

B.Sc., MATHEMATICS

Syllabus

Program Code: UMT

2023 - Onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with “A” Grade by NAAC

PASUMALAI, MADURAI – 625 004

**GUIDLINES FOR OUTCOME BASED EDUCATION WITH CHOICE BASED
CREDIT SYSTEM**

(FOR UG PROGRAM FROM 2023 -2024 ONWARDS)

ELIGIBILITY FOR ADMISSION

Candidates seeking admission to the UG Degree program must have passed the Higher Secondary Education (respective groups – Arts / Science) of the Government of Tamil Nadu or any other state or its equivalent qualification.

DURATION OF THE COURSE

The duration of the course shall be three academic years comprising six semesters with two semesters in each academic year.

Subjects of Study

Part I : Tamil / Hindi /

Part II : English

Part III:

- 1.Core Subjects
- 2.Allied Subjects
- 3.Electives

Part IV:

- 1.Non Major Electives (I Year)
- 2.Skill Based Subjects
- 3.Environmental Studies - Mandatory Subject
- 4.Value Education - Mandatory Subject

Part V :

Extension Activities

ARTS & SCIENCE

CBCS COURSE STRUCTURE FOR UG PROGRAMS

Sem I	Credit	Sem II	Credit	Sem III	Credit	Sem IV	Credit	Sem V	Credit	Sem VI	Credit
1.1. Language - Tamil	3	2.1. Language - Tamil	3	3.1. Language - Tamil	3	4.1. Language - Tamil	3	5.1 Core Course - \CC IX	4	6.1 Core Course - CC XIII	4
1.2 English	3	2.2 English	3	3.2 English	3	4.2 English	3	5.2 Core Course - CC X	4	6.2 Core Course - CC XIV	4
1.3 Core Course - CC I	4	2.3 Core Course - CC III	4	3.3 Core Course - CC V	4	4.3 Core Course - CC VII Core Industry Module	4	5.3. Core Course - CC -XI	4	6.3 Core Course - CC XV	4
1.4 Core Course - CC II	4	2.4 Core Course - CC IV	4	3.4 Core Course - CC VI	4	4.4 Core Course - CC VIII	4	5.3. Core Course -/ Project with viva-voce CC - XII	4	6.4 Elective -VII Generic/ Discipline Specific	3
1.5 Elective I Generic/ Discipline Specific	3	2.5 Elective II Generic/ Discipline Specific	3	3.5 Elective III Generic/ Discipline Specific	3	4.5 Elective IV Generic/ Discipline Specific	3	5.4 Elective V Generic/ Discipline Specific	3	6.5 Elective VIII Generic/ Discipline Specific	3
1.6 Skill Enhancement Course SEC-1 (NME)	2	2.6 Skill Enhancement Course SEC-2 (NME)	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	4.6 Skill Enhancement Course SEC-6	2	5.5 Elective VI Generic/ Discipline Specific	3	6.6 Extension Activity	1
1.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-1	2	2.7 Skill Enhancement Course - SEC-3(NME)	2	3.7 Skill Enhancement Course SEC-5	2	4.7 Skill Enhancement Course SEC-7	2	5.6 Value Education	2	6.7 Professional Competency Skill	2
1.8 Skill Enhancement - (Foundation Course)	2	2.8 Ability Enhancement Compulsory Course (AECC) Soft Skill-2	2	3.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-3	2	4.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-4	2	5.5 Summer Internship /Industrial Training	2		
				3.8 E.V.S	-	4.8 E.V.S	2				
	23		23		22		25		26		21
Total Credit Points											140

**QUESTION PAPER PATTERN FOR THE CONTINUOUS INTERNAL
ASSESSMENT**

Note: Duration – 1 hour

(FOR PART I, PART II & PART III)

The components for continuous internal assessment are:

Part –A

Four multiple choice questions (answer all) 4 x 01= 04 Marks

Part –B

Two questions (‘either or ‘type) 2 x 05= 10 Marks

Part –C

Two questions (‘either or ‘type) 2 x 08=16 Marks

Total 30 Marks

THE COMPONENTS FOR CONTINUOUS INTERNAL ASSESSMENT ARE:

(60 Marks of two continuous internal assessments will be converted to 15 marks)

Two tests and their average --15 marks

Seminar /Group discussion / Quiz Test --5 marks

Assignment --5 marks

Total 25 Marks

QUESTION PAPER PATTERN FOR THE SUMMATIVE EXAMINATIONS:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions 10 x 01 = 10 Marks

No Unit shall be omitted: not more than two questions from each unit.)

Part –B

Five Paragraph questions ('either or 'type) 5 x 05 = 25 Marks

(One question from each Unit)

Part –C

Five Paragraph questions ('either or 'type) 5 x 08 = 40 Marks

(One question from each Unit)

Total

75 Marks

PART-IV- SKILL BASED PAPERS / NME:

The Scheme of Examination for Skill Based Papers: (Except Practical Lab Subjects)

QUESTION PAPER PATTERN FOR THE CONTINUOUS INTERNAL ASSESSMENT (SKILL BASED AND NME COURSES) DURATION – 1 HOUR

- ❖ 50 MCQs will be asked for each internal assessment tests (50 x 1=50 Marks) and converted for 15 marks

THE COMPONENTS FOR CONTINUOUS INTERNAL ASSESSMENT ARE:

Two tests and their average	--15 marks
Seminar /Group discussion / Quiz Test	-- 5 marks
Assignment	-- 5 marks

Total	25 Marks

SUMMATIVE EXAMINATION PATTERN (SKILL BASED AND NME COURSES) DURATION – 3 HOURS

Pattern of the Question Paper for Skill Based and Non-Major Elective courses
(External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)
(15MCQ's from each unit)

PART-IV- ENVIRONMENTAL STUDIES AND VALUE EDUCATION
QUESTION PAPER PATTERN (INTERNAL ASSESSMENT)

Pattern of the Question Paper for Environmental Studies & Value Education
(Internal)

50 MCQs will be asked for each internal assessment tests (50 x 1=50 Marks) and
converted for 15 marks

Two tests and their average	--	15 marks
Project	--	10 marks

Total		25 Marks

* The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

SUMMATIVE EXAMINATION PATTERN

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)
(15MCQ's from each unit)

PART V EXTENSION ACTIVITIES: (MAXIMUM MARKS: 100)

1. NCC
2. NSS
3. Physical Education
4. YRC
5. RRC
6. Health & Fitness Club
7. Eco Club
8. Human Rights Club

Internal Examinations - - 25 Marks

Summative Examinations - - 75 Marks

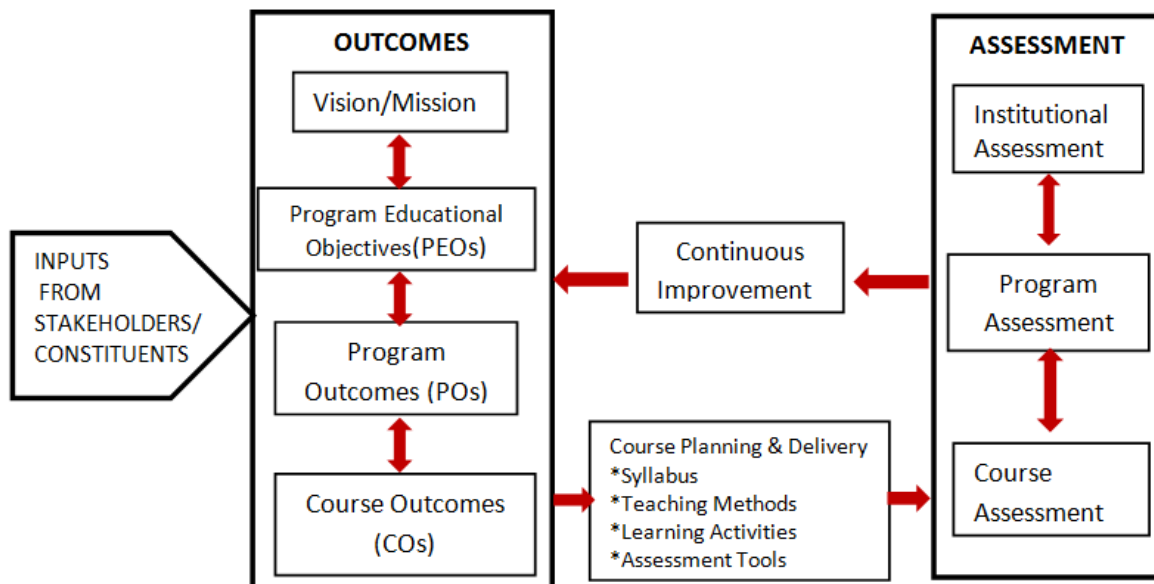
100

OUTCOME BASED EDUCATION:

OBE starts with the identification and articulation of clear and measurable learning outcomes for each course or program. These outcomes describe the skills, knowledge, and abilities that students are expected to acquire. The curriculum, instructional methods, and assessments are aligned with the defined learning outcomes. This ensures that everything taught and evaluated is directly related to what students are expected to learn.

The Learning Outcomes-Based Approach to curriculum planning and transaction in our institution ensures whether the teaching-learning processes are oriented towards enabling students to attain the defined learning outcomes relating to the courses within a programme. The outcome based approach, particularly in the context of undergraduate studies, requires a significant shift from teacher-centric to learner-centric pedagogies and from passive to active/participatory pedagogies.

Assessment Method: The students are assessed with 2 internal examination and the summative examination which includes problem based assignments; practical assignment laboratory reports; observation of practical skills; individual project reports ,case-study reports; team project reports; oral presentations, including seminar presentation; viva voce interviews; computerized adaptive testing; etc. and any other pedagogic approaches as per the context.



INSTITUTIONAL VISION

To Mould the learners into accomplished individuals by providing them with a stimulus for social change through character, confidence and competence.

INSTITUTIONAL MISSION

1. Enlightening the learners on the ethical and environmental issues.
2. Extending holistic training to shape the learners in to committed and competent citizens.
3. Equipping them with soft skills for facing the competitive world.
4. Enriching their employability through career oriented courses.
5. Ensuring accessibility and opportunity to make education affordable to the underprivileged.

Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.

- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS),
MADURAI – 625 004
B.SC MATHEMATICS CURRICULUM
(For the student admitted during the academic year 2023-2024 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – I	Tamil / Alternative Course					
23UTAGT11	தமிழ் இலக்கிய வரலாறு - I	6	3	25	75	100
Part – II	English					
23UENGE11	GENERAL ENGLISH - I	6	3	25	75	100
Part - III	Core Courses					
23UMTCC11	ALGEBRA AND TRIGONOMETRY	5	5	25	75	100
23UMTCC12	DIFFERENTIAL CALCULUS	4	4	25	75	100
Part - III	Elective Courses					
23UPHEA11	ALLIED PHYSICS - I	3	3	25	75	100
23UPHEP11	ALLIED PHYSICS PRACTICAL - I	2	1	25	75	100
Part IV	Non Major Elective					
23UMTNM11	MATHEMATICS FOR COMPETITIVE EXAMINATION - I	2	2	25	75	100
Part IV	Foundation Course					
23UMTFC11	FUNDAMENTALS OF MATHEMATICS	2	2	25	75	100
Total		30	23	200	600	800
SECOND SEMESTER						
Part – I	Tamil / Alternative Course					
23UTAGT21	தமிழ் இலக்கிய வரலாறு – II	6	3	25	75	100
Part – II	English					
23UENGE21	GENERAL ENGLISH - II	6	3	25	75	100
Part - III	Core Courses					
23UMTCC21	ANALYTICAL GEOMETRY (TWO AND THREE DIMENSIONS)	5	5	25	75	100
23UMTCC22	INTEGRAL CALCULUS	4	4	25	75	100
Part - III	Elective Course					
23UPHEA21	ALLIED PHYSICS - II	3	3	25	75	100
23UPHEP21	ALLIED PHYSICS PRACTICAL - II	2	1	25	75	100
Part IV	Non Major Elective					
23UMTNM21	MATHEMATICS FOR COMPETITIVE EXAMINATION - II	2	2	25	75	100
Part IV	Skill Enhancement course					
23UMTSP21	OFFICE AUTOMATION - LAB	2	2	25	75	100
Total		30	23	200	600	800

FIRST SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ALGEBRA AND TRIGONOMETRY			
Course Code	23UMTCC11	L	P	C
Category	CORE	5	-	5
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Basic ideas on the Theory of Equations, Matrices and Number Theory.➤ Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.				
UNIT - I				15
Reciprocal Equations-Standard form-Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems.				
UNIT - II				15
Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems				
UNIT - III				15
Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems.				
UNIT - IV				15
Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion of $\tan n\theta$ in terms of $\tan\theta$, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta\sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+\dots+\theta_n)$ -Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ - related problems				
UNIT - V				15
Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.				
Total Lecture Hours				75

BOOKS FOR STUDY:

- Algebra, Volume I by T.K.Manicavachagom Pillay, T.Natarajan,K.S.Ganapathy, Viswanathan Publication 2007,
- Algebra, Volume II by T.K.Manicavachagom Pillay, T.Natarajan,K.S.Ganapathy, Viswanathan Publication 2007,
- Trigonometry by T.K.Manicavachagom Pillay,T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2008

Unit I – Text Book 1: Chapter 6: Sections 16.16.1, 16.2, 17, 19, 30

Unit II- Text book 1: Chapter 3: Sections 10

Chapter 4: Sections 3.1, 3.5, 3.6, 3.7

Unit III – Text book 2- Chapter 2 Sections 16, 16.1 to 16.4

Unit IV – Textbook 3: Chapter 3: Sections 3, 1, 2

Chapter 3: Sections 4, 4.1

Unit V – Text book 3: Chapter 4: Sections 4, 4.1

Chapter 4: Sections ,1, 2,2.1,2.2,2.3

Chapter 5: Sections 5, 5.1, 5.2

Chapter 6: Sections 6, 1, 2

BOOKS FOR REFERENCES:

- W.S Burnstine and A.W. Panton, Theory of Equations
- David C.Lay, Linear Algebra and its Applications, Third Edition Pearson Education Asia, Indian Reprint, 2007
- G.B. Thomas and R.L.Finney, Calculus, 9th Edition, Pearson Education, Delhi, 2005.
- C.V. Durell and a Robson, Advanced Trigonometry, Courier Corporation, 2003
- J. Stewart, L. Redlin and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012
- Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.

WEB RESOURCES:

- ❖ <https://www.mathwarehouse.com/>
- ❖ <https://www.mathhelp.com/>
- ❖ <https://www.mathsisfun.com/>

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓ GLOBAL
Changes Made in the Course	Percentage of Change	40	No Changes Made		New Course	

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Classify and Solve reciprocal equations	K1 to K4
CO2	Find the sum of binomial, exponential and logarithmic series	K1 to K4
CO3	Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix	K1 to K4
CO4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine	K1 to K4
CO5	Determine relationship between circular and hyperbolic functions and the summation of trigonometric series	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	-	-	-				
CO2	2	1	3	1	-	-				
CO3	3	1	3	1	-	-				
CO4	3	1	3	-	-	-				
CO5	3	1	3	-	-	-				
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:					
COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:			
UNIT	ALGEBRA & TRIGONOMETRY	HRS	PEDAGOGY
I	Reciprocal Equations-Standard form–Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner’s method – related problems.	15	Chalk & Talk
II	Summation of Series: Binomial– Exponential –Logarithmic series	15	Chalk &

	(Theorems without proof) – Approximations - related problems		Talk
III	Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems	15	Chalk & Talk
IV	Expansions of $\sin^n\theta$, $\cos^n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion of $\tan^n\theta$ in terms of $\tan\theta$, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta\sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+\dots+\theta_n)$ -Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ - related problems.	15	Chalk & Talk
V	Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.	15	Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
				(10 x 1 = 10 Marks)	
1.	Unit - I	CO1	K1	a)	b)
				c)	d)
2.	Unit - I	CO1	K2	a)	b)
				c)	d)
3.	Unit - II	CO2	K1	a)	b)
				c)	d)
4.	Unit - II	CO2	K2	a)	b)
				c)	d)
5.	Unit - III	CO3	K1	a)	b)
				c)	d)
6.	Unit - III	CO3	K2	a)	b)
				c)	d)
7.	Unit - IV	CO4	K1	a)	b)
				c)	d)
8.	Unit - IV	CO4	K2	a)	b)
				c)	d)
9.	Unit - V	CO5	K1	a)	b)
				c)	d)
10.	Unit - V	CO5	K2	a)	b)

				c)	d)
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Answer ALL the questions				PART – B		(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2			
OR						
11. b)	Unit - I	CO1	K2			
12. a)	Unit - II	CO2	K3			
OR						
12. b)	Unit - II	CO2	K3			
13. a)	Unit - III	CO3	K2			
OR						
13. b)	Unit - III	CO3	K2			
14. a)	Unit - IV	CO4	K3			
OR						
14. b)	Unit - IV	CO4	K3			
15. a)	Unit - V	CO5	K3			
OR						
15. b)	Unit - V	CO5	K3			

Answer ALL the questions				PART – C		(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3			
OR						
16. b)	Unit - I	CO1	K3			
17. a)	Unit - II	CO2	K4			
OR						
17. b)	Unit - II	CO2	K4			
18. a)	Unit - III	CO3	K3			
OR						
18. b)	Unit - III	CO3	K3			
19. a)	Unit - IV	CO4	K4			
OR						
19. b)	Unit - IV	CO4	K4			
20. a)	Unit - V	CO5	K4			
OR						
20. b)	Unit - V	CO5	K4			



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	DIFFERENTIAL CALCULUS			
Course Code	23UMTCC12	L	P	C
Category	CORE	4	-	4
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ The basic skills of differentiation, successive differentiation, and their applications.➤ Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.				
UNIT – I Successive Differentiation				12
Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product – Feynman’s method of differentiation				
UNIT – II Partial Differentiation				12
Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions				
UNIT - III Partial Differentiation (Continued)				12
Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers.				
UNIT – IV Envelope				12
Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.				
UNIT - V Curvature				12
Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutives – Radius of Curvature in Polar Co-ordinates.				
Total Lecture Hours				60

BOOKS FOR STUDY:

- Calculus, Volume I by T.K.Manicavachagom Pillay, S. Narayanan , Viswanathan Publication 2007,

Unit I – Text Book 1: Chapter 3: Sections 1.1 - 1.6 and Section: 2.1 & 2.2

Unit II- Text book 1: Chapter 8: Sections 1.1 – 1.5

Unit III – Chapter 8 Sections 1.6, 1.7, Sections: 4 & 5

Unit IV – Chapter 10: Sections 1.1 - 1.4

Unit V – Chapter 10: Sections 2.1,2.2 & 2.5, 2.6

BOOKS FOR REFERENCES:

- H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002
- G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010.
- M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

WEB RESOURCES:

- ❖ <https://nptel.ac.in>
- ❖ <https://www.mathwarehouse.com/>
- ❖ <https://www.mathhelp.com/>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓	
Changes Made in the Course	Percentage of Change		50	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:										K LEVEL
After studying this course, the students will be able to:										
CO1	Find the nth derivative, form equations involving derivatives and apply Leibnitz formula									K1 to K4
CO2	Find the partial derivative and total derivative coefficient									K1 to K4
CO3	Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers									K1 to K4
CO4	Find the envelope of a given family of curves									K1 to K4
CO5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates									K1 to K4
MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	-	-	-				

CO2	2	1	3	-	-	-			
CO3	3	2	3	2	-	-			
CO4	3	2	3	2	1	-			
CO5	3	2	3	2	1	-			

S- STRONG

M – MEDIUM

L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:

UNIT	DIFFERENTIAL CALCULUS	HRS	PEDAGOGY
I	Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product – Feynman’s method of differentiation	12	Chalk & Talk
II	Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions.	12	Chalk & Talk
III	Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers.	12	Chalk & Talk
IV	Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.	12	Chalk & Talk
V	Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutives – Radius of Curvature in Polar Co-ordinates.	12	Chalk & Talk

**Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)**

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions			PART – A		(10 x 1 = 10 Marks)
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ALLIED PHYSICS – I			
Course Code	23UPHEA11	L	P	C
Category	ALLIED PAPER	3	-	3
COURSE OBJECTIVES:				
➤ To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.				
UNIT - I	WAVES, OSCILLATIONS AND ULTRASONICS	09		
Simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – applications of ultrasonics				
UNIT - II	PROPERTIES OF MATTER	09		
<i>Elasticity:</i> elastic constants – bending of beam – theory of non- uniform bending – determination of Young’s modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum <i>Viscosity:</i> streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille’s formula – comparison of viscosities – burette method, <i>Surface tension:</i> definition – molecular theory – droplets formation.				
UNIT - III	HEAT AND THERMODYNAMICS	09		
Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot’s cycle – efficiency – entropy – change of entropy in reversible and irreversible process.				
UNIT - IV	ELECTRICITY AND MAGNETISM	09		
Potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart’s law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit				
UNIT - V	DIGITAL ELECTRONICS	09		
Logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan’s theorem – verification				
Total Lecture Hours				45

BOOKS FOR STUDY:

- R.Murugesan (2001), Allied Physics, S. Chand & Co, New Delhi.
- Brijlal and N.Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi.
- Brijlal and N.Subramaniam (1994), Properties of Matter, S.Chand & Co., New Delhi.
- J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8th edition), S.Chand & Co., New Delhi.
- R.Murugesan (2005), Optics and Spectroscopy, S.Chand & Co ,New Delhi.
- A.Subramaniyam, Applied Electronics 2nd Edn., National Publishing Co., Chennai.

BOOKS FOR REFERENCES:

- Resnick Halliday and Walker (2018). Fundamentals of Physics (11th edition), John Willey and Sons, Asia Pvt .Ltd., Singapore.
- V.R.Khann aand R.S.Bedi (1998), Text book of Sound 1st Edn. Kedharnaath Publish & Co, Meerut.
- N.S.Khare and S.S.Srivastava (1983), Electricity and Magnetism 10th Edn., Atma Ram & Sons, New Delhi.
- D.R.Khanna and H.R. Gulati (1979). Optics, S. Chand Co. Ltd., New Delhi.
- V.K. Metha (2004).Principles of electronics 6th Edn. S.Chand and company.

WEB RESOURCES:

- ❖ https://youtu.be/M_5KYncYNyc
- ❖ <https://youtu.be/ljJLJgIvaHY>
- ❖ https://youtu.be/7mGqd9HQ_AU
- ❖ <https://youtu.be/h5jOAw57OXM>
- ❖ <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		50	No Changes Made		New Course		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:

CO1	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field	K1 to K4
CO2	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life.	K1 to K4
CO3	Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.	K1 to K4
CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric field.	K1 to K4
CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
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CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	2	3	2	2	3	2	3
CO2	2	3	3	3	2	2	3	2	3	3
CO3	3	2	3	2	3	3	2	3	3	3
CO4	3	3	3	3	3	2	3	2	2	2
CO5	2	2	3	3	2	3	3	3	3	2

3 - STRONG

2 - MEDIUM

1 - LOW

CO / PO MAPPING:					
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	1	3	-	2
CO 2	3	1	3	-	2
CO 3	3	1	3	-	2
CO 4	3	1	3	-	2
CO 5	3	1	3	-	2
WEITAGE					
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS					

LESSON PLAN:			
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UNIT	ALLIED PHYSICS – I	HRS	PEDAGOGY
I	Simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of	9	Lecture method, PPT,

	transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – applications of ultrasonics		Demonstration
II	<i>Elasticity</i> : elastic constants – bending of beam – theory of non- uniform bending – determination of Young’s modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum <i>Viscosity</i> : streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille’s formula – comparison of viscosities – burette method, <i>Surface tension</i> : definition – molecular theory – droplets formation.	9	Lecture method, PPT, Demonstration
III	Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot’s cycle – efficiency – entropy – change of entropy in reversible and irreversible process.	9	Lecture method, PPT, Demonstration
IV	Potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart’s law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit	9	Lecture method, PPT, Demonstration
V	Logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan’s theorem – verification	9	Lecture method, PPT, Demonstration

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CIA I	CO1	K1 – K4	2	K1, K2	K1 OR K1	K3 OR K3
	CO2	K1 – K4	2	K1,K2	K2 OR K2	K4 OR K4
CIA II	CO3	K1 – K4	2	K1, K2	K2 OR K2	K3 OR K3
	CO4	K1 – K4	2	K1,K2	K3 OR K3	K4 OR K4
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2	10	-	12	21.43	-
	K2	2	10	-	12	21.43	
	K3	-	-	16	16	28.57	42.86
	K4	-	-	16	16	28.57	71.43
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.57	-
	K2	2	10		12	21.43	
	K3		10	16	26	46.43	25.00
	K4			16	16	28.57	71.43
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1, K2	2	K1, K2	K1, K1	K2, K2
2	CO2	K1, K2	2	K1, K2	K2, K2	K2, K2
3	CO3	K1, K2	2	K1, K2	K2, K2	K3, K3
4	CO4	K1, K2	2	K1, K2	K3, K3	K3, K3
5	CO5	K1, K2	2	K1, K2	K4, K4	K4, K4
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	10		15	10.72	-
K2	5	20	32	57	40.71	51.43
K3		10	32	42	30.00	30.00
K4		10	16	26	18.57	18.57
Marks	10	50	80	140	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A (10 x 1 = 10 Marks)	
1.	Unit - I	CO1	K1	a)	b)
				c)	d)
2.	Unit - I	CO1	K2	a)	b)
				c)	d)
3.	Unit - II	CO2	K1	a)	b)
				c)	d)
4.	Unit - II	CO2	K2	a)	b)
				c)	d)
5.	Unit - III	CO3	K1	a)	b)
				c)	d)
6.	Unit - III	CO3	K2	a)	b)
				c)	d)
7.	Unit - IV	CO4	K1	a)	b)
				c)	d)
8.	Unit - IV	CO4	K2	a)	b)
				c)	d)
9.	Unit - V	CO5	K1	a)	b)
				c)	d)
10.	Unit - V	CO5	K2	a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K1		
OR					
11. b)	Unit - I	CO1	K1		
12. a)	Unit - II	CO2	K2		
OR					
12. b)	Unit - II	CO2	K2		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K4		
OR					
15. b)	Unit - V	CO5	K4		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K2		
OR					
16. b)	Unit - I	CO1	K2		
17. a)	Unit - II	CO2	K2		
OR					
17. b)	Unit - II	CO2	K2		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K3		
OR					
19. b)	Unit - IV	CO4	K3		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ALLIED PHYSICS PRACTICALS – I			
Course Code	23UPHEP11	L	P	C
Category	ALLIED PRACTICAL	-	2	1

COURSE OBJECTIVES:

- Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

SEMESTER - I LIST OF EXPERIMENTS

30

Minimum of Eight Experiments from the list:

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever, scale and telescope
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by torsional oscillations without mass
5. Surface tension and interfacial Surface tension – drop weight method
6. Comparison of viscosities of two liquids – burette method
7. Specific heat capacity of a liquid – half time correction
8. Verification of laws of transverse vibrations using sonometer
9. Calibration of low range voltmeter using potentiometer
10. Determination of thermo emf using potentiometer
11. Verification of truth tables of basic logic gates using ICs
12. Verification of De Morgan's theorems using logic gate ICs.
13. Use of NAND as universal building block.

Note : Use of digital balance permitted

Total Lecture Hours

30

BOOKS FOR STUDY:

- Srinivasan.M.N., Balasubramanian.S., Ranganathan.R., A Text Book of Practical Physics, 2017 Edition, Sultan Chand & Sons

BOOKS FOR REFERENCES:

- Ouseph.C., Practical Physics and Electronics, 2013, S.Viswanathan.P.Ltd.
- Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers (2007)

WEB RESOURCES:

- ❖ [https://nptel.ac.in/course.html/physics/experimental physics I, II and III](https://nptel.ac.in/course.html/physics/experimental%20physics%20I,%20II%20and%20III)
- ❖ <https://nptel.ac.in/courses/115/105/115105110/>
- ❖ https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		70	No Changes Made			New Course	

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:	
CO1	Remembering the Aim and apparatus used in the experiment
CO2	Understanding of laws and formulas of the experiment
CO3	Applying the knowledge to do the experiment
CO4	Calculating and examining the aim of the experiment
CO5	Interpreting the result of the experiment

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	1	2	3	3	3	1	3
CO2	3	3	2	2	2	3	3	3	1	3
CO3	3	3	3	3	3	3	3	3	2	3
CO4	3	3	2	3	3	3	3	3	1	3
CO5	3	3	2	2	2	3	3	3	1	3

3 - STRONG

2 - MEDIUM

1 - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	3	-	2
CO 2	3	2	3	-	2
CO 3	3	2	3	-	2
CO 4	3	2	3	-	2
CO 5	3	2	3	-	2
WEITAGE					
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS					

LESSON PLAN:

SEM	ALLIED PHYSICS PRACTICALS – I	HRS	PEDAGOGY
I	1. Young’s modulus by non-uniform bending using pin and microscope 2. Young’s modulus by non-uniform bending using optic lever, scale and telescope 3. Rigidity modulus by torsional oscillations without mass 4. Comparison of viscosities of two liquids – burette method 5. Verification of laws of transverse vibrations using sonometer 6. Calibration of low range voltmeter using potentiometer 7. Verification of truth tables of basic logic gates using ICs 8. Use of NAND as universal building block.	30	Demonstration and Video

Learning Outcome Based Education & Assessment (LOBE)				
Formative Examination - Blue Print				
Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	Cos	K Level	No. of. Questions	K - Level
CIA-I	CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
Question Pattern CIA - I		No. of Questions to be asked	1 Question for Each Student	
		No. of Questions to be answered	1	
		Marks for each question	30	
		Total Marks for each section	30	

Distribution of Marks with COs & K Level for Correction of CIA I				
	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	2.0
	CO2	Formula and Tabular Column	K2	5
	CO3	Understanding and Observation	K4	12.0
	CO4	Calculation and Graph	K3	8.0
	CO5	Interpretation of result	K2	3.0
	Total Marks			

Distribution of Marks with K Level CIA I					
	K Level	Distribution of the work of the experiment	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	Aim and apparatus	2	6.66	-
	K2	Formula and Tabular Column Interpretation of result	8	26.67	
	K3	Understanding and Observation	8	26.67	33.33
	K4	Calculation and Graph	12	40.00	60.00
	Marks		30	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)			
COs	K - Level	No. of Questions	K – Level
CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
No. of Questions to be Asked		1 Question for Each Student	
No. of Questions to be answered		1	
Marks for each question		60	
Total Marks for each section		60	
(Figures in parenthesis denotes, questions should be asked with the given K level)			

Distribution of Marks with COs & K Level for Correction of the Summative Exam			
COs	Distribution of the work of the experiment	K - Level	MARKS
CO1	Aim and apparatus	K1	5
CO2	Formula and Tabular Column	K2	10
CO3	Understanding and Observation	K4	25
CO4	Calculation and Graph	K3	15
CO5	Interpretation of result	K2	5
Total Marks			60

Distribution of Marks with K Level

K Level	Parameters for K-Level	Total Marks	% of (Marks without choice)	Consolidated %
K1	Aim and apparatus	5	8.33	-
K2	Formula and Tabular Column, Interpretation of result	15	25.00	8.33
K3	Understanding and Observation	25	41.67	33.33
K4	Calculation and Graph	15	25.00	75.00
Marks		60	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	MATHEMATICS FOR COMPETITIVE EXAMINATION - I			
Course Code	23UMTNMI1	L	P	C
Category	NON MAJOR ELECTIVE	2	-	2
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To improve the ability to face the competitive examinations.➤ To solve numbers, percentage, ratio.➤ To identify the exact method to problems.➤ To apply the concepts in Competitive Examinations.				
UNIT – I				6
Number system – Decimals - Fractions.				
UNIT – II				6
Operation on numbers – Divisibility – Arithmetic Progression – Geometric Progression.				
UNIT - III				6
HCF Factorization method – Division method –Factorization method of finding LCM – Common Division method – Comparison of fractions.				
UNIT – IV				6
Concept of percentage- Results on population – Results on Depreciation.				
UNIT - V				6
Comparison of ratios - Compounded ratio - Variation.				
Total Lecture Hours				30
BOOKS FOR STUDY:				
<ul style="list-style-type: none">➤ Text Material will be supplied by the Department.				
BOOKS FOR REFERENCES:				
<ul style="list-style-type: none">➤ Aggarwal. R.S, Quantitative Aptitude for Competitive Examinations, S.Chand and Company Ltd, Reprint 2011, New Delhi.➤ Abhigit Guha, Quantitative Aptitude, fourth edition, Tata MC Graw Hill Publication, 2011, New Delhi.➤ Mohan Rao. U, Quantitative Aptitude, Scitech Publications, Reprint, 2013, Chennai.				
WEB RESOURCES:				
<ul style="list-style-type: none">❖ https://www.mathwarehouse.com/❖ https://www.mathhelp.com/❖ https://www.mathsisfun.com/				

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL	✓	NATIONAL	GLOBAL
Changes Made in the Course	Percentage of Change		No Changes Made		✓	New Course
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.						

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:

CO1	Recall the concepts of numbers and decimals	K1 to K2
CO2	Demonstrate the understanding of divisibility and their properties	K1 to K2
CO3	Classify the factors in finding LCM and HCF	K1 to K2
CO4	Explain the percentage related problems	K1 to K2
CO5	Illustrate the problems on ratios	K1 to K2

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	3	3	3	3				
CO2	2	3	2	3	2	3				
CO3	3	2	3	2	3	3				
CO4	3	2	3	2	2	3				
CO5	2	3	3	3	2	2				

S- STRONG

M – MEDIUM

L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:

UNIT	MATHEMATICS FOR COMPETITIVE EXAMINATION - I	HRS	PEDAGOGY
I	Number system – Decimals - Fractions.	6	Chalk & Talk
II	Operation on numbers – Divisibility – Arithmetic Progression – Geometric Progression.	6	Chalk & Talk
III	HCF Factorization method – Division method –Factorization method of finding LCM – Common Division method – Comparison of fractions.	6	Chalk & Talk
IV	Concept of percentage- Results on population – Results on Depreciation	6	Chalk & Talk
V	Comparison of ratios - Compounded ratio - Variation.	6	Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	Cos	K Level	Section A	
			MCQs	
			No. of. Questions	K - Level
CI	CO1	K1 – K2	25	K1,K2
AI	CO2	K1 – K2	25	K1,K2
CI	CO3	K1 – K2	25	K1,K2
AII	CO4	K1 – K2	25	K1,K2
Question Pattern CIA I & II		No. of Questions to be asked	50	
		No. of Questions to be answered	50	
		Marks for each question	1	
		Total Marks for each section	50	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	FUNDAMENTALS OF MATHEMATICS			
Course Code	23UMTFC11	L	P	C
Category	CORE	2	-	2
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To bridge the gap and facilitate transition from higher secondary to tertiary education➤ To instill confidence among stakeholders and inculcate interest for Mathematics				
UNIT - I Algebra				6
Binomial theorem, General term, middle term, problems based on these concepts				
UNIT - II Algebra				6
Sequences and series (Progressions). Fundamental principle of counting. Factorial n.				
UNIT - III Algebra				6
Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.				
UNIT - IV Trigonometry				6
Introduction to trigonometric ratios, proof of $\sin(A+B)$, $\cos(A+B)$, $\tan(A+B)$ formulae, multiple and sub multiple angles, $\sin(2A)$, $\cos(2A)$, $\tan(2A)$ etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule				
UNIT - V Calculus				6
Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.				
Total Lecture Hours				30
BOOKS FOR STUDY:				
<ul style="list-style-type: none">➤ NCERT class XI and XII text books.➤ Any State Board Mathematics text books of class XI and XII				
BOOKS FOR REFERENCES:				
<ul style="list-style-type: none">➤ State Board Mathematics text books of class X➤ State Board Mathematics text books of class IX➤ NCERT class IX and X text books.				
WEB RESOURCES:				
<ul style="list-style-type: none">❖ https://www.mathwarehouse.com/❖ https://www.mathhelp.com/❖ https://www.mathsisfun.com/				

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL	REGIONAL		✓	NATIONAL		GLOBAL	
Changes Made in the Course	Percentage of Change		No Changes Made			New Course		✓
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.								

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems	K1 to K2
CO2	Find the various sequences and series and solve the problems related to them. Explain the principle of counting.	K1 to K2
CO3	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations	K1 to K
CO4	Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.	K1 to K2
CO5	Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.	K1 to K2

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	1	1	1	1	1				
CO2	2	1	1	2	2	1				
CO3	2	1	1	2	2	1				
CO4	1	1	1	1	1	1				
CO5	1	1	1	1	1	1				
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:					
COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE	3	2	1		

OF COURSE CONTRIBUTION TO POS						
UNIT	FUNDAMENTALS OF MATHEMATICS				HRS	PEDAGOGY
I	Binomial theorem, General term, middle term, problems based on these concepts				6	Chalk & Talk
II	Sequences and series (Progressions). Fundamental principle of counting. Factorial n.				6	Chalk & Talk
III	Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.				6	Chalk & Talk
IV	Introduction to trigonometric ratios, proof of $\sin(A+B)$, $\cos(A+B)$, $\tan(A+B)$ formulae, multiple and sub multiple angles, $\sin(2A)$, $\cos(2A)$, $\tan(2A)$ etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule				6	Chalk & Talk
V	Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.				6	Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	Cos	K Level	Section A	
			MCQs	
			No. of Questions	K - Level
CI AI	CO1	K1 – K2	25	K1,K2
	CO2	K1 – K2	25	K1,K2
CI AII	CO3	K1 – K2	25	K1,K2
	CO4	K1 – K2	25	K1,K2
Question Pattern CIA I & II		No. of Questions to be asked	50	
		No. of Questions to be answered	50	
		Marks for each question	1	
		Total Marks for each section	50	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

SECOND SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ANALYTICAL GEOMETRY (TWO & THREE DIMENSIONS)			
Course Code	23UMTCC21	L	P	C
Category	CORE	5	-	5
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes.➤ To present mathematical arguments about geometric relationships.➤ To solve real world problems on geometry and its applications.				
UNIT – I				15
Pole, Polar - conjugate points and conjugate lines – diameters – conjugate diameters of an ellipse - semi diameters- conjugate diameters of hyperbola.				
UNIT – II				15
Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola				
UNIT - III				15
The Plane-Angle between two planes -Length of the perpendicular–Bisecting planes- Distance between two planes.				
UNIT – IV				15
The Straight line–angle between a line and a plane – co – planar lines–shortest distance between two skew lines –length of the perpendicular.				
UNIT - V				15
Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle- tangent plane-angle of intersection of two spheres- condition for the orthogonality.				
Total Lecture Hours				75

BOOKS FOR STUDY:

- **Analytical Geometry (Two Dimensional)** by P.Durai Pandian, Laxmi Duraipandian, D.Muhilan.
- **Analytical Geometry (Three Dimensions) and Vector Calculus** by Dr.S.Arumugam and Issac.

Unit I – Text Book 1: Chapter 6: Sections 6.9,6.10,6.13
Chapter 7: Sections 7.3,7.4

Unit II- Text book 1: Chapter 9: Sections 9.1& 9.3 to 9.8

Unit III – Text book 2- Chapter 2 (full)

Unit IV – Textbook 2: Chapter 3: Sections 3.1 & 3.2

Unit V – Text book 2: Chapter 4 (full)

BOOKS FOR REFERENCES:

- S. L. Loney, Co-ordinate Geometry.
- Robert J. T. Bell, Co-ordinate Geometry of Three Dimensions.
- William F. Osgood and William C. Graustein, Plane and Solid Analytic Geometry, Macmillan Company, New York, 2016. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
- Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961.
- Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010.
- William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006.
- John F. Randolph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969.
- Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962

WEB RESOURCES:

- ❖ <https://nptel.ac.in>
- ❖ <https://www.mathwarehouse.com/>
- ❖ <https://www.mathhelp.com/>
- ❖ <https://www.mathsisfun.com/>

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRENEURSHIP
Curriculum Relevance	LOCAL	REGIONAL	NATIONAL	✓ GLOBAL
Changes Made in the Course	Percentage of Change	40	No Changes Made	New Course
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.				

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:		
CO1	Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola	K1 to K4
CO2	Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola	K1 to K4
CO3	Explain in detail the system of Planes	K1 to K4
CO4	Explain in detail the system of Straight lines	K1 to K4
CO5	Explain in detail the system of Spheres	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	2	1	-	-				
CO2	2	2	2	1	-	-				
CO3	3	2	2	1	-	-				
CO4	3	2	3	1	-	-				
CO5	3	2	3	1	-	-				

S- STRONG

M - MEDIUM

L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:

UNIT	ANALYTICAL GEOMETRY (Two & Three Dimensions)	HRS	PEDAGOGY
I	Pole, Polar - conjugate points and conjugate lines – diameters – conjugate diameters of an ellipse - semi diameters- conjugate diameters of hyperbola.	15	Chalk & Talk
II	Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola.	15	Chalk & Talk
III	The Plane-Angle between two planes -Length of the perpendicular– Bisecting planes- Distance between two planes.	15	Chalk & Talk
IV	The Straight line–angle between a line and a plane – co – planar lines– shortest distance between two skew lines –length of the perpendicular.	15	Chalk & Talk
V	Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle- tangent plane- angle of intersection of two spheres- condition for the orthogonality.	15	Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level

K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
				(10 x 1 = 10 Marks)	
1.	Unit - I	CO1	K1	a)	b)
				c)	d)
2.	Unit - I	CO1	K2	a)	b)
				c)	d)
3.	Unit - II	CO2	K1	a)	b)
				c)	d)
4.	Unit - II	CO2	K2	a)	b)
				c)	d)
5.	Unit - III	CO3	K1	a)	b)
				c)	d)
6.	Unit - III	CO3	K2	a)	b)
				c)	d)
7.	Unit - IV	CO4	K1	a)	b)
				c)	d)
8.	Unit - IV	CO4	K2	a)	b)
				c)	d)
9.	Unit - V	CO5	K1	a)	b)
				c)	d)
10.	Unit - V	CO5	K2	a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	INTEGRAL CALCULUS			
Course Code	23UMTCC22	L	P	C
Category	CORE	4	-	4
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals.➤ Knowledge about Beta and Gamma functions and their applications.➤ Skills to Determine Fourier series expansions.				
UNIT – I				12
Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula.				
UNIT – II				12
Multiple Integrals - definition of double integrals - evaluation of double integrals- Changing of order of integration – double integrals in polar coordinates.				
UNIT - III				12
Triple integrals –applications of multiple integrals - volumes of solids of revolution - volumes of solids of revolution as double integrals- volume as a triple integral–change of variables – Jacobian.				
UNIT – IV				12
Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions.				
UNIT – V				12
Geometric and Physical Applications of Integral calculus.				
Total Lecture Hours				60

BOOKS FOR STUDY:

- Narayanan. S and Manickavasagam Pillai. T.K, **Calculus Volume II** , (2015)

Unit I : Chapter 1 : Sections 13.1 to 13.10 and 15.1

Unit II : Chapter 5: Sections 2.1 & 2.2 and 3.1 & 3.2

Unit III: Chapter 5 : Sections 4 & 5.1 to 5.4 and 6.1 to 6.3

Chapter 6: Sections 1.1 & 1.2

Unit IV : Chapter 7: Sections 1.1 to 1.5 and 2.1 to 2.3 and 3 & 4

Unit V: Chapter 2: Sections 1.1 to 1.4 and 2.1 only

BOOKS FOR REFERENCES:

- Bali. N. P, **Integral Calculus**, Laxmi Publications, (1991), Delhi.
- Arumugam. S and Isaac, **Calculus**, New Gamma Publishing House, 2008, Palayamkottai.
- George B.Thomas, Maurice D.Weir and Joel Hass **Calculus** 12th Edition, Pearson Education, 2015.
- H. Anton, I. Birens and S. Davis, **Calculus**, John Wiley and Sons, Inc., 2002.
- **G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.**
- **D. Chatterjee, Integral Calculus and Differential Equations, Tata-McGraw Hill Publishing Company Ltd.**
- P. Dyke, **An Introduction to Laplace Transforms and Fourier Series**, Springer Undergraduate Mathematics Series, 2001 (second edition).

WEB RESOURCES:

- ❖ <https://nptel.ac.in>
- ❖ <https://www.mathwarehouse.com/>
- ❖ <https://www.mathhelp.com/>
- ❖ <https://www.mathsisfun.com/>

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL	✓	NATIONAL	GLOBAL
Changes Made in the Course	Percentage of Change	40	No Changes Made		New Course	

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae	K1 to K4
CO2	Evaluate double and triple integrals and problems using change of order of integration	K1 to K4
CO3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution	K1 to K4
CO4	Explain beta and gamma functions and to use them in solving problems of integration	K1 to K4
CO5	Explain Geometric and Physical applications of integral calculus	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	-	-	-				
CO2	3	1	3	-	-	-				
CO3	3	1	3	-	-	-				
CO4	3	1	3	-	-	-				
CO5	3	1	3	-	2	1				
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:					
COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:			
UNIT	INTEGRAL CALCULUS	HRS	PEDAGOGY
I	Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula.	12	Chalk & Talk
II	Multiple Integrals - definition of double integrals - evaluation of double integrals- Changing of order of integration – double integrals in polar coordinates.	12	Chalk & Talk
III	Triple integrals –applications of multiple integrals - volumes of solids of revolution - volumes of solids of revolution as double integrals- volume	12	Chalk &

	as a triple integral–change of variables – Jacobian.		Talk
IV	Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions.	12	Chalk & Talk
V	Geometric and Physical Applications of Integral calculus.	12	Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level

K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
				(10 x 1 = 10 Marks)	
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)



PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ALLIED PHYSICS – II			
Course Code	23UPHEA21	L	P	C
Category	ALLIED PAPER	3	-	3
COURSE OBJECTIVES:				
➤ To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.				
UNIT - I	OPTICS			09
Interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster’s law – optical activity				
UNIT - II	ATOMIC PHYSICS			09
Atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli’s exclusion principle – electronic configuration – periodic classification of elements – photo electric effect – Einstein’s photoelectric equation				
UNIT - III	NUCLEAR PHYSICS			09
Nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses – controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor				
UNIT - IV	INTRODUCTION TO RELATIVITY			09
Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence				
UNIT - V	SEMICONDUCTOR PHYSICS			09
p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment)				
Total Lecture Hours				45

BOOKS FOR STUDY:

- R.Murugesan (2005), Allied Physics, S.Chand & Co, New Delhi.
- K.Thangaraj and D.Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.
- Brijlal and N.Subramanyam (2002), Text book of Optics, S.Chand & Co, New Delhi.
- R.Murugesan (2005), Modern Physics, S.Chand & Co, New Delhi.
- A.Subramaniyam, Applied Electronics, 2nd Edn., National Publishing Co., Chennai.

BOOKS FOR REFERENCES:

- Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore.
- D.R.Khanna and H.R. Gulati (1979). Optics, S.Chand & Co. Ltd., New Delhi.
- A.Beiser (1997), Concepts of Modern Physics, Tata McGraw Hill Publication, New Delhi.
- Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, New Delhi.
- V.K.Metha (2004), Principles of electronics, 6th Edn. , S.Chand and Company, New Delhi.

WEB RESOURCES:

- ❖ <https://www.berkshire.com/learningcenter/deltapfacemask/><https://www.youtube.com/watch?v=QrhxU47gtj4>https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo
- ❖ <https://www.youtube.com/watch?v=JrRrp5F-Qu4>
- ❖ <https://www.validyne.com/blog/leak-test-using-pressure-transducers/>
- ❖ <https://www.atoptics.co.uk/atoptics/blsky.htm> -
- ❖ <https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		85	No Changes Made		New Course		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Explain the concepts of interference, diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns	K1 to K4
CO2	Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Relate the importance of interpreting improving theoretical models based on observation. Appreciate inter disciplinary nature of science and in solar energy related applications.	K1 to K4
CO3	Summarize the properties of nuclei, nuclear forces, structure of atomic nucleus and nuclear models. Solve problems on decay rate half-life and mean-life. Interpret nuclear processes like fission and fusion.	K1 to K4
CO4	To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa.	K1 to K4
CO5	Summarize the working of semiconductor devices like junction diode, Zener diode and power supplies that are practically used in daily life	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	2	3	2	2	3	2	3
CO2	2	3	3	3	2	2	3	2	3	3
CO3	3	2	3	2	3	3	2	3	3	3
CO4	3	3	3	3	3	2	3	2	2	2
CO5	2	2	3	3	2	3	3	3	3	2
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:					
COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	1	3	-	2
CO 2	3	1	3	-	2
CO 3	3	1	3	-	2
CO 4	3	1	3	-	2
CO 5	3	1	3	-	2
WEITAGE					
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS					

LESSON PLAN:

UNIT	ALLIED PHYSICS –II	HRS	PEDAGOGY
I	Interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster’s law – optical activity	9	Lecture method, PPT, Demonstration
II	Atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli’s exclusion principle – electronic configuration – periodic classification of elements – photo electric effect – Einstein’s photoelectric equation	9	Lecture method, PPT, Demonstration
III	Nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses – controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor	9	Lecture method, PPT, Demonstration
IV	Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence	9	Lecture method, PPT, Demonstration
V	p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment)	9	Lecture method, PPT, Demonstration

**Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)**

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1, K2	K1 OR K1	K3 OR K3
AI	CO2	K1 – K4	2	K1,K2	K2 OR K2	K4 OR K4
CI	CO3	K1 – K4	2	K1, K2	K2 OR K2	K3 OR K3
AII	CO4	K1 – K4	2	K1,K2	K3 OR K3	K4 OR K4
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2	10	-	12	21.43	-
	K2	2	10	-	12	21.43	
	K3	-	-	16	16	28.57	42.86
	K4	-	-	16	16	28.57	71.43
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.57	-
	K2	2	10		12	21.43	
	K3		10	16	26	46.43	25.00
	K4			16	16	28.57	71.43
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1, K2	2	K1, K2	K1, K1	K2, K2
2	CO2	K1, K2	2	K1, K2	K2, K2	K2, K2
3	CO3	K1, K2	2	K1, K2	K2, K2	K3, K3
4	CO4	K1, K2	2	K1, K2	K3, K3	K3, K3
5	CO5	K1, K2	2	K1, K2	K4, K4	K4, K4
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level

K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	10		15	10.72	-
K2	5	20	32	57	40.71	51.43
K3		10	32	42	30.00	30.00
K4		10	16	26	18.57	18.57
Marks	10	50	80	140	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions			PART – A		(10 x 1 = 10 Marks)
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K1		
OR					
11. b)	Unit - I	CO1	K1		
12. a)	Unit - II	CO2	K2		
OR					
12. b)	Unit - II	CO2	K2		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K4		
OR					
15. b)	Unit - V	CO5	K4		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K2		
OR					
16. b)	Unit - I	CO1	K2		
17. a)	Unit - II	CO2	K2		
OR					
17. b)	Unit - II	CO2	K2		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K3		
OR					
19. b)	Unit - IV	CO4	K3		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ALLIED PHYSICS PRACTICALS – II			
Course Code	23UPHEP21	L	P	C
Category	ALLIED PRACTICAL	-	2	2

COURSE OBJECTIVES:

- Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

SEMESTER - I LIST OF EXPERIMENTS 30

Minimum of Eight Experiments from the list:

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Wavelength of mercury lines using spectrometer and grating
4. Refractive index of material of the lens by minimum deviation
5. Refractive index of liquid using liquid prism
6. Determination of AC frequency using sonometer
7. Specific resistance of a wire using PO box
8. Thermal conductivity of poor conductor using Lee's disc
9. Determination of figure of merit table galvanometer
10. Determination of Earth's magnetic field using field along the axis of a coil
11. Characterisation of Zener diode
12. Construction of Zener/IC regulated power supply
13. Construction of AND, OR, NOT gates using diodes and transistor
14. NOR gate as a universal building block

Note : Use of digital balance permitted

Total Lecture Hours 30

BOOKS FOR STUDY:

- Srinivasan.M.N., Balasubramanian.S., Ranganathan.R., A Text Book of Practical Physics, 2017 Edition, Sultan Chand & Sons

BOOKS FOR REFERENCES:

- Ouseph.C., Practical Physics and Electronics, 2013, S.Viswanathan.P.Ltd.
- Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers (2007)

WEB RESOURCES:

- ❖ [https://nptel.ac.in/course.html/physics/experimental physics I, II and III](https://nptel.ac.in/course.html/physics/experimental%20physics%20I,%20II%20and%20III)
- ❖ <https://nptel.ac.in/courses/115/105/115105110/>
- ❖ https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLoFRX7n8z4tHYK

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL	REGIONAL		NATIONAL		GLOBAL		✓
Changes Made in the Course	Percentage of Change		70	No Changes Made		New Course		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:

CO1	Remembering the Aim and apparatus used in the experiment	K1
CO2	Understanding of laws and formulas of the experiment	K2
CO3	Applying the knowledge to do the experiment	K4
CO4	Calculating and examining the aim of the experiment	K3
CO5	Interpreting the result of the experiment	K2

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	1	2	3	3	3	1	3
CO2	3	3	2	2	2	3	3	3	1	3
CO3	3	3	3	3	3	3	3	3	2	3
CO4	3	3	2	3	3	3	3	3	1	3
CO5	3	3	2	2	2	3	3	3	1	3
3 - STRONG			2 - MEDIUM				1 - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	3	-	2
CO 2	3	2	3	-	2
CO 3	3	2	3	-	2
CO 4	3	2	3	-	2
CO 5	3	2	3	-	2
WEITAGE					
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS					

LESSON PLAN:

SEM	ALLIED PHYSICS PRACTICALS – II	HRS	PEDAGOGY
I	1. Radius of curvature of lens by forming Newton’s rings 2. Wavelength of mercury lines using spectrometer and grating 3. Determination of AC frequency using sonometer 4. Thermal conductivity of poor conductor using Lee’s disc 5. Determination of figure of merit table galvanometer 6. Characterisation of Zener diode 7. Construction of Zener regulated power supply 8. NOR gate as a universal building block	30	Demonstration and Video

**Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)**

Internal	Cos	K Level	No. of. Questions	K - Level
CIA-I	CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
Question Pattern CIA - I		No. of Questions to be asked	1 Question for Each Student	
		No. of Questions to be answered	1	
		Marks for each question	30	
		Total Marks for each section	30	

Distribution of Marks with COs & K Level for Correction of CIA I

	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	2.0
	CO2	Formula and Tabular Column	K2	5
	CO3	Understanding and Observation	K4	12.0
	CO4	Calculation and Graph	K3	8.0
	CO5	Interpretation of result	K2	3.0
	Total Marks			30

Distribution of Marks with K Level CIA I					
	K Level	Distribution of the work of the experiment	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	Aim and apparatus	2	6.66	-
	K2	Formula and Tabular Column Interpretation of result	8	26.67	
	K3	Understanding and Observation	8	26.67	33.33
	K4	Calculation and Graph	12	40.00	60.00
	Marks		30	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)			
COs	K - Level	No. of Questions	K – Level
CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
No. of Questions to be Asked		1 Question for Each Student	
No. of Questions to be answered		1	
Marks for each question		60	
Total Marks for each section		60	
(Figures in parenthesis denotes, questions should be asked with the given K level)			

Distribution of Marks with COs & K Level for Correction of the Summative Exam			
COs	Distribution of the work of the experiment	K - Level	MARKS
CO1	Aim and apparatus	K1	5
CO2	Formula and Tabular Column	K2	10
CO3	Understanding and Observation	K4	25
CO4	Calculation and Graph	K3	15
CO5	Interpretation of result	K2	5
Total Marks			60

Distribution of Marks with K Level

K Level	Parameters for K-Level	Total Marks	% of (Marks without choice)	Consolidated %
K1	Aim and apparatus	5	8.33	-
K2	Formula and Tabular Column, Interpretation of result	15	25.00	8.33
K3	Understanding and Observation	25	41.67	33.33
K4	Calculation and Graph	15	25.00	75.00
Marks		60	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	MATHEMATICS FOR COMPETITIVE EXAMINATION - II			
Course Code	23UMTNM21	L	P	C
Category	NON MAJOR ELECTIVE	2	-	2
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To improve the ability to face the competitive examinations➤ To identify the exact method to problems➤ To apply the concepts in Competitive Examinations.➤ To familiarize the concepts of HCF, LCM, Calendar, Rules of alligation.➤ To identify verbal and non – verbal problems				
UNIT – I				6
Finding LCM, HCF – Problems on decimals and fractions.				
UNIT – II				6
Problems relating relation between the ages.				
UNIT - III				6
Alligation – Mean price - Rule of alligation.				
UNIT – IV				6
Calendar – Leap Year – Non Leap Year – Number of Days between Dates				
UNIT - V				6
Non Verbal Reasoning – Completion of Figures – Completion of Series.				
Total Lecture Hours				30
BOOKS FOR STUDY:				
<ul style="list-style-type: none">➤ Text Material will be supplied by the Department				
BOOKS FOR REFERENCES:				
<ul style="list-style-type: none">➤ Aggarwal. R.S, Quantitative Aptitude for Competitive Examinations, S.Chand and Company Ltd, Reprint 2011, New Delhi.➤ AbhigitGuha, Quantitative Aptitude, fourth edition, Tata MCGraw Hill Publication, 2011, New Delhi.➤ BS Sijwali, Indu Sijwali, Non -Verbal Reasoning, Arihant Publications (India) LTD., New Delhi				
WEB RESOURCES:				
<ul style="list-style-type: none">❖ https://www.mathwarehouse.com/❖ https://www.mathhelp.com/❖ https://www.mathsisfun.com/				

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL	✓	NATIONAL	GLOBAL
Changes Made in the Course	Percentage of Change		No Changes Made		✓	New Course
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.						

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:		
CO1	Explain the LCM, HCF and Decimal values	K1 to K2
CO2	Under the relation and concept of ages	K1 to K2
CO3	Recall the rules of allegation	K1 to K2
CO4	Illustrate the concepts related to calendar	K1 to K2
CO5	Classify the non-verbal reasoning problems	K1 to K2

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	3	3	3	3				
CO2	2	3	2	3	2	3				
CO3	3	2	3	2	3	3				
CO4	3	2	3	2	2	3				
CO5	2	3	3	3	2	2				

S - STRONG

M - MEDIUM

L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:

UNIT	MATHEMATICS FOR COMPETITIVE EXAMINATION- II	HRS	PEDAGOGY
I	LCM, HCF, Decimals	6	Chalk & Talk
II	Relation between ages	6	Chalk & Talk
III	Alligation – Mean price - Rule of alligation.	6	Chalk & Talk
IV	Calendar – Leap Year – Non Leap Year – Number of Days between Dates	6	Chalk & Talk
V	Non Verbal Reasoning – Completion of Figures – Completion of Series.	6	Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	Cos	K Level	Section A	
			MCQs	
			No. of. Questions	K - Level
CI	CO1	K1 – K2	25	K1,K2
AI	CO2	K1 – K2	25	K1,K2
CI	CO3	K1 – K2	25	K1,K2
AII	CO4	K1 – K2	25	K1,K2
Question Pattern CIA I & II		No. of Questions to be asked	50	
		No. of Questions to be answered	50	
		Marks for each question	1	
		Total Marks for each section	50	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	OFFICE AUTOMATION - LAB			
Course Code	23UMTSP21	L	P	C
Category	SKILL PRACTICAL	-	2	2

COURSE OBJECTIVES:

- To improve the employability skill
- To present mathematical concepts in seminar / conference
- To document project works
- To prepare various type of charts for the given data
- To familiarize the office automation tools

List of Programs

1. Type a meaningful message in word document. Give a title for the passage and format the same as per the specification given below:
 - Insert date and time, Title should be in Bold, italics, underlined
 - Font size, style, Line spacing should be doubled
 - Set left margin to 1.5, right margin to 1.75
 - Apply border to the passage
2. Prepare a timetable using Table Auto format in MS Word.
3. Prepare a bio-data in MS Word using wizard.
4. Design an invitation with two column break, use word to insert picture, design border and shading
5. Using mail merge prepare an interview call letter.
6. Create a Student Mark Statement in MS Excel and calculate total, average and percentage using Auto sum.
7. Create a yearly budget of a company and create different types of chart for the data.
8. Create a slide show using blank presentation with at least 20 slides.
9. Present the college details or any publishing work using Auto content wizard.
10. Create a Seminar presentation using insert picture and sound.

BOOKS FOR STUDY:

- C.Nellai Kannan, **MS Office**, Nels Publications, 3rd edition, Tirunelveli, 2004.

BOOKS FOR REFERENCES:

- Sanjay Saxena, **A First course in Computers**, Vikas Publishing House Pvt Ltd Edition, New Delhi, 2003.
- Vikas Gupta, **Comdex Computer Course Kit**, Dream Tech Press Edition, New Delhi, 2003.
- WEBSITE : <https://www.free-computer-tutorials.net/word-2007.html>

WEB RESOURCES:

- ❖ <https://www.youtube.com/watch/yCVy5Kw0l8s>
- ❖ <https://edu.gcfglobal.org/en/subjects/office/>

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL	REGIONAL	✓	NATIONAL		GLOBAL	
Changes Made in the Course	Percentage of Change		No Changes Made			New Course	✓

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	have the basic knowledge of Microsoft Office	K1 to K4
CO2	Improve the capability on DTP process.	K1 to K4
CO3	Encourage the mail merge and sorting process.	K1 to K4
CO4	have knowledge of charts and functions	K1 to K4
CO5	Create a PowerPoint presentation.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	2	3				
CO2	2	2	2	3	3	2				
CO3	2	2	2	2	2	2				
CO4	3	2	3	1	2	1				
CO5	1	2	2	2	1	2				

S- STRONG**M - MEDIUM****L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:

UNIT	MS OFFICE	HRS	PEDAGOGY
	<ol style="list-style-type: none"> Type a meaningful message in word document. Give a title for the passage and format the same as per the specification given below: <ul style="list-style-type: none"> Insert date and time, Title should be in Bold, italics, underlined Font size, style, Line spacing should be doubled Set left margin to 1.5, right margin to 1.75 Apply border to the passage Prepare a timetable using Table Auto format in MS Word. Prepare a bio-data in MS Word using wizard. Design an invitation with two column break, use word to insert picture, design border and shading Using mail merge prepare an interview call letter. Create a Student Mark Statement in MS Excel and calculate total, average and percentage Using Auto sum. Create a yearly budget of a company and create different types of chart for the data. Create a slide show using blank presentation with at least 20 slides. Present the college details or any publishing work using Auto content wizard. Create a Seminar presentation using insert picture and sound. 	30	Demonstration and Video

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	Cos	K Level	No. of Questions	K - Level
CIA I	CO1- CO5	K1 – K4	2 Question for Each Student	K1-K4
Question Pattern CIA I		No. of Questions to be asked	2 Question for Each Student	
		No. of Questions to be answered	2	
		Marks for each question		
		Total Marks for each section		

Distribution of Marks with K Level CIA I									
	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
CIA I	K1	5					5	20	20
	K2		5				5	20	20
	K3			5			5	20	20
	K4				5	5	10	40	40
	Marks						25	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			2	
No. of Questions to be answered			2	
Marks for each question			36.5	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

B.Sc., MATHEMATICS

Syllabus

Program Code: UMT

2023 - Onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with “A” Grade by NAAC

PASUMALAI, MADURAI – 625 004

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS),

MADURAI – 625 004

B.SC MATHEMATICS CURRICULUM

(For the students admitted from the academic year 2023-2024 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
THIRD SEMESTER						
Part – I	Tamil / Alternative course					
23UTAGT31	தமிழக வரலாறும் பண்பாடும்	6	3	25	75	100
Part – II	English					
23UENGE31	GENERAL ENGLISH - III	6	3	25	75	100
Part - III	Core courses					
23UMTCC31	VECTOR CALCULUS AND APPLICATIONS	5	5	25	75	100
23UMTCC32	DIFFERENTIAL EQUATIONS AND APPLICATIONS	5	5	25	75	100
Part - III	Elective course					
23UMTEC31	MATHEMATICAL STATISTICS	4	3	25	75	100
Part - IV	Skill Based courses					
23UMTSP31	WEB DESIGNING	1	1	25	75	100
23UMTSP32	DATA ANALYSIS USING SPSS (LAB)	2	2	25	75	100
Part - IV	Mandatory course					
23UEVSG41	ENVIRONMENTAL STUDIES	1	-	-	-	-
Total		30	22	175	525	700
FOURTH SEMESTER						
Part – I	Tamil / Alternative course					
23UTAGT41	தமிழும் அறிவியலும்	6	3	25	75	100
Part – II	English					
23UENGE41	GENERAL ENGLISH - IV	6	3	25	75	100
Part - III	Core courses					
23UMTCC41	INDUSTRIAL STATISTICS	6	6	25	75	100
23UMTCC42	ELEMENTS OF MATHEMATICAL ANALYSIS	4	4	25	75	100
Part - III	Elective course					
23UMTEC41	TRANSFORMATION TECHNIQUES	3	3	25	75	100
Part - IV	Skill Based courses					
23UMTSC41	INTRODUCTION TO DATA SCIENCE	2	2	25	75	100
23UMTSP41	PROGRAMMING IN C++ (LAB)	2	1	25	75	100
Part - IV	Mandatory course					
23UEVSG41	ENVIRONMENTAL STUDIES	1	2	25	75	100
Total		30	24	200	600	800

THIRD SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	VECTOR CALCULUS AND APPLICATIONS			
Course Code	23UMTCC31	L	P	C
Category	CORE	5	-	5
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Knowledge about differentiation of vectors and on differential operators.➤ Knowledge about derivatives of vector functions.➤ Skills in evaluating line, surface and volume integrals.➤ The ability to analyze the physical applications of derivatives of vectors.				
UNIT - I				15
Vector point function - Scalar point function – Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product.				
UNIT - II				15
The vector operator ‘del’, The gradient of a scalar point function - Divergence of a vector - Curl of a vector – solenoidal and irrotational vectors – simple applications.				
UNIT - III				15
Laplacian operator, Vector identities - Line integral - simple problems.				
UNIT - IV				15
Surface integral - Volume integral – Applications.				
UNIT - V				15
Gauss divergence Theorem, Stoke’s Theorem, Green’s Theorem in two dimensions – Applications to real life situations.				
Total Lecture Hours				75

BOOKS FOR STUDY:

- Vector Analysis by P. Duraipandian and Kayalal Pachaiyappa-S.Chand Publication

UNIT-I : Chapter 2 sections 2.1 to 2.3

UNIT-II Chapter 2 sections 2.4 to 2.7

UNIT-III: Chapter 2 sections 2.9 to 2.13 Chapter 3 sections 3.1 to 3.4

UNIT-IV : Chapter 3 Sections 3.5 to 3.7

UNIT-V: Chapter 4 sections 4.1 to 4.5

BOOKS FOR REFERENCES:

- J.C. Susan ,Vector Calculus, , (4th Edn.) Pearson Education, Boston, 2012.
- A. Gorguis, Vector Calculus for College Students, Xilbius Corporation, 2014.
- J.E. Marsden and A. Tromba ,Vector Calculus, , (5thedn.) W.H.Freeman, New York, 1988.

WEB RESOURCES:

- ❖ <https://nptel.ac.in>
- ❖ <https://www.mathwarehouse.com/>
- ❖ <https://www.mathhelp.com/>
- ❖ <https://www.mathsisfun.com/>

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓ GLOBAL
Changes Made in the Course	Percentage of Change		No Changes Made		✓	New Course

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:

CO1	Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products	K1 to K4
CO2	Applications of the operator ‘del’ and to Explain solenoidal and ir-rotational vectors	K1 to K4
CO3	Solve simple line integrals	K1 to K4
CO4	Solve surface integrals and volume integrals	K1 to K4
CO5	Verify the theorems of Gauss, Stoke’s and Green’s Two Dimension)	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
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CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-				
CO2	3	2	3	1	2	-				
CO3	3	3	3	3	-	-				
CO4	3	3	3	3	-	-				
CO5	3	3	3	3	2	-				

S- STRONG

M – MEDIUM

L - LOW

CO / PO MAPPING:					
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:			
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UNIT	VECTOR CALCULUS AND APPLICATIONS	HRS	PEDAGOGY
I	Vector point function - Scalar point function – Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product.	15	Chalk & Talk
II	The vector operator ‘del’, The gradient of a scalar point function - Divergence of a vector - Curl of a vector – solenoidal and irrotational vectors – simple applications.	15	Chalk & Talk

III	Laplacian operator, Vector identities - Line integral - simple problems.	15	Chalk & Talk, PPT
IV	Surface integral - Volume integral – Applications.	15	Chalk & Talk
V	Gauss divergence Theorem, Stoke’s Theorem, Green’s Theorem in two dimensions – Applications to real life situations.	15	Seminar

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	
	K4			16	16	28.6	
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
(10 x 1 = 10 Marks)					
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	DIFFERENTIAL EQUATIONS AND APPLICATIONS			
Course Code	23UMTCC32	L	P	C
Category	CORE	5	-	5
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Knowledge about the methods of solving Ordinary and Partial Differential Equations.➤ The understanding of how Differential Equations can be used as a powerful tool in solving problems in science.				
UNIT - I				15
Ordinary Differential Equations: Variable separable -Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation - Bernoulli's Equation-Exact differential equations.				
UNIT - II				15
Equation of first order but not of higher degree: Equation solvable for dy/dx - Equation solvable for y - Equation solvable for x - Clairauts' form - Linear Equations with constant coefficients-Particular integrals of algebraic, exponential, trigonometric functions and their products – Linear Equations with variable coefficients.				
UNIT - III				15
Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals-Reduction to the Normal form-Change of the Independent Variable-Method of Variation of Parameters.				
UNIT - IV				15
Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral-General integral-Lagrange's Linear Equations –Simple Applications.				
UNIT - V				15
Special methods – Standard forms-Charpit's Methods –Simple Applications				
Total Lecture Hours				75

BOOKS FOR STUDY:

- S. Narayanan and T.K. Manickavachagom Pillay, Differential Equations and Its Applications, S. Viswanathan Publishers Pvt. Ltd. 2006

UNIT-I : Chapter 2 Sections 1 – 6

UNIT-II: Chapter 4 Sections 1, 2.1, 2.2,3.1, Chapter 5 Section 4, 5

UNIT-III: Chapter 6 Section 6, Chapter 8 Sections 1 – 4

UNIT-IV : Chapter 12 Sections 1, 2, 3 and 4

UNIT-V: Chapter 12 Sections 5 and 6

BOOKS FOR REFERENCES:

- Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
- G.F. Simmons, Differential equations with applications and historical notes, 2ndEd, Tata Mcgraw Hill Publications, 1991.
- H.T. H. Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi,1985.
- Horst R. Beyer, Calculus and Analysis, Wiley, 2010.
- 5. Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer- Verlag, New York. 1983.

WEB RESOURCES:

- ❖ <https://nptel.ac.in>
- ❖ <https://www.mathwarehouse.com/>
- ❖ <https://www.mathhelp.com/>
- ❖ <https://www.mathsisfun.com/>

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓ GLOBAL
Changes Made in the Course	Percentage of Change	40	No Changes Made		New Course	

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:

CO1	Determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations	K1 to K4
CO2	Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products	K1 to K4
CO3	Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters	K1 to K4
CO4	Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations	K1 to K4
CO5	Explain standard forms and Solve Differential equations using Charpit's method	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
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CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	1	-				
CO2	3	1	3	2	1	-				
CO3	3	1	3	2	1	-				
CO4	3	1	3	2	2	1				
CO5	3	1	3	2	2	1				

S- STRONG

M - MEDIUM

L - LOW

CO / PO MAPPING:					
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:			
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UNIT	DIFFERENTIAL EQUATIONS AND APPLICATIONS	HRS	PEDAGOGY
I	Ordinary Differential Equations: Variable separable -Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation -Bernoulli's Equation- Exact differential equations.	15	Chalk & Talk

II	Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y-Equation solvable for x- Clairauts' form – Linear Equations with constant coefficients- Particular integrals of algebraic, exponential, trigonometric functions and their products.	15	Chalk & Talk
III	Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals- Reduction to the Normal form-Change of the Independent Variable- Method of Variation of Parameters.	15	Chalk & Talk, PPT
IV	Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral- General integral-Lagrange's Linear Equations –Simple Applications.	15	Chalk & Talk
V	Special methods – Standard forms-Charpit's Methods –Simple Applications	15	Seminar

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level

K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
				(10 x 1 = 10 Marks)	
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	MATHEMATICAL STATISTICS			
Course Code	23UMTEC31	L	P	C
Category	CORE ELECTIVE	4	-	3
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To provide an understanding of the fundamental concepts of probability theory and statistical inference.➤ To develop skills in applying probability theory and statistical inference to solve real-world problems.➤ To introduce students to various probability distributions and their applications in statistical inference.➤ To provide a solid foundation for advanced courses in probability theory and statistical interference.				
UNIT - I				12
Probability: Definition of Sample Space – Events – Definition of Probability – Addition and Multiplication laws of probability – independence of events- Conditional Probability – Baye’s theorem –Simple Problems				
UNIT - II				12
Random Variables (Discrete and Continuous) – Distribution Function –Mathematical Expectation –Conditional Expectation and Conditional variance - Moment generating Function- Probability Generating Function – Cumulants – Characteristic Function – Simple Problems.				
UNIT - III				12
Discrete distribution: Binomial, Poisson Continuous distribution: and Normal				
UNIT - IV				12
Sampling distribution & Test of Significance: Sampling - Tests of significance - Null Hypothesis - Tests of significance for large samples.				
UNIT - V				12
Tests of significance for small samples: Using the chi-square distribution - Student’s t-distribution - F-distribution				
Total Lecture Hours				60

BOOKS FOR STUDY:

- V S.C .Gupta & V.K .Kapoor :Fundamentals of Mathematical Statistics ,Sultan & sons

UNIT-I : Chapter 3 - sections 3.8-3.15 & Chapter 4 - sections 4.1 – 4.2

UNIT-II Chapter 5 - sections 5.1 , 5.2 , 5.3, 5.4.1

Chapter 6 – Sections 6.2 , 6.3, 6.9, 7.1

Chapter 7 - sections 7.1, 7.1.2, 7.2, 7.3

UNIT-III: Chapter 8 - sections 8.4, 8.5

Chapter 9 - sections 9.2

UNIT-IV : Chapter 14 sections 14.4, 14.5, 14.6

UNIT-V: Chapter 15 sections 15.1, 15.2

Chapter 16 sections 16.2 - 16.5

BOOKS FOR REFERENCES:

- H.C.Saxena Elementary Statistics, Abhiror Prakashan ,New Delhi ,2008.
- T.Veerarajan, Fundamental of Applied Statistics, Yesdee Publishing Private Limited ,2017.
- Kapoor, Mathematical statistics, second edition, Delhi Pusthk Sadan, 1961
- P.R. Vittal, Mathematical Statistics, Margham Publications, Chennai, 2004

WEB RESOURCES:

- ❖ <https://www.zweigmedia.com/RealWorld/Summary7.html>
- ❖ <https://wise.cgu.edu/wp-content/uploads/2015/04/StatWISE1110p.xls>

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		10	No Changes Made			New Course	
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.								

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:

CO1	Define sample space, events, and probability and apply the addition and multiplication laws of probability to calculate probabilities of events.	K1 to K4
CO2	Define random variables, probability density function, cumulative distribution function, and their properties.	K1 to K4
CO3	Understand and apply the Binomial, Poisson, and Normal distributions to solve real-world problems	K1 to K4
CO4	Understand the concept of sampling distribution and apply the Central Limit Theorem to calculate the mean and standard deviation of the sampling distribution.	K1 to K4
CO5	Use the chi-square distribution, Student's t-distribution, and F-distribution to test hypotheses for small samples.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
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CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-				
CO2	3	2	3	1	2	-				
CO3	3	3	3	3	-	-				
CO4	3	3	3	3	-	-				
CO5	3	3	3	3	2	-				

S- STRONG

M – MEDIUM

L - LOW

CO / PO MAPPING:					
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	3	1		
CO 4	3	3	1		
CO 5	3	3	1		
WEIGHTAGE	15	13	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	3	1		

LESSON PLAN:			
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UNIT	MATHEMATICAL STATISTICS	HRS	PEDAGOGY
I	Probability: Definition of Sample Space – Events – Definition of Probability –Addition and Multiplication laws of probability independence of events- Conditional Probability –Baye’s theorem – Simple Problems.	12	Chalk & Talk

II	Random Variables (Discrete and Continuous) – Distribution Function –Mathematical Expectation –Conditional Expectation and Conditional variance - Moment generating Function- Probability Generating Function – Cumulants – Characteristic Function – Simple Problems.	12	Chalk & Talk
III	Discrete distribution: Binomial, Poisson Continuous distribution: and Normal	12	Chalk & Talk, PPT
IV	Sampling distribution & Test of Significance: Sampling - Tests of significance - Null Hypothesis - Tests of significance for large samples.	12	Chalk & Talk
V	Tests of significance for small samples: Using the chi-square distribution - Student's t- distribution - F-distribution	12	Seminar

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level

K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
				(10 x 1 = 10 Marks)	
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	WEB DESIGNING			
Course Code	23UMTSP31	L	P	C
Category	SKILL	-	1	1

COURSE OBJECTIVES:

- Understand the fundamentals of web design and electronic publishing
- Learn how to create lists and nested lists using HTML
- Learn how to create web page layouts and designs using CSS
- Learn how to work with block elements, objects, lists, and tables using CSS.
- Understand the usage of themes, div, span, tables, and frames in web design

List of Programmes

1. Design a page having suitable background colour and text colour with title “My First Web Page” using all the attributes of the Font tag.
2. Create a HTML document giving personal details in proper order using alignment attributes of Paragraph tag.
3. Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.
4. Create a page to show different character formatting tags.
5. Write HTML code to create a Web page with an appropriate image towards the left hand of the page when user clicks on the image another web page should open.
6. Write a HTML code to create a web page with pink color background and display moving message in red colour.
7. Create a web page, showing an ordered & unordered list of names of department in your institution.
8. Create the table in HTML

Total Lecture Hours

15

BOOKS FOR REFERENCES:

- Hirdesh Bharadwaj, Web designing, Paper Back, 2016
- Brain D Miller, Principles of web design, Allworth Publications, 2022.

WEB RESOURCES:

- ❖ <https://digital.com/wp-content/uploads/html-cheat-sheet.pdf>
- ❖ <https://tutorial.techaltum.com/webdesigning.html> - Web Designing Tutorial
- ❖ <https://www.w3schools.com/html/> - HTML tutorial
- ❖ <https://www.w3schools.com/css/default.asp> - CSS Tutorial
- ❖ <https://www.w3schools.com/css/default.asp> - Javascript Tutorial

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	GLOBAL
Changes Made in the Course	Percentage of Change	100	No Changes Made		New Course	✓

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:		
CO1	Students will be able to design and publish their own web pages using HTML	K1 to K4
CO2	Students will be able to define styles using pseudo-elements and link a style sheet to an HTML document	K1 to K4
CO3	Students will be able to create web page layouts and designs using CSS, and style various elements such as background, text, and font	K1 to K4
CO4	Students will be able to design and implement forms and form elements in their web pages	K1 to K4
CO5	Students will be able to create a table	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-				
CO2	3	2	3	1	2	-				
CO3	3	3	3	3	-	-				
CO4	3	3	3	3	-	-				
CO5	3	3	3	3	2	-				

S- STRONG

M – MEDIUM

L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	3	1		
CO 4	3	3	1		
CO 5	3	3	1		
WEIGHTAGE	15	13	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTIO	3	3	1		

LESSON PLAN:

List of Programmes	HRS	PEDAGOGY
<ol style="list-style-type: none"> 1. Design a page having suitable background colour and text colour with title “My First Web Page” using all the attributes of the Font tag. 2. Create a HTML document giving personal details in proper order using alignment attributes of Paragraph tag. 3. Write HTML code to design a page containing some text in a paragraph by giving suitable heading style. 4. Create a page to show different character formatting tags. 5. Write HTML code to create a Web page with an appropriate image towards the left hand of the page when user clicks on the image another web page should open. 6. Write a HTML code to create a web page with pink color background and display moving message in red colour. 7. Create a web page, showing an ordered & unordered list of names of department in your institution. Create the table in HTML 	15	

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	75	100

Internal Assessment : Observation & attendance -10 mark

Model examination - 15 mark

Total CIA - 25 mark

Model examination should be conducted for 30 mark and it has to be converted to 15 mark

Learning Outcome Based Education & Assessment (LOBE)				
Formative Examination - Blue Print				
Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	Cos	K Level	No. of. Questions	K - Level
CIA-I	CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
Question Pattern CIA - I		No. of Questions to be asked	1 Question for Each Student	
		No. of Questions to be answered	1	
		Marks for each question	30	
		Total Marks for each section	30	

Distribution of Marks with COs & K Level for Correction of CIA I				
	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	2.0
	CO3	Short Procedure	K2	10.0
	CO2	Tabulation	K4	8.0
	CO4	Experiment & calculation	K3	5.0
	CO5	Result (nil) (1 mark will be reduced for each 2% deviation) minimum mark 1	K1	5.0
	Total Marks			30

Summative Examination: Duly completed Record: 15 mark

End Semester Exam: 60 marks

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

COs	K - Level	No. of Questions	K – Level
CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
No. of Questions to be Asked		1 Question for Each Student	
No. of Questions to be answered		1	
Marks for each question		60	
Total Marks for each section		60	
(Figures in parenthesis denotes, questions should be asked with the given K level)			

Distribution of Marks with COs & K Level for Correction of CIA I

	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	4.0
	CO3	Short Procedure	K2	20.0
	CO2	Tabulation	K4	16.0
	CO4	Experiment & calculation	K3	10.0
	CO5	Result (nil) (2 mark will be reduced for each 2% deviation) minimum mark 2)	K1	10.0
	Total Marks			60



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	DATA ANALYSIS USING SPSS (LAB)			
Course Code	23UMTSP32	L	P	C
Category	SKILL	-	2	2
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Train the students to gain knowledge in the statistical software (SPSS) packages for problem solving.➤ Introduce the basic functions of SPSS.➤ Train the students for making graphs and diagrams➤ Provide the students with the skills to use SPSS for processing and analysing statistical data sets➤ Train the students to process data and generate outputs.				
List of Programs:				
1. Data Aggregation –Sorting, Selecting cases, Splitting file and Listing Cases.				
2. Frequencies and Descriptive statistics- Measures				
3. Graphs and diagrams: Pie, bar, line and Histogram				
4. Correlation coefficient				
5. Regression Analysis				
6. One sample t-test				
7. Chi square test				
8. ANOVA- One way classification				
Total Lecture Hours				30

BOOKS FOR STUDY:

- **SPSS FOR YOU** – A.Rajathi, P.Chandran – MJP Publishers, 2016
- **Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS** By Ajai S. Gaur & Sanjaya S. Gaur - SAGE Publications India Pvt Ltd.

BOOKS FOR REFERENCES:

- “SPSS in Simple Steps”, Smruti Bulsari, Sanjay Sinha Kiran Pandya, Dreamtech Press, 2011.
- “Statistical Data Analysis: A Practical Guide”, Milan Meloun, Woodhead Publishing India; 1 edition, 2011.
- **A HANDBOOK OF STATISTICAL ANALYSES USING SPSS (DR. BRIJESH AWASTHI)** – Redshine Publication.

WEB RESOURCES:

- ❖ https://med.und.edu/daccota/_files/pdfs/berdc_resource_pdfs/data_analysis_using_spss.pdf
- ❖ https://students.shu.ac.uk/lits/it/documents/pdf/analysing_data_using_spss.pdf
- ❖ <https://www.lboro.ac.uk/media/media/schoolanddepartments/mlsc/downloads/spssand-statistics-guide.pdf> <http://wise.cgu.edu/wp-content/uploads/2014/11/SPSS-Step-by-Step-Regression-Introduction.pdf>
- ❖ <https://www.javatpoint.com/spss> - **SPSS Tutorial**
- ❖ <https://www.open.edu/openlearn/society-politics-law/sociology/getting-started-spss/content-section-0?active-tab=description-tab> - **Free Course SPSS**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL	REGIONAL		NATIONAL		✓	GLOBAL
Changes Made in the Course	Percentage of Change		No Changes Made		✓	New Course	
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.							

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Examine Data Aggregation in SPSS	K1 to K4
CO2	Calculate the statistics measures using SPSS	K1 to K4
CO3	Construct Graphs and diagrams using SPSS	K1 to K4
CO4	Determine correlation coefficient and Regression lines using SPSS	K1 to K4
CO5	Analyse t-Test, Chi square test and ANOVA- One way classification using SPSS	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	2	1	2	2				
CO2	3	2	2	2	2	2				
CO3	3	2	3	1	2	2				
CO4	3	2	2	2	2	2				
CO5	3	2	2	2	2	2				
S- STRONG			M - MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:

List of Programmes	HRS	PEDAGOGY
1. Data Aggregation –Sorting, Selecting cases, Splitting file and Listing Cases. 2. Frequencies and Descriptive statistics- Measures 3. Graphs and diagrams: Pie, bar, line and Histogram 4. Correlation coefficient 5. Regression Analysis 6. One sample t-test 7. Chi square test 8. ANOVA- One way classification	30	

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	75	100

Internal Assessment : Observation & attendance -10 mark

Model examination - 15 mark

Total CIA - 25 mark

Model examination should be conducted for 30 mark and it has to be converted to 15 mark

Learning Outcome Based Education & Assessment (LOBE)				
Formative Examination - Blue Print				
Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	Cos	K Level	No. of. Questions	K - Level
CIA-I	CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
Question Pattern CIA - I		No. of Questions to be asked	1 Question for Each Student	
		No. of Questions to be answered	1	
		Marks for each question	30	
		Total Marks for each section	30	

Distribution of Marks with COs & K Level for Correction of CIA I				
	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	2.0
	CO3	Short Procedure	K2	10.0
	CO2	Tabulation	K4	8.0
	CO4	Experiment & calculation	K3	5.0
	CO5	Result (nil) (1 mark will be reduced for each 2% deviation) minimum mark 1	K1	5.0
	Total Marks			30

Summative Examination: Duly completed Record: 15 mark

End Semester Exam: 60 marks

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

COs	K - Level	No. of Questions	K – Level
CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
No. of Questions to be Asked		1 Question for Each Student	
No. of Questions to be answered		1	
Marks for each question		60	
Total Marks for each section		60	
(Figures in parenthesis denotes, questions should be asked with the given K level)			

Distribution of Marks with COs & K Level for Correction of CIA I

	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	4.0
	CO3	Short Procedure	K2	20.0
	CO2	Tabulation	K4	16.0
	CO4	Experiment & calculation	K3	10.0
	CO5	Result (nil) (2 mark will be reduced for each 2% deviation) minimum mark 2)	K1	10.0
	Total Marks			60

FOURTH SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	INDUSTRIAL STATISTICS			
Course Code	23UMTCC41	L	P	C
Category	CORE	6	-	6
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To bridge the gap between industry academia interface – to apply the theory learnt to industrial applications➤ Explain the importance of statistical quality control in industrial settings.➤ Identify sources of variation in industrial processes and products.➤ Explain the importance of Analysis of time series, Analysis of Variance and Design of Experiments in Industrial applications.➤ Create and interpret control charts for attributes.				
UNIT - I		18		
Statistical Quality Control: Introduction – Basis of SQC – Benefits of SQC – Process Control and Product control – Control Charts – Tools for SQC - Control chart for variables – control chart for mean (X chart) ,Range Chart (R chart) Standard deviation chart (σ chart).				
UNIT - II		18		
Control chart for attributes - Natural Tolerance limits and specification limits - Acceptance of sampling plans for attributes -single, double, Multiples and sequential sampling plans				
UNIT - III		18		
Analysis of Time Series: Components – Analysis – Measurement of Trend – Measurement of Seasonal variation- Index of Industrial production				
UNIT - IV		18		
Analysis of Variance: Introduction – One way classification – two way classifications with one observation per cell.				
UNIT - V		18		
Design of Experiments: Introduction – Three Principles of Experimental Design – Completely Randomised Design – Randomised Block Design.				
Total Lecture Hours				90

BOOKS FOR STUDY:

- Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals Of Applied Statistics, 4th Edition(Reprint), Sultan Chand & Sons

Unit I: Chapter 1 - 1.1 to 1.8

Unit II: Chapter 1 – 1.9 to 1.12

Unit III: Chapter 2 – 2.1 to 2.5 and Chapter 3 – 3.7

Unit IV: Chapter 5 – 5.1 to 5.3 [5.3.1 to 5.3.4]

Unit V: Chapter 6 – 6.1 to 6.5

- Montgomery, D. C. (2009): Introduction to Statistical Quality Control, 6th Edition, Wiley India Pvt. Ltd.

BOOKS FOR REFERENCES:

- S. Leavenworth (1988) Statistical Quality Control (Sixth Edition), McGrawhill Book co, New York.
- Goon, A. M., M.K. Gupta and B. Dasgupta (1987) Fundamentals of Statistics, Vol. II. World Press, Kolkata.
- Mahajan (1997) Statistical Quality Control, Dhanpat Rai & sons, New Delhi.
- Papoulis A. Probability, Random Variables and Stochastic process, Tata McGraw Hill Education Pvt. Ltd., New Delhi
- Baisnab A., Jas M., Elements of Probability and Statistics, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 1993

WEB RESOURCES:

- ❖ [OpenIntro Statistics - https://www.openintro.org/book/stat/](https://www.openintro.org/book/stat/)
- ❖ [http://spcchartsonline.com/ - Statistical Quality Control Tutorial](http://spcchartsonline.com/)
- ❖ ["Control Charts" \(Online Tutorial\): https://www.spcforexcel.com/knowledge/control-chart-basics/control-charts](https://www.spcforexcel.com/knowledge/control-chart-basics/control-charts)
- ❖ [https://www.analyticsvidhya.com/blog/2018/01/anova-analysis-of-variance/ - ANOVA Tutorial](https://www.analyticsvidhya.com/blog/2018/01/anova-analysis-of-variance/)

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change			No Changes Made			New Course	✓

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:

CO1	Understand the need for statistical quality control techniques in industrial settings.	K1 to K4
CO2	Identify the causes of variation in industrial processes and products	K1 to K4
CO3	Understand the importance of Time series in industrial applications	K1 to K4
CO4	Understand the applications of Analysis of variance in industrial settings	K1 to K4
CO5	Gain knowledge in Experimental designs	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
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CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-				
CO2	3	2	3	1	2	-				
CO3	3	3	3	3	-	-				
CO4	3	3	3	3	-	-				
CO5	3	3	3	3	2	-				
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:					
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	3	1		
CO 4	3	3	1		
CO 5	3	3	1		
WEIGHTAGE	15	13	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	3	1		

LESSON PLAN:			
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UNIT	INDUSTRIAL STATISTICS	HRS	PEDAGOGY
I	Statistical Quality Control: Introduction – Basis of SQC – Benefits of SQC – Process Control and Product control – Control Charts – Tools for SQC - Control chart for variables – control chart for mean (X chart) ,Range Chart (R chart) Standard deviation chart (σ chart)	18	Chalk & Talk
II	Control chart for attributes - Natural Tolerance limits and specification limits - Acceptance of sampling plans for attributes - single, double, Multiples and sequential sampling plans	18	Chalk & Talk

III	Analysis of Time Series: Components – Analysis – Measurement of Trend – Measurement of Seasonal variation- Index of Industrial production.	18	Chalk & Talk, PPT
IV	Analysis of Variance: Introduction – One way classification – two way classifications with one observation per cell.	18	Chalk & Talk
V	Design of Experiments: Introduction – Three Principles of Experimental Design – Completely Randomised Design – Randomised Block Design..	18	Seminar

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
(10 x 1 = 10 Marks)					
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ELEMENTS OF MATHEMATICAL ANALYSIS			
Course Code	23UMTCC42	L	P	C
Category	CORE	4	-	4
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Identify and characterize sets and functions and Understand, test and analyze the convergence and divergence of➤ Understand metric spaces with suitable examples				
UNIT - I				12
Sets and Functions: Set s and elements- Operations on sets- functions- real valued functions- equivalence-countability real numbers- least upper bounds.				
UNIT - II				12
Sequences of Real Numbers: Definition of a sequence and subsequence-limit of a sequence – convergent sequences– divergent sequences.				
UNIT - III				12
bounded sequences-monotone sequences ,Operations on convergent sequences				
UNIT - IV				12
Operations on divergent sequences – limit superior and limit inferior-Cauchy sequences.				
UNIT - V				12
Limits and Metric Spaces: Limit of a function on a real line - Metric spaces - Limits in metric spaces – Open set and Closed sets.				
Total Lecture Hours				60

BOOKS FOR STUDY:

- Richard R. Goldberg, Methods of Real Analysis: Oxford and IBH Publishing, (1 January 2020)

Unit I: Chapter 1 Sections 1.1 – 1.7

Unit II: Chapter 2 Sections 2.1 – 2.4

Unit III: Chapter 2 Sections 2.5 – 2.7

Unit IV: Chapter 2 Sections 2.8 – 2.10

Unit V: Chapter 4 Sections 4.1 – 4.3, Chapter 5 Sections 5.4 &, 5.5

BOOKS FOR REFERENCES:

- 1.T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
- 2. R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
- 3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
- 4. K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.

WEB RESOURCES:

- ❖ <https://nptel.ac.in>
- ❖ <https://www.mathwarehouse.com/>
- ❖ <https://www.mathhelp.com/>
- ❖ <https://www.mathsisfun.com/>

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL	REGIONAL	NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	40	No Changes Made		New Course	
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.						

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Explain in detail about sets and functions, equivalence and countability and the LUB axiom	K1 to K4
CO2	Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences	K1 to K4
CO3	Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences	K1 to K4
CO4	Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences	K1 to K4
CO5	Explain about the metric spaces and functions continuous on a Metric space	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-				
CO2	3	2	3	1	2	-				
CO3	3	3	3	3	-	-				
CO4	3	3	3	3	-	-				
CO5	3	3	3	3	2	-				
S- STRONG			M - MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	2	1		
CO 4	3	2	1		
CO 5	3	2	1		
WEIGHTAGE	15	10	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	2	1		

LESSON PLAN:

UNIT	ELEMENTS OF MATHEMATICAL ANALYSIS	HRS	PEDAGOGY
I	Sets and Functions: Set s and elements- Operations on sets- functions- real valued functions- equivalence-countability real numbers- least upper bounds.	12	Chalk & Talk
II	Sequences of Real Numbers: Definition of a sequence and subsequence- limit of a sequence – convergent sequences– divergent sequences	12	Chalk & Talk
III	bounded sequences-monotone sequences ,Operations on convergen sequences	12	Chalk & Talk, PPT
IV	Operations on divergent sequences – limit superior and limit inferior- Cauchy sequences	12	Chalk & Talk
V	Limits and Metric Spaces: Limit of a function on a real line - Metric spaces - Limits in metric spaces – Open set and Closed sets	12	Seminar

**Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)**

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
(10 x 1 = 10 Marks)					
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	TRANSFORMATION TECHNIQUES			
Course Code	23UMTEC41	L	P	C
Category	ELECTIVE	3	-	3
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To solve certain types of differential equations using Laplace Transforms➤ To discuss the basic concepts relating Fourier series.				
UNIT - I				9
The Laplace transforms: Definitions, Piecewise continuity –Sufficient condition for the existence of the Laplace Transform–results derived from the definitions – Laplace Transform of Periodic functions – Some General theorems -Using Laplace Transforms evaluate certain integrals.				
UNIT - II				9
The Inverse transforms – Modifying the results to get the inverse Laplace transforms.				
UNIT - III				9
Laplace transformation can be used to solve ordinary differential equations with constant coefficients – Solving system of differential equations– solving differential equations with variable coefficients-Solving equations involving integrals by Laplace transforms				
UNIT - IV				9
Fourier Transforms: Fourier integral theorem – Fourier sine and cosine integrals -Complex form of Fourier integral – Inversion formula for complex Fourier Transform – Fourier sine and cosine transform				
UNIT - V				9
Properties of Fourier Transform – Convolution Theorem –Parseval's identity.				
Total Lecture Hours				45

BOOKS FOR STUDY:

- S. Narayanan and T. K. Manickavasagam Pillai, Differential Equations and its applications, (Reprint Oct 2014 – 2015), S.Viswanathan (Printers and Publishers) Private Ltd , Chennai- 600003.

Unit I: Chapter IX- Sections – 1.1, 1.2 and Sections 2 – 5

Unit II: Chapter IX- Sections – 6, 7

Unit III: Chapter IX- Sections – 8 to 11

- P.R.Vittal, Differential Equations, Fourier and Laplace Transforms, Probability –(3rd Edition, Reprint 2012), Margham Publications, Chennai – 600017.

Unit IV: Chapter VIII – Pages 8.1 – 8.8

Unit V: Chapter VIII – Pages 8.8 – 8.19

BOOKS FOR REFERENCES:

- George F.Simmons, Differential Equations with applications and Historical Notes,(12thReprint) TATA MAGRAW-Hill Publishing Company Ltd., New Delhi.

WEB RESOURCES:

- ❖ <https://mathworld.wolfram.com/LaplaceTransform.html>
- ❖ <https://mathworld.wolfram.com/FourierSeries.htmlhttps://www.mathhelp.com/>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL	REGIONAL		NATIONAL		✓	GLOBAL	
Changes Made in the Course	Percentage of Change		60	No Changes Made		New Course		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Find the Laplace transform for the given function.	K1 to K4
CO2	Find the inverse Laplace transformation for the given function.	K1 to K4
CO3	Solve the differential equations using Laplace transforms.	K1 to K4
CO4	Find the Fourier sine and cosine integrals for the given function.	K1 to K4
CO5	Convolute the given transformations	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-				
CO2	3	2	3	1	2	-				
CO3	3	3	3	3	-	-				
CO4	3	3	3	3	-	-				
CO5	3	3	3	3	2	-				

S- STRONG

M - MEDIUM

L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	3	1		
CO 4	3	3	1		
CO 5	3	3	1		
WEIGHTAGE	15	13	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	3	1		

LESSON PLAN:

UNIT	TRANSFORMATION TECHNIQUES	HRS	PEDAGOGY
I	The Laplace transforms: Definitions, Piecewise continuity –Sufficient condition for the existence of the Laplace Transform– results derived from the definitions – Laplace Transform of Periodic functions – Some General theorems -Using Laplace Transforms evaluate certain integrals.	9	Chalk & Talk
II	The Inverse transforms – Modifying the results to get the inverse Laplace transforms	9	Chalk & Talk
III	Laplace transformation can be used to solve ordinary differential equations with constant coefficients – Solving system of differential equations– solving differential equations with variable coefficients- Solving equations involving integrals by Laplace transforms	9	Chalk & Talk, PPT
IV	Fourier Transforms: Fourier integral theorem – Fourier sine and cosine integrals -Complex form of Fourier integral – Inversion formula for complex Fourier Transform – Fourier sine and cosine transform	9	Chalk & Talk
V	Properties of Fourier Transform – Convolution Theorem –Parseval's identity.	9	Seminar

**Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print**

Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	25
	K2	2	10		12	21.4	
	K3		10	16	26	46.4	46.4
	K4			16	16	28.6	28.6
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2	10		2	3.6	
	K3		10	16	26	46.4	46.4
	K4			16	26	46.4	46.4
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
2	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
3	CO3	K1 – K4	2	K1,K2	2(K2,K2)	2(K3,K3)
4	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
5	CO5	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.6	4
K2	5	20		25	17.8	18
K3		30	32	62	44.3	44
K4			48	48	34.3	34
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	
				(10 x 1 = 10 Marks)	
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K2		
OR					
11. b)	Unit - I	CO1	K2		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K2		
OR					
13. b)	Unit - III	CO3	K2		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3		
OR					
16. b)	Unit - I	CO1	K3		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K3		
OR					
18. b)	Unit - III	CO3	K3		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	INTRODUCTION TO DATA SCIENCE			
Course Code	23UMTSC41	L	P	C
Category	SKILL	2	-	2
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Understand the importance of data science in today's world.➤ Build models for prediction and classification.➤ Implement supervised and unsupervised machine learning algorithms.➤ Understand the Hadoop framework.				
UNIT - I				6
Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science				
UNIT - II				6
Overview – research goals - retrieving data - transformation –Exploratory Data Analysis – Model building				
UNIT - III				6
Applications of Machine learning in Data Science – Machine learning algorithms – Modeling process – Types – Supervised –Unsupervised				
UNIT - IV				6
Hadoop framework – Spark – replacing MapReduce				
UNIT - V				6
NoSQL – ACID – CAP – BASE – types				
Total Lecture Hours				30

BOOKS FOR STUDY:

- Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016.

Unit I : Chapter 1 - 1.1 – 1.4

Unit II: Chapter 2 - 2.1 -2.6

Unit III : Chapter 3 – 3.1 – 3.3

Unit IV : Chapter 5 – 5.1

Unit V : Chapter 6 – 6.1

BOOKS FOR REFERENCES:

- Introduction to Data Science - B. Uma Maheswari , R. Sujatha - WILLEY- 2021
- MurtazaHaider, “Getting Started with Data Science – Making Sense of Data with Analytics”, IBM press, E-book

WEB RESOURCES:

- ❖ <https://jakevdp.github.io/PythonDataScienceHandbook/>
- ❖ <https://www.cmpe.boun.edu.tr/~ethem/i2ml2e/>
- ❖ <https://www.open.edu/openlearn/science-maths-technology/learn-code-dataanalysis/content-section-overview?active-tab=content-tab>
- ❖ <https://www.w3schools.com/datascience/>
- ❖ <https://www.kaggle.com/code/helgejo/an-interactive-data-science-tutorial>
- ❖ <https://www.nbshare.io/> -

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	100	No Changes Made		New Course		✓	
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.								

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Identify the different facets of data and explain the data science process..	K1 & K2
CO2	Retrieve and transform data, perform exploratory data analysis, and build models.	K1 & K2
CO3	Evaluate and compare machine learning algorithms and apply them to real117 world data science problems	K1 & K2
CO4	Understand the Hadoop framework and use it for big data processing	K1 & K2
CO5	Explain the concepts of NoSQL databases and apply them to solve data management problems.	K1 & K2

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-				
CO2	3	2	3	1	2	-				
CO3	3	3	3	3	-	-				
CO4	3	3	3	3	-	-				
CO5	3	3	3	3	2	-				
S- STRONG			M - MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	3	1		
CO 4	3	3	1		
CO 5	3	3	1		
WEIGHTAGE	15	13	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	3	1		

LESSON PLAN:

UNIT	INTRODUCTION TO DATA SCIENCE	HRS	PEDAGOGY
I	Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science.	6	Chalk & Talk
II	Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building	6	Chalk & Talk
III	Applications of Machine learning in Data Science - Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised	6	Chalk & Talk, PPT
IV	Hadoop framework – Spark – replacing MapReduce	6	Chalk & Talk
V	NoSQL – ACID – CAP – BASE – types	6	Seminar

**Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)**

Internal	Cos	K Level	Section A	
			MCQs	
			No. of. Questions	K - Level
CI AI	CO1	K1 – K2	25	K1,K2
	CO2	K1 – K2	25	K1,K2
CI AII	CO3	K1 – K2	25	K1,K2
	CO4	K1 – K2	25	K1,K2
Question Pattern CIA I & II		No. of Questions to be asked	50	
		No. of Questions to be answered	50	
		Marks for each question	1	
		Total Marks for each section	50	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				



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FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	PROGRAMMING IN C++ LAB			
Course Code	23UMTSP41	L	P	C
Category	SKILL	-	2	1

COURSE OBJECTIVES:

- To learn the fundamental programming concepts and methodologies which are essential to building good C++ programs.
- To practice the C++ programming language via laboratory experiences.
- To code, document, test, and implement a well-structured, robust computer program using the C++ programming language.
- To write reusable modules (collections of functions).
- To create and call functions that use parameter passing and return values

UNIT - I

List of Programs in C++

1. Write a C++ program for In-line function.
2. Write a C++ program for Function overloading
3. Write a C++ program for Functions using Default arguments.
4. Write a C++ program using Static member functions
5. Write a C++ program for Constructors.
6. Write a C++ program for Unary Operator overloading.
7. Write a C++ program using Binary Operator overloading.
8. Write a C++ program in Friend function.
9. Write a C++ program using Single inheritance.
10. Write a C++ program using recursive function

Total Lecture Hours

30

BOOKS FOR STUDY:

- E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, New Delhi, Fifth Edition, 2011.

BOOKS FOR REFERENCES:

- LesHanCock, Morris Kringer, **C Primer**, McGraw Hill , 1997.
- Robert Lafore, **Object-Oriented Programming in Microsoft C++**, Galgotia Publications, New Delhi, 2000
- Bjarne Stroustrup, **The C++ Programming Language**, Addison-Wesley, New York, 1999

WEB RESOURCES:

- ❖ <https://nptel.ac.in/courses/106/104/106104128/>
- ❖ <https://nptel.ac.in/courses/106/105/106105171/>
- ❖ <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-096-introduction-to-c-january-iap-2011/lecture-notes/>

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED			ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change		No Changes Made			✓	New Course	
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.								

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Illustrate the appropriate use of data types.	K1 to K4
CO2	Demonstrate the understanding of algorithms in the problem-solving process.	K1 to K4
CO3	Develop programs using conditional, iterative, and functions.	K1 to K4
CO4	Explain control structures for a given programming task.	K1 to K4
CO5	Apply fundamental syntax rules for identifiers, declarations, expressions and functions	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	-	1				
CO2	3	3	3	2	-	1				
CO3	3	3	3	2	1	1				
CO4	3	3	3	2	1	1				
CO5	3	3	3	2	1	1				
S- STRONG			M - MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1		
CO 2	3	2	1		
CO 3	3	3	1		
CO 4	3	3	1		
CO 5	3	3	1		
WEIGHTAGE	15	13	5		
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	3	3	1		

LESSON PLAN:

PROGRAMMING IN C++ LAB	HRS	PEDAGOGY
List of Programs in C++ 1. Write a C++ program for In-line function. 2. Write a C++ program for Function overloading 3. Write a C++ program for Functions using Default arguments. 4. Write a C++ program using Static member functions 5. Write a C++ program for Constructors. 6. Write a C++ program for Unary Operator overloading. 7. Write a C++ program using Binary Operator overloading. 8. Write a C++ program in Friend function. 9. Write a C++ program using Single inheritance. 10. Write a C++ program using recursive function	30	

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	75	100

Internal Assessment : Observation & attendance -10 mark

Model examination - 15 mark

Total CIA - 25 mark

Model examination should be conducted for 30 mark and it has to be converted to 15 mark

**Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)**

Internal	Cos	K Level	No. of. Questions	K - Level
CIA-I	CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
Question Pattern CIA - I		No. of Questions to be asked	1 Question for Each Student	
		No. of Questions to be answered	1	
		Marks for each question	30	
		Total Marks for each section	30	

Distribution of Marks with COs & K Level for Correction of CIA I

	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	2.0
	CO3	Short Procedure	K2	10.0
	CO2	Tabulation	K4	8.0
	CO4	Experiment & calculation	K3	5.0
	CO5	Result (nil) (1 mark will be reduced for each 2% deviation) minimum mark 1	K1	5.0
	Total Marks			30

Summative Examination: Duly completed Record: 15 mark

End Semester Exam: 60 marks

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

COs	K - Level	No. of Questions	K – Level
CO1 - CO5	K1 – K4	1 Question for Each Student	K1 – K4
No. of Questions to be Asked		1 Question for Each Student	
No. of Questions to be answered		1	
Marks for each question		60	
Total Marks for each section		60	
(Figures in parenthesis denotes, questions should be asked with the given K level)			

Distribution of Marks with COs & K Level for Correction of CIA I				
	COs	Distribution of the work of the experiment	K - Level	MARKS
CIA I	CO1	Aim and apparatus	K1	4.0
	CO3	Short Procedure	K2	20.0
	CO2	Tabulation	K4	16.0
	CO4	Experiment & calculation	K3	10.0
	CO5	Result (nil) (2 mark will be reduced for each 2% deviation) minimum mark 2)	K1	10.0
	Total Marks			60