE
5. https://tnou.ac.in/eslm/UG/B.COM/SEM%20III/BCOSE%2031%20Business%20Statistics.pdf

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. A. Singaravelan Signature of the Course in - charge	 Signature of the HOD

26UPS4A4

Program Code :21		B.Sc Psychology		
Title of the Paper		ALLIED IV: RESEARCH METHODOLOGY		
Batch 2026-2029	**Hours / Week 5**	**Total Hours 75**	**Credits 5**	**Employability**

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(15 Hours)**

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

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

UNIT II **(15 Hours)**

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

UNIT III **(15 Hours)**

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

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

26UPS4A4

UNIT IV **(15 Hours)**

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

UNIT V **(15 Hours)**

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

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

Text Book

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

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

Reference Books

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

26UPS4A4

e-Resources:

1. https://onlinecourses.nptel.ac.in/noc26_ge43/preview
2. https://www.youtube.com/watch?v=ivekZHdBDk0
3. https://archive.nptel.ac.in/content/storage2/courses/109104044/lecture8/8_5.htm
4. https://nptel.ac.in/courses/103106120
5. https://www.youtube.com/watch?v=fZ7r_cMfRRw

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. A. Amuthalakshmi Signature of the Course in - charge	 Signature of the HOD

26UAF4A4

Programme Code :20		B.Com (Accounting and Finance)		
Title of the Paper		BUSINESS STATISTICS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

UNIT III **(18 Hours)**

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

26UAF4A4

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).**

Text Book:

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

Reference Books:

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

e-Resources:

1. https://nptel.ac.in/courses/110107114
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
3. https://www.youtube.com/playlist?list=PLOzRYVm0a65ctyxZGjO_0Vrzp-aUlPejI
4. https://www.youtube.com/watch?v=DVpoCWZwEfE
5. https://tnou.ac.in/eslm/UG/B.COM/SEM%20III/BCOSE%2031%20Business%20Statistics.pdf

26UAF4A4

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. A. Singaravelan Signature of the Course in - charge	 Signature of the HOD

26UAI2A2

Programme Code :24		B. Sc Artificial Intelligence and Machine Learning		
Title of the Paper		Allied 2: Optimization Techniques and Linear Algebra		
Batch 2026-2029	Hours/Week 6	Total Hours 90	Credits 5	Skill development /Employability

Course Objectives

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

Course Outcomes (CO)

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

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

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

26UAI2A2

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

UNIT V **(18 Hours)**

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

TEXT BOOK

1. Kantiswarup, P.K.Gupta and Man Mohan, Operations Research, 16th Thoroughly Revised Ed., Sultan Chand & Sons, New Delhi, (Reprint 2014).
2. Gilbert Strang (2016), Introduction to Linear Algebra, 5th Edition. Wellesley – Cambridge Press.

REFERENCE BOOKS

1. P.K.Gupta & ManMohan**, "**Problems in Operations Research**"** SultanChand Publications, 6th Edition, 1994, New Delhi.
2. B.S.Goel and S.K.Mittal , Operations Research, 16th Edition, Pragathi Prakashan Publishers, Meerut, 1999.
3. S.Lang (1997), Introduction to Linear Algebra, Second Edition, Springer.
4. Schaum's Outline series, Linear Algebra, McGraw Hill Book Company, New Delhi.
5. Dr.S.N.Goel, Linear Algebra, 4th Edition, Kadar Nath, Ram Nath, Meerut.

26UAI2A2

e-Resources:

1. https://www.youtube.com/watch?v=a2QgdDk4Xjw
2. https://www.youtube.com/watch?v=Q31jKiEXxdc
3. https://www.youtube.com/watch?v=BUGIhEecipE
4. https://www.youtube.com/watch?v=FmD1S5yP_os
5. https://www.youtube.com/watch?v=SK17H2w3fKA
6. https://www.youtube.com/watch?v=DbAdBzWnTD8

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. M. Rathika Signature of the Course in - charge	 Signature of the HOD

26UDA2A2

Programme Code :23		B. Sc Computer Science with Data Analytics		
Title of the Paper		Allied 2: Optimization Techniques and Linear Algebra		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Skill development /Employability

Course Objectives

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

Course Outcomes (CO)

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

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

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

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

26UDA2A2

UNIT III **(18 Hours)**

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

UNIT IV **(18 Hours)**

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

UNIT V **(18 Hours)**

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

TEXT BOOKS

1. Kantiswarup, P.K.Gupta and Man Mohan, Operations Research, 16th Thoroughly Revised Ed., Sultan Chand & Sons, New Delhi, (Reprint 2014).
2. Gilbert Strang (2016), Introduction to Linear Algebra, 5th Edition. Wellesley – Cambridge Press.

REFERENCE BOOKS

1. P.K.Gupta & ManMohan**, "**Problems in Operations Research**"** SultanChand Publications, 6th Edition, 1994, New Delhi.
2. B.S.Goel and S.K.Mittal , Operations Research, 16th Edition, Pragathi Prakashan Publishers, Meerut, 1999.
3. S.Lang (1997), Introduction to Linear Algebra, Second Edition, Springer.
4. Schaum's Outline series, Linear Algebra, McGraw Hill Book Company, New Delhi.
5. Dr.S.N.Goel, Linear Algebra, 4th Edition, Kadar Nath, Ram Nath, Meerut.

e-Resources:

1. https://www.youtube.com/watch?v=a2QgdDk4Xjw
2. https://www.youtube.com/watch?v=Q31jKiEXxdc
3. https://www.youtube.com/watch?v=BUGIhEecipE
4. https://www.youtube.com/watch?v=FmD1S5yP_os
5. https://www.youtube.com/watch?v=SK17H2w3fKA
6. https://www.youtube.com/watch?v=DbAdBzWnTD8

26UDA2A2

MAPPING

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

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

Content prepared by Name of the Faculty: Dr. K. Baby Signature of the Course in - charge	 Signature of the HOD

26UCI2A2

Programme Code : 22		B.COM IT		
Title of the Paper		ALLIED II- STATISTICS FOR BUSINESS		
Batch 2026-2029	Hours / Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

1. To impart basic knowledge about statistical concepts.
2. To solve the business problems using statistical techniques
3. To develop the students ability in business by using the graphical and algebraic techniques.

Course Outcomes (CO)

K1 to K5	CO1	Choose a statistical method for solving practical problems.
	CO2	Understand and use the basic measure of central tendency.
	CO3	Identify different types of statistical data.
	CO4	Classify the structure and characteristics of statistical data.
	CO5	Evaluate the correlation coefficients and Formulate regression line by identifying dependent and independent variables

Syllabus

UNIT I **(18 Hours)**

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

UNIT II **(18 Hours)**

Measures of central tendency : Arithmetic mean, Median, Mode, Geometric and Harmonic mean – their computation – Properties and uses (Statements only).

Measures of dispersion : R**ange*** - Quartile deviation - Standard deviation - coefficient of variation.

UNIT III **(18 Hours)**

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

26UCI2A2

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).**

Text Book:

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

Reference Books:

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

e- Resources:

1. https://nptel.ac.in/courses/110107114
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou22_cm08
3. https://www.youtube.com/playlist?list=PLOzRYVm0a65ctyxZGjO_0Vrzp-aUlPejI
4. https://www.youtube.com/watch?v=DVpoCWZwEfE
5. https://tnou.ac.in/eslm/UG/B.COM/SEM%20III/BCOSE%2031%20Business%20Statistics.pdf

UMA 241

26UCI2A2

MAPPING

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

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

Content prepared by Name of the Faculty: Mrs. S. Selvi Celin Prabha Signature of the Course in - charge	 Signature of the HOD

26UBU2A2

Programme Code : 28		B.COM BA		
Title of the Paper		ALLIED PAPER II – BUSINESS STATISTICS II		
Batch 2026-2029	**Hours / Week 6**	**Total Hours 90**	**Credits 5**	**Skill Development/ Employability**

Course Objectives

1. To analysis a data for the purpose of exploration using descriptive and inferential statistics.
2. To solve the creative application statistical problems.
3. To enable the students to learn the Statistical methods of inferential statistics.

Course Outcomes (CO)

K1 to K5	CO1	Explain the creative application of linear regression in multivariate context for predictive purpose.
	CO2	Understand probability and sampling distribution.
	CO3	Understand the concepts of chi-square test.
	CO4	Understand the statistical tools for multivariate data set.
	CO5	Examine the data reliability and validity of the data set.

Syllabus

UNIT I **(18 Hours)**

Time Series: Meaning, Components and models – Business forecasting – Methods of estimating trend – Graphic, semi – average, Moving average and Method of Least squares – Measurement of Seasonal variations – method of simple average.

UNIT II **(18 Hours)**

Probability: Probability Laws – Addition Law – Conditional probability – Multiplication law – Bayes theorem – Binomial distribution – Poisson distribution – Normal distribution.

UNIT III **(18 Hours)**

Test of Hypothesis: Type I error and II errors – one tailed and two tailed test – Test of hypothesis concerning large samples –Testing hypothesis about population mean – Testing Hypothesis about difference between two means – test of hypothesis concerning attributes – Testing hypothesis about population proportion – Testing hypothesis about difference between two proportions.

UNIT IV **(18 Hours)**

Chi- Square test – Condition for the application of Chi – square test. Analysis of Variance: one way, two classifications.

26UBU2A2

UNIT V **(18 Hours)**

Partial Correlation coefficient – multiple correlation – coefficient multiple determination – Multiple regression (problems only).

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

Text Book:

S.P. Gupta and M.P. Gupta, Business Statistics– Sultan Chand & Sons Educational Publishers , New Delhi., 18th Edition.

Reference Books:

1. Dr. P R Vittal, Business Mathematics & Statistics, Margham Publications, Chennai, 6th edition, 2006.
2. S.P. Gupta, Statistical Methods, Sultan Chand & Sons, 46th edition 2021

e-Resources:

1. https://www.youtube.com/watch?v=HWwH7PisAEs
2. https://www.youtube.com/watch?v=cqTwHnNbc8g
3. https://www.youtube.com/watch?v=HSYvgC6bfmU
4. https://www.youtube.com/watch?v=qUQ-alqJQag
5. https://www.youtube.com/watch?v=I0mQQE61dOQ

MAPPING

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

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

Content prepared by Name of the Faculty: 1. Dr. A. Amuthalakshmi 2. Dr. M. Rathika Signature of the Course in - charge	 Signature of the HOD

VALUE ADDED COURSE

STATISTICAL TOOLS USING R PROGRAMMING

Semester : IV
Duration : 30 Hours

CHAPTER – 1 INTRODUCTION

- •Introduction and preliminaries
- •The R environment - Related software and documentation
- •Installing and overview of R and R studio
- •Getting help with functions and features - R commands, case sensitivity
- •Executing commands from or diverting output to a file
- •Data permanency and removing objects
- •Simple manipulations; numbers and vectors: Vectors and assignment - Vector Arithmetic
- •Generating regular sequences - Logical vectors

CHAPTER – 2 OBJECTS AND ATTRIBUTES

- •Missing values - Character vectors
- •Index vectors - selecting and modifying subsets of a data set
- •Objects, their modes and attributes
- •Changing the length of an object - Getting and setting attributes
- •Ordered and unordered factors
- •The function apply () and ragged arrays - Ordered factors

CHAPTER – 3 ARRAY AND MATRICES

- •Arrays and matrices
- •Array indexing - Subsections of an array
- • Index matrices - The array () function – Mixed vector and array arithmetic
- •The recycling rule
- • Matrix facilities - Matrix multiplication Lists
- •Data frames - Working with data frames
- •Managing the search path

CHAPTER – 4 CONDITIONAL EXECUTION

- •Reading data from files
- •Accessing built - in datasets - Editing data
- •Grouping, loops and conditional execution - Control statements
- •Repetitive execution: for loops, repeat and while
- •The '...' argument - Assignments within functions

CHAPTER – 5 R – PACKAGES

- •Graphical procedures: High-level plotting commands
- •Graphics parameters list - Graphical elements
- •Pre – defined methods
- •CHARTS – pie charts, bar chart, plot
- •Packages
- •Spam detection
- •Credit card fraud detection

CHAPTER – 6 SUMMARY STATISTICS

- ·Measures of Location
- ·Measures of dispersion

CHAPTER – 7 CLASSICAL STATISTICAL TESTS

·Null-hypothesis testing

·Test statistics

VALUE ADDED COURSE

PYTHON Programming

Semester : V

Duration : 30 Hours

- **Introduction**
  - Comparison C, C++, Python
  - Programming LanguageIntroduction
- **PYTHON**
  - AboutPython
  - WhyPython?
  - PythonInterpreter
  - PythonCompilation
  - Python Scripts in Linux/Unix &Windows
  - White spaceSignificance
  - LineTermination
  - Comments in Python
  - Basic OutputGeneration
  - Simple User Input
  - PythonModules
  - Module SearchPaths
  - Determining the System SearchPath
- **PROGRAMMING IN PYTHON**
  - PythonVariables
  - Naming Conventions & Rules
  - Types asObjects
  - Variable References & GarbageCollection
  - Sequence Types
  - ListIteration
  - ListEnumeration
  - NumericTools
  - The DecimalModule
  - OperatorPrecedence
  - Generating Strings inPython
  - Common String Methods
  - Type Conversion in Python
  - Formatting StringOutput
  - VariableSubstitution
  - StringSlicing
  - Conditional Statements and Looping
  - Basic Input/Output with Files

- Arrays&Functions

- **PYTHON'SLISTS**
  - Common List Methods
  - Other ListOperations
  - The range ()Function
  - Multidimensional
  - Lists(Matrices)
  - Tuples
- **PYTHON DICTIONARIES**
  - Introduction
  - Assigning Values toDictionaries
  - DictionaryMethods
  - Dictionaries Vs. Lists & Tuples
- **MODULES & PACKAGES**
  - ModuleBasics
  - Packages
  - Using all and _Variables
  - Usingname
- **OOP'SPROGRAMMING**
  - The ClassStatements
  - ClassInheritance
  - Classes as Objects
  - Using Dictionaries
  - Understanding self
  - Overriding Inherited Methods
  - More Inheritance
  - Operator Overloading
  - Empty Classes for Storage
- **Databases Connection with Python**
  - About Database Access
  - Postgre SQL Connect Strings
  - Cursor Objects
- **EXCEPTION HANDLING**
  - Default Exception Handler
  - Exception Classes
  - Using Try/Except/Finally Exceptions
  - Custom Exceptions
  - Exception Implementation
  - Using Asserts

- **PYTHON & THE WEB**
  - About the Web
  - Understanding HTTP
  - Using the CGI Module



JOB ORIENTED COURSE (JOC)



KONGUNADUARTSANDSCIENCECOLLEGE (AUTONOMOUS)

COIMBATORE–641029

CURRICULUMANDSCHEMEOFEXAMINATIONS(CBCS)
(2026-2027and onwards)

for theprogramme

JOBORIENTED COURSE

Offeredby

DEPARTMENTOFMATHEMATICS

JOBORIENTED COURSE

Curriculum and Scheme of Examinations under CBCS for the candidates
Admitted from 2026 - 2027 and onwards

Titleof thePaper	Instructional Hrs/Cycle	ExamMarks			Durationof Exam	Credits
		CIA	ESE	Total		
QuantitativeAptitude	2	-	100	100	3	2
Total	**2**	**-**	**-**	**100**	**-**	**2**

CBCS – Choice Based Credit System
CIA–ContinuousInternalAssessment
ESE – End of Semester Examinations

*-DurationofExaminationis scheduledfor3 Hoursto enhancespeedycalculation

BLOOM'STAXONOMYBASEDASSESSMENTPATTERN

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

Theory Examination(ONLINE MODE)
ESE: 100 Marks

Knowledge Level	Section	Marks	Description	Total
K1– K5 Q1 to 100	Answerall	100x1 =100	MCQ-100	100

Programme Code: 01	JOB ORIENTED COURSE			
Title of the Paper	Quantitative Aptitude			
Batch: 2026 - 2027	Instruction Hours/Cycle 2	Total Hours 30	Credits 2	Employability/ Skill Development

Course Objectives

1. Understand about Master Fundamental Mathematical Concepts
2. To Develop Analytical and Logical Thinking.
3. Understand about Data Interpretation and Analysis, Master Time, Work, and Speed Problems
4. Solve the Probability and Permutation/Combination Problems.
5. Improve Speed and Accuracy in Solving Problems

Syllabus

UNIT – I **6 Hours**

Number Systems-LCM and HCF-Decimal Fractions-Simplification-Square Roots and Cube Roots -Average-Problems on Ages-Surds & Indices-Percentages-Problems on Numbers.

UNIT – II **6 Hours**

Logarithm-Permutation and Combinations-Probability-Profit and Loss-Simple and Compound Interest -Time, Speed and Distance- Time & Work-Ratio and Proportion-Area-Mixtures and Allegation.

UNIT – III **6 Hours**

Problems on Trains - Heights and Distances – Discount – Partnership - Stocks & Shares – Odd Man Out & Series.

UNIT – IV **6 Hours**

Data Interpretation: Data Interpretation-Tables-Column Graphs-Bar Graphs-Line Charts-Pie Chart-Venn Diagrams.

UNIT – V **6 Hours**

Analogy-Blood Relation-Directional Sense-Number and Letter Series-Coding – Decoding-Calendars-Clocks-Venn Diagrams-Seating Arrangement-Syllogism.

Text Books:

1. "R S Agarwal", 2015, Quantitative aptitude for Competitive examination.
2. "Abhijit Guha", 4th edition, Quantitative Aptitude by Competitive Examinations.

e-Resources:

1. https://www.youtube.com/watch?v=5o60TC3THEw
2. https://www.youtube.com/watch?v=qzWjclCaxeM
3. https://www.youtube.com/watch?v=78b4Jn4rw44
4. https://www.youtube.com/watch?v=b6t0994ZZDA
5. https://www.youtube.com/watch?v=Aja8BIHeRDw

Mapping

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

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

Content prepared by (Based on Inputs) Signature of the Course in-charge	Signature of the HOD