M.Sc., MATHEMATICS



Program Code: PMT



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

Eligibility condition for admission

For admission to Post Graduate Programmers (P.G) a candidate should have passed the 3 years degree course (under 10 + 2 + 3 pattern) (B.Sc Mathematics and B.Sc Mathematics with CA) recognized by the university as equivalent there to.

Duration

Two years. Each year consists of 2 semesters. The duration of a semester is 90 working days.

Attendance

75% of the classes in each semester shortage of attendance can be condoned as per existing university rules.

Evaluation procedure :

A mark Statement with

 $CGPA = \sum (MarksXcredits)$

 $\Sigma(Credits)$

Where the summations are over all paper appeared up to the current semester.

Examinations: 3 hours duration. Total marks 100 for all papers External Internal ratio 75:25 with 2 Internal tests.

The scheme of Examination

The components for continuous internal assessment are:

Two tests and their average --15 marks

Seminar /Group discussion --5 marks

Assignment

Total

25 Marks

--5 marks

Pattern of the questions paper for the continuous Internal Assessment

(For Part III, Elective & NME Paper)

The components for continuous internal assessment are: Part –A						
Four multiple choice questions (answer all)	4 x01= 04 Marks					
Part –B	2 02 04					
Three short answers questions (answer all)	3 x02= 06	o Marks				
Part –C Two questions ('either or 'type)	2 x 05=10) Marks				
Part –D	2 x 05-1					
Two questions out of three	$2 \times 10 = 20$	0 Marks				
D MAM	A 0					
Total	-40) Marks				
	6)					
	K Y					
Pattern of the question paper for the Summative Examinat	ions:					
Note: Duration- 3 hours	-					
Part – A	10 01	50001				
Ten multiple choice questions	10 x01	= 10 Marks				
No Unit shall be omitted: not more than two questions fro	m each unit.	.)				
Part –B						
Short answer questions (one question from each unit)	5 x02	= 10 Marks				
Part –C		6				
Five Paragraph questions ('either or 'type)	5 x 05	= 25 Marks				
(One question from each Unit)						
Part –D						
Three Essay questions out of five	3 x 10	=30 Marks				
(One question from each Unit)	- N					
Total		75 Marks				

Minimum Marks for a Pass

50% of the aggregate (Internal +Summative Examinations).No separate pass minimum for the Internal Examinations.34 marks out of 75 is the pass minimum for the Summative Examinations.

VISION

To empower the students so as to face the competitive world and make them fit for the MNCs according to their necessity and requirement

MISSION

To provide an environment where students can learn and become competent users of mathematics and mathematics applications

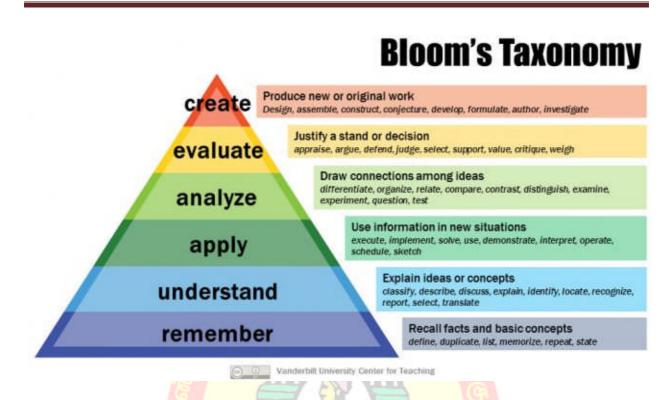
The 12 Graduate Attributes*:

- 1. (KB) A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
- 2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions
- 3. (Inv.) Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
- 4. (Des.) Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
- 5. (Tools) Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
- 6. (Team) Individual and teamwork: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
- 7. (Comm.) Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
- 8. (Prof.) Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
- 9. (Impacts) Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and

cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

- 10. (Ethics) Ethics and equity: An ability to apply professional ethics, accountability, and equity.
- 11. (Econ.) Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
- 12. (LL) Life-long learning: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

WA	Graduate Attributes	Caption as
1	Demonstrated competence in university level mathematics, natural	A knowledge
	sciences, engineering fundamentals, and specialized engineering	base for
	knowledge appropriate to the program.	engineering
2	An ability to use appropriate knowledge and skills to identify,	Problem
	formulate, analyze, and solve complex engineering problems in order to	analysis
	reach substantiated conclusions	
3	An ability to conduct investigations of complex problems by methods	
	that include appropriate experiments, analysis and interpretation of data	Investigation
	and synthesis of information in order to reach valid conclusions.	
7	An ability to communicate complex engineering concepts within the	Communicat
	profession and with society at large. Such ability includes reading,	ion skills
	writing, speaking and listening, and the ability to comprehend and write	
	effective reports and design documentation, and to give and effectively	
	respond to clear instructions.	
6	An ability to work effectively as a member and leader in teams,	Individual
	preferably in a multi-disciplinary setting.	and
		teamwork
10	An ability to apply professional ethics, accountability, and equity.	Ethics and
	றாயலு	equity
12	An ability to identify and to address their own educational needs in a	Life-long
	changing world in ways sufficient to maintain their competence and to	learning
	allow them to contribute to the advancement of knowledge	



PROGE	RAM EDUCATIONAL OBJECTIVE (PEOs) are:
PEO1:	Enhance the entrepreneurial abilities, life skills and research initiatives through
	experiential learning practices and building self confidence
PEO2 :	Collaborate with industry and alumnae to explore the new avenues in respective
	domains and raise the employability ratio
PEO3:	Equip with soft skills and critical thinking to produce an erudite and trustworthy
	generation to fit into versatile situations
PEO4 :	Adhere to the ethical and environmental sustainability to create morally upright and
	empowered citizens to face industry/ Institution

Academic Council Meeting Held on 29.04.2021

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M. Sc., Mathematics Programme Outcomes

At the end of the programme, the students will be able to

S. No	Programme Outcomes	Graduate Attributes
1	Demonstrate analytical and practical knowledge in	Disciplinary Knowledge
	the field of Science and Technology.	
2	Express their disciplinary knowledge with others	
	effectively in both oral and written form in an	Communication Skills
	organized manner.	
3	Make proficiency by using Computer Technology in	
	learning activities and update their knowledge, skills	Digital Literacy & Life-long
	to fulfill the requirements at the workplace in their	Learning
	life span.	5
4	Employ critical and analytical thinking in	(A)
	understanding the concepts of Mathematical &	Analytical Reasoning &
	Computing Sciences and qualify competitive	Critical Thinking
	examinations CSIR NET/ SET/ TET.	
5	Identify Mathematical and Computational methods in	Problem Solving
	order to solve critical problems.	rioblem Solving
6	Work independently and do detailed study of various	
	concepts of Science.	Self-directed learning
7	Plan, execute, report the results of an	
	experiment/investigation together as a group/team	Research-related skills and
	with interest and work efficiently as a member of a	
	team.	



M. Sc. Mathematics Programme Specific Outcomes

At the end of the Programme, the students will be able to

S. No	Programme Specific Outcomes	Graduate Attributes
1	Demonstrate the understanding of mathematical concepts in the field of Science and Technology.	Disciplinary Knowledge
2	Express their mathematical knowledge with others effectively in both oral and written form in an organized manner.	Communication Skills
3	Proficient in using digital learning platforms and update their knowledge, skills to fulfill the requirements at the workplace in their life span.	Digital Literacy & Life-long Learning
4	Employ critical and analytical thinking in understanding the concepts of Mathematical Science and in appearing Competitive examinations SET/ NET/ TET.	Analytical Reasoning & Critical Thinking
5	Choose appropriate mathematical and computational methods in order to solve different types of problems.	Problem Solving
6	Work independently and do detailed study of various concepts of Science.	Self-directed learning
7	Plan, execute, report the results of an experiment/investigation with the highest standard of ethics in research and work efficiently as a team member / leader.	



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous), Pasumalai M.Sc., MATHEMATICS, Curriculum

(For the student admitted during the academic year 2021-2022 onwards)

Course	Title of the Course	Hours	Credits	Max	Maximum Marks		
Code				Int	Ext	Total	
FIRST SEM	IESTER						
	Core Courses						
21PMTC11	Algebra	6	4	25	75	100	
21PMTC12	Analysis	6	4	25	75	100	
21PMTC13	Ordinary Differential Equations	6	4	25	75	100	
21PMTC14	Graph Theory and its Algorithms	6	4	25	75	100	
21PMTC15	Classical Mechanics	6	4	25	75	100	
211 111 010	Total 30 20		125	375	500		
SECOND S	EMESTER	1121	121	1		•	
21PMTC21	Advanced Algebra	6	4	25	75	100	
21PMTC22	Partial Differential Equations	6	4	25	75	100	
21PMTC23	Numerical Analysis	6	4	25	75	100	
21PMTC24	Fuzzy Algebra and its	6	4 9	25	75	100	
	Applications (Kan a	E				
21PMTN21	Mathematics for Competitive Examinations	6	6	25	75	100	
	Total	30	22	125	375	500	
THIRD SEN	MESTER		E E				
21PMTC31	Field Theory and Lattices	6	4	25	75	100	
21PMTC32	Complex Analysis	6	4	25	75	100	
21PMTC33	Top <mark>ology</mark>	6	4	25	75	100	
21PMTE31	Operations Research	6	6	25	75	100	
21PMTE32	Integral Equations	6	6	25	75	100	
	Total	30	24	125	375	500	
FOURTH S	EMESTER		S				
21PMTC41	Measure Theory and Integration	6	4	25	75	100	
21PMTC42	Functional Analysis	6	4	25	75	100	
21PMTPR1	Project	6	4	40	60	100	
21PMTE41	Number Theory	6	6	25	75	100	
21PMTE42	Stochastic Process	6	6	25	75	100	
	Total	30	24	140	360	500	
	Grand Total	120	90	515	1485	2000	





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS (For those who joined in 2021-2022 and after)

Course Name ALGEBRA Course Code 21PMTC11 С L Р Core 4 Category 6 Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENURSHIP **Course Objectives:** To introduce the advanced ideas in Group theory. • To familiarize Abelian groups and Ring theory. • • To know about unique factorization domain. To equip the students in fields and ideals. To know about Euclidean rings, Polynomial rings. Unit: I 18 Groups (Definitions only) - Subgroups - A Counting Principle - Normal subgroups and Quotient groups - Permutation groups. 18 Unit: II Another Counting Principle -Sylow's Theorems - Direct Products - Finite Abelian Groups Unit: III 18 Ideals and Quotient Rings - More Ideals and Quotient Rings, The Field of Quotients of an Integral Domain Unit: IV 18 Euclidean Rings - A particular Euclidean Rings. Unit: V 18 Polynomial rings - Polynomials over the rational field - Polynomial rings over Commutative rings. **Total Lecture Hours** 90 Books for Study: I. N. Herstein, Topics in Algebra, Second Edition, John Wiley and Sons, New Delhi, Reprint 2010.

> Unit I - Chapter 2: Sections 2.1, 2.4, 2.5, 2.6, 2.10 Unit II - Chapter 2: Sections 2.11, 2.12, 2.13, 2.14

Volume II – Science Syllabus / 20	021 -2022
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	Unit III- Chapter 3: Sections 3.4, 3.5, 3.6,	
	Unit IV - Chapter 3: Sections 3.7, 3.8	
	Unit V - Chapter 3: Sections 3.9,3.10,3.11.	
Books	for References:	
	Seph A Gallian, <i>Contemporary Abstract Algebra</i> , 8 th Edition, <i>Cengage Learning Livate Limited</i> , New Delhi, 2013.	India
2. Th	omas W.Hungerford, Algebra, Springer International Edition, Newyork, 2009.	
3. La	ng Serge , Algebra , Addison – Welsey, 2002	
Web F	Resources	
https:/	//www.youtube.com/watch?v=PN-cro0J_v8&list=PLEAYkSg4uSQ1Yhxu2U-	
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https:// http:// Perry.l COUF On th	/nptel.ac.in/courses/111/106/111106113/ www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by html RSE OUTCOMES e successful completion of the course , the students will be able to	K Level
https:// http:// Perry.l COUF On th	/nptel.ac.in/courses/111/106/111106113/ www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by html RSE OUTCOMES e successful completion of the course , the students will be able to	
https:// http:// Perry.l COUF	<u>Anptel.ac.in/courses/111/106/111106113/</u> <u>www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by</u> <u>html</u> SE OUTCOMES e successful completion of the course , the students will be able to Demonstrate the understanding of group, normal groups, quotient group and permutation groups.	K Leve
https:// http:// Perry.l COUF On th CO1: CO2:	Imptel.ac.in/courses/111/106/111106113/ www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by Imml ESE OUTCOMES e successful completion of the course , the students will be able to Demonstrate the understanding of group, normal groups, quotient group and permutation groups.	K Level
https:// http:// Perry.1 COUF On th CO1:	Imptel.ac.in/courses/111/106/111106113/ www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by tml ESE OUTCOMES e successful completion of the course , the students will be able to Demonstrate the understanding of group, normal groups, quotient group and permutation groups. Use Sylow's theorem in algebraic structures	K Level

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	-1	1	3	2	1
CO 2	3	2	1	/	2	2	2
CO 3	2	3	20 L	1	2	1	-
CO 4	2	3	1_0	1	3	2	2
CO 5	2	2	1	1	2	1	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hours	Pedagogy
Ι	Groups (Definitions only) – Subgroups - A Counting Principle - Normal subgroups and Quotient groups - Permutation groups	18	Chalk & Talk
II	Counting Principle -Sylow's Theorems - Direct Products –Finite Abelian Groups.	18	Chalk & Talk
III	Ideals and Quotient Rings - More Ideals and Quotient Rings, The Field of Quotients of an Integral Domain.	18	Chalk & Talk
IV	Euclidean Rings - A particular Euclidean Rings.	18	Chalk & Talk
V	Polynomial rings - Polynomials over the rational field - Polynomial rings over Commutative rings.	18	Chalk & Talk

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Course Designed by: Dr.A.Hamari Choudhi and Dr.V.Ramachandran

-	native E culation	ning Out <mark>come</mark> Bas Examination - Blue Mappi <mark>ng – K Le</mark> v	<mark>e Print</mark> vels with Cou	to	comes (COs)	BE)		-
Inte Co rnal	Cos	K Level	Section A	111	Section B		Section C	Section D
		5	MCQs	ng	Short Answ	vers 😑	Either or	Open
		3 5	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI AI	CO1	Upto K2	2	K1 & K2	1	K1	2 2	3
	CO2	Upto K3	2	K1 & K2	2	K2		3
CI AII	CO3	Upto K4	2	K1 & K2	1	K2	2	3
	CO4	Upto K4	2	K1 & K2	2	K2	2	3
Ques Patte CIA		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

	Distrib	oution of Ma	rks with K	Level CIA	I & CIA I	I		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	,		4	6.67	17
	K2	2	4			6	10	
CIA	K3			10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2	5∕m ∘	Game	4	6.67	17
CIA II	K2	2	4		× 6×	6	10	
	K3		6/1	10	20	30	50	50
	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	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	MOQs	The start	Short Ans	wers	Section C	Section D
		3.1	No. of	K –	No. of	K –	(Either /	(Open
		2	Questions	Level	Question	Level	or	Choice)
		3.				29	Choice)	
1	CO1	Upto K2	2.1.1.1.1.	K1 &	1	K1	2(K1 &	1(K2)
			D VILLANI	K2	dimensi's	181	K1)	
2	CO2	Upto K3	2	K1 &	1	K1	2(K3 &	1(K3)
			K6 ()	K2		W.	K3)	
3	CO3	Upto K4	2	K1 &	1 5	K2	2(K3 &	1(K4)
			S (9)	K2	13		K3)	
4	CO4	Upto K4	2	K1 &	1	K2	2(K4 &	1(K3)
				K2			K4)	
5	CO5	Upto K3	2	K1 &	1	K2	2(K2 &	1(K3)
				K2			K2)	
No. of	f Questio	ons to be	10		5		10	5
Asked	1							
No. of	f Questio	ons to be	10		5		5	3
answered								
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figu	res in pa	renthesis den	otes. questior	ıs should	be asked wi	ith the gi	ven K level)	

(Figures in parentnesis denotes, questions should be asked with the given K

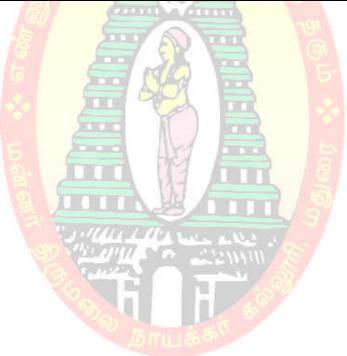
]	Distribution	of Marks wi	th K Level				
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NB: Hi	gher level of p	erformance of	of the student	s is to be ass	essed by a	attempting	higher level

of K levels.

Summative Examinations - Question Paper – Format

Section	A (Mi	ultiple Cho	ice Questions)
		uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	" s Male & M'A war alows a
9	CO5	K1	S VERING CO STANIN S
10	CO5	K2	CA THE CASE AND
Section	n B (Sho	ort Answer	rs)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	றாயுகள்
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Ty	
		uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K4	

·			
17) b	CO2	K4	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K5	
19) b	CO4	K5	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher level
of K lev	vels		
Section	D (Op	en Choice)	
Answei	r Any T	hree ques	tions (3x10=30 marks)
Q.No	CO	K Level	Questions
21	CO1	K2	and the second s
22	CO2	K4	
23	CO3	K3	
24	CO4	K5	S AMARANA S
25	CO5	K4	





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS (For those who joined in 2021-2022 and after)

Course Name ANALYSIS **Course Code** 21PMTC12 С L Р Category Core 6 4 \checkmark Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENURSHIP **Course objectives:** To acquire knowledge about continuous functions and its properties. • To relate the derivative of real valued functions with continuous functions. • • To impart the fundamental theorem of Calculus. To introduce the concept of Riemann integral. To get an idea about the Sequences and Series of functions. Unit: I 18 Limits of Functions - Continuous Functions - Continuity and Compactness - Continuity and Connectedness – Discontinuities - Monotonic Functions - Infinite Limits and Limits at Infinity. Unit: II 18 The Derivative of a Real Function - Mean Value Theorems - The Continuity of Derivatives -L'Hospital's Rule – Derivatives of Higher Order - Taylor's Theorem - Differentiation of Vector valued Functions Unit: III 18 The Riemann-Stieltjes Integral- Definition and Existence of the Integral - Properties of the Integral -Integration and Differentiation - Integration of Vector valued functions -Rectifiable Curves. Unit: IV 18 Sequence and Series of functions - Uniform convergence - Uniform convergence and Continuity -Uniform convergence and Integration Unit: V 18 Uniform Convergence and Differentiation - Equi-continuous Families of Functions - The Stone -Weierstrass Theorem **Total Lecture Hours** 90 **Books for Study:** Walter Rudin, Principles of Mathematical Analysis - McGraw Hill International Editions, Mathematics series, Third Edition (1976). Unit I: Chapter 4 Section 4.1 – 4.34 Unit II: Chapter 5 Section 5.1 – 5.19

Unit II	I: Chapter 6 Section $6.1 - 6.27$	
Unit IV	Chapter 7 Section 7.1 – 7.15	
Unit V	: Chapter 7 Section 7.16 – 7.26	
1. Pat	for References: rick M. Fitzpatrick, Advanced Calculus, AMS, Pine and Applied Undergra ian Edition, 2006.	iduate Texts,
2. Ap	ostol, Mathematical Analysis , Narosa Publishing House, Indian edition, 1974. Royden, Real Analysis , Third Edition, OHI Learning Pvt Ltd., 3 rd Edition,	New Delhi,
Web F	Resources	
https:/	/nptel.ac.in/courses/111/106/111106053/	
https://	ocw.mit.edu/courses/mathematics/18-100c-real-analysis-fall-2012/	
https://	cosmolearning.org/courses/real-analysis-with-prof-sh-kulkarni/	
COUR	SE OUTCOMES	K Level
On th	e successful comple <mark>tion of the c</mark> ourse , the students <mark>will be able</mark> to	
CO1:	Knowledge about limit, continuity, connectedness and its properties.	K2
CO2:	Identify the derivative of real valued functions with continuous concept and consequences	K3
CO3:	Illustrate the derivatives of higher order, differentiation and integration	K3
CO4:	Apply the fundamental theorem of sequence and series	K4
CO5:	Importance of uniform convergence and Stone – Weierstrass theorem	K5

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3,00	A TUT	2		2	-
CO 2	3	2	1	1	1-15	-	-
CO 3	3	2		2	2	2	1
CO 4	2	3	1	2	2	-	-
CO 5	2	1	ூந	n 188	-	-	2

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*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

<u>LESSON PLAN</u>

UNIT	COURSE NAME	Hours	Pedagogy
I	Limits of Functions - Continuous Functions - Continuity and Compactness - Continuity and Connectedness – Discontinuities - Monotonic Functions - Infinite Limits and Limits at Infinity.	18	Chalk & Talk
Π	The Derivative of a Real Function - Mean Value Theorems – The Continuity of Derivatives – L'Hospital's Rule – Derivatives of Higher Order - Taylor's Theorem - Differentiation of Vector valued Functions	18	Chalk & Talk
III	The Riemann-Stieltjes Integral- Definition and Existence of the Integral - Properties of the Integral - Integration and Differentiation - Integration of Vector valued functions -Rectifiable Curves.	18	Chalk & Talk
IV	Sequence and Series of functions – Uniform convergence - Uniform convergence and Continuity - Uniform convergence and Integration	18	Chalk & Talk
V	Uniform Convergence and Differentiation - Equicontinuous Families of Functions - The Stone - Weierstrass Theorem	18	Chalk & Talk

Course Designed by: Mrs.S.Andal and Mrs. S.Ragavi

	native E	ning Out <mark>come</mark> Bas Examination - Blue Mappin <mark>g – K</mark> Lev	e Print	H A		BE)		
Inte	Cos	K Lev <mark>el</mark>	Section A	TT)	Section B		Section C	Section D
rnal		5	MCQs		Short Answers		Either or	Open
		§.	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI AI	CO1	Upto K2	2	K1 & K2	1	K1	2	3
	CO2	Upto K3	2	K1 & K2	2	K2	2	3
CI AII	CO3	Upto K4	2	K1 & K2	1	K2	2	3
	CO4	Upto K4	2	K1 & K2	2	K2	2	3
Ques Patte CIA		No. of Questions to be asked	4	யை	3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

	Distrib	oution of Ma	rks with K	Level CIA	I & CIA I	I		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	,		4	6.67	17
	K2	2	4			6	10	
CIA	K3			10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2	5∕m ∘	Game	4	6.67	17
CIA	K2	2	4		× 6×	6	10	
II	K3		6/1	10	20	30	50	50
	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	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	MOQs	h they	Short An	swers	Section C	Section D
		in out	No. of Questions	K – Level	No. of Questio n	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	23-1444	K1&K2	1	K1	2(K1&K1)	1(K2)
2	CO2	Upto K3	2	K1&K2	121111	K1	2(K3&K3)	1(K3)
3	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
4	CO4	Upto K4	2	K1&K2	1	K2	2(K4&K4)	1(K3)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No. of Asked	Questio	ns to be	10		5		10	5
No. of Questions to be answered		ns to be	10		5		5	3
Marks for each question		question	1		2		5	10
Total I section	Marks fo n	r each	10		10		25	30

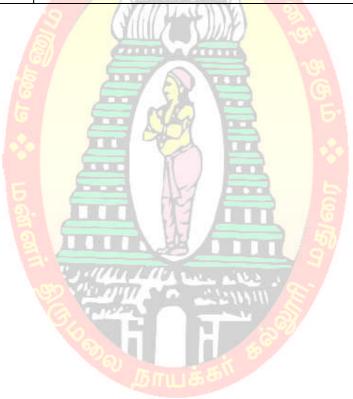
]	Distribution	of Marks wi	th K Level				
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	-
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NR· Hi	gher level of r	erformance	of the student	s is to be ass	essed by	attemnting	higher level

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

Summative Examinations - Question Paper – Format

Section	n A (Mu	ıltiple Cho	ice Questions)
Answe	r All Q	uestions 🦯	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2 🤇	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1 📀	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	P HILL I HALL SHE ST
		ort Answer	
Answe		uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	நாயகம்
14	CO4	K2	
15	CO5	K2	
		her/Or Ty	
		uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	

18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K5	
20) b	CO5	K5	
NB: Hi	igher le	vel of perf	ormance of the students is to be assessed by attempting higher level
of K le	vels	_	
<i>a</i>			
Section	ı D (Op	en Choice)	
	· •	en Choice) Three ques	
	· •	· · · · · · · · · · · · · · · · · · ·	
Answe	r Any T	Three ques	tions (3x10=30 marks)
Answe Q.No	r Any T CO	Three ques K Level	tions (3x10=30 marks)
Answe Q.No 21	r Any T CO CO1	Three ques K Level K2	tions (3x10=30 marks)
Answe Q.No 21 22	r Any T CO CO1 CO2	Chree questK LevelK2K3	tions (3x10=30 marks)





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS (For those who joined in 2021-2022 and after)

Course Name ORDINARY DIFFERENTIAL EQUATIONS Course Code 21PMTC13 Р С L Category 4 Core 6 ENTREPRENURSHIP Nature of course: EMPLOYABILITY SKILL ORIENTED **COURSE OBJECTIVES:** To produce knowledge on ODEs. To familiarize with power series solution, special functions. To learn about existence and uniqueness of solutions. To solve homogenous and non-homogenous equations. To solve standard type of OD equations. Unit: I 18 Second order homogeneous equation, Initial Value Problem, Linear Dependence and Independence, A formula for Wronskian, Non-homogeneous equation of order two. Unit: II 18 Homogeneous equation of order n, Initial value problems, Annihilator method to solve nonhomogeneous equation, algebra of constant coefficient operators. Unit: III 18 Initial value problem for the homogeneous equation, Solution of the Homogeneous equation, the Wronskian and linear independence, Reduction of the order of a homogeneous equation, The non-homogeneous equation, Homogeneous equation with analytic coefficients, The Legendre equation. Unit: IV 18 The Euler equation, Second order equation with Regular Singular points – an example, Second order equation with Regular Singular points – the general case, A convergence proof, The exceptional cases, The Bessel equation, The Bessel equation (continued). Unit: V 18 Equation with Variable Separated, Exact equation, The method of Successive Approximations, The Lipschitz Condition, Convergence of the Successive Approximation, Non local existence of solution, Approximation to and uniqueness of solutions. **Total Lecture Hours** 90 **Books for Study:** E.A.Coddington, An Introduction to Ordinary Differential Equation, PHI Learning Private Limited, New Delhi, 2010. Unit I - Chapter 2 : Section 1 to 6 Unit II - Chapter 2 : Section 7 to 12

Unit III - Chapter 3: Section 1 to 8 Unit IV - Chapter 4: Section 1 to 8 Unit V - Chapter 5: Section 1 to 8

Books for References:

- 1. M.Rama Mohan Rao, Ordinary Differential Equations Theory and Applications, East West Press Publications, New Delhi, 1980.
- 2. Purna Chandra Biswal, **Ordinary Differential Equations**, PHILearning Publications, New Delhi, 2012.
- 3. SG Deo, Ordinary Differential Equations, Tata Mc Graw Hill Publications, New Delhi, 2010.

Web Resources

https://nptel.ac.in/courses/111/107/111107111/

https://ocw.mit.edu/courses/mathematics/18-03-differential-equations-spring-2010/video-lectures/ https://www.youtube.com/watch?v=CogfMjKUGc0

COU	RSE OUTCOMES	K Level						
On th	On the successful comp <mark>letion of t</mark> he course , the stud <mark>ents will b</mark> e able to							
CO1:	Analyze the existence and uniqueness of solutions of ordinary differential	K4						
	equations							
CO2:	Solve homogenous equation and non-homogenous equation with constant co-efficient	K3						
CO3:	Develop the concepts of ordinary differential equation for homogeneous and non-	K3						
	homogenous equations.							
CO4:	Demonstrate the understanding of power series and special functions	K2						
CO5:	Compute the solution by iterative procedure for exact equation.	K3						

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2			3	2 1	-
CO 2	2	1 20	2,10	2	2	2	1
CO 3	2	299	2 17 5	· · · · · · · ·	3	1	-
CO 4	2	-16	Create (1	2	-
CO 5	3	- 2	2	1	2	2	2

CO & PO Mapping:

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

and the second

LESSON PLAN

UNIT	COURSE NAME	Hours	Pedagogy
Ι	Second order homogeneous equation, Initial Value Problem, Linear Dependence and Independence, A formula for Wronskian, Non- homogeneous equation of order two.	18	Chalk & Talk
Π	Homogeneous equation of order n, Initial value problems, Annihilator method to solve non- homogeneous equation, algebra of constant coefficient operators.	18	Chalk & Talk
III	Initial value problem for the homogeneous equation, Solution of the Homogeneous equation, the Wronskian and linear independence, Reduction of the order of a homogeneous equation, The non-homogeneous equation, Homogeneous equation with analytic coefficients, The Legendre equation.	18	Chalk & Talk
IV	The Euler equation, Second order equation with Regular Singular points – an example, Second order equation with Regular Singular points – the general case, A convergence proof, The exceptional cases, The Bessel equation, The Bessel equation (continued).	18	Chalk & Talk
V	Equation with Variable Separated, Exact equation, The method of Successive Approximations, The Lipschitz Condition, Convergence of the Successive Approximation, Non local existence of solution, Approximation to and uniqueness of solutions.	18	Chalk & Talk

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Course Designed by: Dr.M.Saravanan and Mrs. R.Sumathi

	native	rning Out <mark>come</mark> Bas Examinati <mark>on - Blue</mark> n Mapping <mark>– K L</mark> ev	Print					
Inte rnal	Cos	K Level	Section ASMCQsSNo. of.K -		Section B Short Answers No. of. K -		Section C Either or Choice	Section D Open Choice
CI AI	CO1 CO2		Questions 2 2	Level K1&K2 K1&K2	Questions 1 2	Level K1 K2	2 2	3 3
CI AII	CO3 CO4	Upto K4	2 2	K1&K2 K1&K2	1 2	K2 K2	2 2	3 3
Ques Patte	rn	No. of Questions to be asked	4		3		4	3
CIA I II	I &	No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

	Distrib	oution of Ma	rks with K l	Level CIA	I & CIA I	I		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	6.67	17
	K2	2	4			6	10	
CIA	K3			10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2		N 6/2	4	6.67	17
CIA	K2	2	4671	0000	01	6	10	1
II	K3		6/1	10	20	30	50	50
	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	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	MOQs	11-	Short Ans	wers	Section C	Section D
		3	No. of	K –	No. of	K –	(Either / or	(Open
		13	Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Upto K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)
2	CO2	Upto K3	2	K1&K2	1211111	K1	2(K3&K3)	1(K3)
3	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
4	CO4	Upto K4	2	K1&K2	1	K2	2(K4& K4)	1(K3)
5	CO5	Upto K3	2	K1&K2	1 8	K2	2(K2&K2)	1(K3)
No. of	Question	ns to be	10	Bruis	5		10	5
Asked	l			STITLE				
No. of	Question	ns to be	10		5		5	3
answe	red							
Marks	for each	question	1		2		5	10
Total	Marks for	r each	10		10		25	30
section	n							
(Figur	res in par	renthesis den	otes, questio	ns should	be asked wi	th the gi	ven K level)	

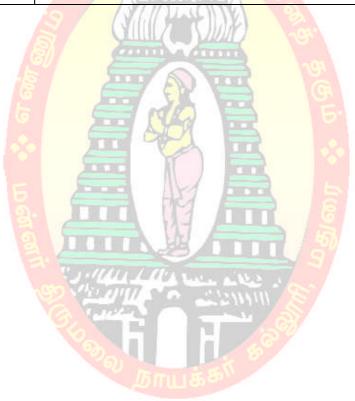
]	Distribution	of Marks wi	th K Level				
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	-
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NR• Hi	gher level of r	erformance	of the student	s is to be ass	essed by g	attemnting	higher level

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

Summative Examinations - Question Paper – Format

			ice Questions)
		uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2 0	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1 📀	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	P within I think a start of the
Sectior	n B (Sho	ort Answei	s)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	நாயக்கு
14	CO4	K2	
15	CO5	K2	
Sectior	n C (Eit	her/Or Ty	pe)
Answe	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K4	
16) b	CO1	K4	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	

-			
18) b	CO3	K3	
19) a	CO4	K2	
19) b	CO4	K2	
20) a	CO5	K3	
20) b	CO5	K3	
NB: H	igher le	vel of perf	ormance of the students is to be assessed by attempting higher level
of K le	vels		
<i>a</i>			
Section	ı D (Op	en Choice)	
		en Choice) Three ques	
Answe	r Any T	Three ques	tions (3x10=30 marks)
Answe Q.No	r Any T CO	Three ques K Level	tions (3x10=30 marks)
Answe Q.No 21	r Any 7 CO CO1	Three quest K4	tions (3x10=30 marks)
Answe Q.No 21 22	r Any T CO CO1 CO2	K Level K4 K3	tions (3x10=30 marks)





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

(For those who joined in 2021-2022 and after)

Course Name	GRAPH THEORY A	ND	ITS ALGORITHMS	5				
Course Code	21PMTC14					L	Р	C
Category	Core					6	-	4
Nature of cours	e: EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPREN	URS	HIP	
Course objectiv	ves:	5 E	ம் கண்ட					
To apply graTo improveTo learn to prove	nd the fundamental con- aph theory in different f the different types of pr nodel problems using g problems algorithmica	ields oof raph	writing skills.	2001				0
	nd Adjacency Matrices.	Sub	graphs Vertex degre	es. I	Paths and Con	nectio		8 vcles
	a, Trees, Cut edges and				unio una con	neen	, e.	, 0105,
Unit: II					1 Bu]	8
Euler tours, Ha	miltonian cycles, The	trav	elling salesman prot	olem	, Matchings,	Matc	hings	and
Coverings in Bi	partite graphs							
Unit: III					and the second sec		1	8
	Num <mark>ber, Vizing</mark> 's The	orem	n, Chromatic number,	Bro	ok's theorem.			
Unit: IV	2				6			8
	ar grap <mark>hs, Dual Graphs</mark>							rected
	d Paths, Directed Cycle	s, Flo	ows, Cuts, The Max-F	low	Min –Cut the	orem.		
Unit: V	1.1.114	a parte	Manual No.	-		1		8
	onnectedness and comp					d sep	arabil	ity –
directed circuits	- shortest path algorith	m –	planarity testing – iso			TTan		90
Dools for Stud	***	1		W.	Total Lecture	e Hou	rs	0
Books for Stud	d U.S.R.Murty, Graph	Theo	ry with Applications	Nor	th Holland			
Publications, Ne		meo	ry with Applications.	INOI	ui Honanu			
	Chapter 1 : Section 1.3 t	017	7 and 1 9					
	Chapter 2: Section 2.1 to							
	Chapter 4: Section 4.1,							
	Chapter 5: Section 5.1							
Unit III	- Chapter 6 : Section 6.							
	Chapter 8 : Section 8.							
Unit IV	- Chapter 9 : Section 9.							
	Chapter 10 : Section	10.1	to 10.3					
2. Narsingh Dec	: Graph Theory with A	oplic	ations to Engineering	and	Computer Sc	ience,	,	
Prentice Hall, 19								
Unit V -	Chapter 11 : Section 11	.4 to	0 11.7					

Books	for References:								
1. Joł	n Clark and Derek Allan Holton, A first look at Graph Theo	ry, World							
Sci	entificPublications, Singapore, 1991.								
2. Ha	rary, Graph Theory, Narosa Publishing House, New Delhi, 1988.								
3. S.F	3. S.K.Yadav, Elements of Graph Theory, Ane Books Pvt. Ltd, New Delhi, 2010								
Web R	Web Resources								
https:/	/nptel.ac.in/courses/111/106/111106102/								
https://	nptel.ac.in/courses/111/106/111106050/								
https://	www.math.kit.edu/iag6/lehre/graphtheo2015w/media/lecture_notes.pdf								
Course Outcomes K Level									
Course	e Outcomes	K Level							
	e Outcomes e successful completion of the course , the students will be able to	K Level							
		K Level							
On th	e successful completion of the course , the students will be able to								
On th CO1:	e successful completion of the course , the students will be able to Understand the definition of different types of graphs and Sperner's lemma.	K2							
On th CO1:	e successful completion of the course , the students will be able to Understand the definition of different types of graphs and Sperner's lemma. Make use of graph theory concepts in travelling salesman problem, Matching	K2							
On th CO1: CO2:	e successful completion of the course , the students will be able to Understand the definition of different types of graphs and Sperner's lemma. Make use of graph theory concepts in travelling salesman problem, Matching and covering.	K2 K3							
On th CO1: CO2: CO3:	e successful completion of the course , the students will be able to Understand the definition of different types of graphs and Sperner's lemma. Make use of graph theory concepts in travelling salesman problem, Matching and covering. Categorize chromatic number, edge chromatic number with theorems.	K2 K3 K4							

CO & PO Mappings:

CO & P	O Mapping	s: (?)			3	(GA)	
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2		JAN 1		2	-
CO 2	2	2	2	1	2	1	1
CO 3	2	1	1	1	2	-	1
CO 4	3	2	1	11	1	1	2
CO 5	3	2	3	2	2	1	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hours	Pedagogy
Ι	The Incidence and Adjacency Matrices, Sub graphs, Vertex degrees,	18	PPT, Chalk
	Paths and Connection, Cycles, Sperner's lemma, Trees, Cut edges		&
	and Bonds, Cut vertices		Talk, quiz
II	Euler tours, Hamiltonian cycles, The travelling salesman problem,	18	Chalk &
	Matchings, Matchings and Coverings in Bipartite graphs		Talk, PPT
III	Edge Chromatic Number, Vizing's Theorem, Chromatic number,	18	Chalk &
	Brook's theorem		Talk
IV	Plane and Planar graphs, Dual Graphs ,Euler's formula ,Bridges ,	18	Chalk &
	Kuratowski's Theorem, Directed Graphs, Directed Paths, Directed		Talk,
	Cycles, Flows, Cuts, The Max-Flow Min –Cut theorem.		Assignment
V	Algorithms : connectedness and components – spanning tree – cut	18	Chalk &
	vertices and separability – directed circuits – shortest path algorithm		Talk, PPT
	– planarity testing – isomorphism		

Course Designed by: Dr.V.Ramachandran and Dr.A.Hamari Choudhi

For			ing Outcome kamination -]			ntior	n & Ass	essi	nent (L	OBE	2)				
			Mapping – K	Lev			rse Out	con					Q 4 .		S 4 ¹
Inte			K Level		Section MCQs	ection A			Section				Sectio	n	Section
rnal									Short A		-		C Either	• • •	D
					No. of.		K -		No. of.		K-		Choic		Open Choice
CT	001	1	11 4 170		Questio	ns	Level	7.0	Questi	ons	Le	vel		C	
CI	CO		Upto K2		2		K1&K		1		K1		2		3
AI	CO2		Upto K3		2		K1&K		2		K2		2		3
CI	CO3		Upto K4		2		K1&K		1		K2		2		3
AII	CO4	1	Upto K4		2		K1&K	32	2		K2		2		3
Que Patt	stion ern		lo. of Question be asked	IS	4		222	~	3				4		3
CIA II	I &		lo. of Question be answered	IS	4	1)))	3	3			2		2
			Iarks for each uestion	1	1				2	Ň		3	5		10
		Ť	otal Marks for ach section	1	4	7	R	Y	6		9		10		20
	Distr		ution of <mark>Mar</mark> l	KS W	ith K Le	vel (CIAI&	CI	AII		Ð				
	K Level	l	Section A (Multiple Choice Questions)	(Sh An	ction B fort swer estions)	C (Ei Or	ction ither / ioice)	D	ction (Open noice)	To Ma	tal arks	(M wi	of Iarks thout oice)	Co of	onsolidate %
	K1		2	2	-			Æ		4	13	6.6	67	17	
	K2		2	4	M.M.M.		25			6	0	10			
CIA	K3			P	1.11414	10	10	20	1.44	30		50		50	
	K4		3	80	the mi	10		10		20	37		.33	33	
	Mark	s	4	6		20		30		60	1	10		10	
	K1		2	2	0					4		6.6	67	17	
CIA	K2		2	4	0				450	6		10			
Ι	K3				1	10		20	1	30		50		50	
	K4					10	пшэ	10		20			.33	33	
	Mark	s	4	6		20		30		60		10	0	10	0

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.

	ative Ex mes (CC		tion – I	Blue P	rint Aı	rticulati	on Mappi	ng – K Lev	vel with Co	urse		
S.No			MO)s		Short A	nswers	Section	C Section D			
				No. o	•	K –	No. of	K –	(Either /			
				Ques	tions	Level	Questio	n Level	or Choice)	Choice)		
1	CO1	Upto	K2	2		K1 & K2	1	K1	2(K1 & K1)	1(K2)		
2	CO2	CO2 Upto K3		2		K1 & K2	1	K1	2(K3 & K3)	1(K3)		
3	CO3	Upto	to K4 2		6	K1 & K2	al anor	K2	2(K3 & K3)	1(K4)		
4	CO4	Upto	K4	2		K1 & K2	01	K2	2(K4 & K4)	1(K3)		
5	CO5	Upto	K3	2	13	K1 & K2	ET A	K2	2(K2 & K2)	1(K3)		
No. of Questions to be Asked			10			5	- Con	10	5			
No. of answer	Question	ns to be	18	10			5) Č	5	3		
Marks	for each	questi	on	1	-	TUR	2		5	10		
Total I	Marks fo	r each s	section	10		ap	10		25	30		
(Figur	es in pa	renthes	sis deno	otes, qu	uestion	is shoul	d be asked	with the g	<mark>given</mark> K lev	el)		
	Distrib	oution	of Mai	rks wi	th K I	Level		5				
K Level		Section A (Multiple				the second se		1 1000			% of (Marks	Consolidated %
	Choie Ques	ce tions)	Answ Quest		Choi	ce)	Choice)		without choice)			
K1	5		4	27	114	alex.	alles and	9	7.5	17		
K2	5		6	- C	1111	20		11	9.17			
K3				0.1	25		20	45	37.5	37		
K4				N6	25		30	55	45.83	46		
Marks	10		10		50		50	120	100	100		
NB: H	ligher le	vel of p	erform	nance (of the s	tudents	s is to be as	sessed by	attempting	higher level		
of K le	e	•						·	- 0	-		

Section	ı A (Mı		active Examinations - Question Paper – Format ice Questions)
		uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	•
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	5 9 00r
9	CO5	K1	
10	CO5	K2	6 / D 0000 1 8
Section	n B (Sho	ort Answer	s)
		uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	101
12	CO2	K1	
13	CO3	K2	
14	CO4	K2 0	
15	CO5	K2	
Section	n C (Eit	her/Or Ty	pe)
		uestions	$(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	P
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	0
20) b	CO5	K3	தாயக்கு
NB: Hi	igher le	vel of perf	ormance of the students is to be assessed by attempting higher level
of K le		-	
	D (0	en Choice)	1
	і D (Op		
Section Answe		Three ques	tions (3x10=30 marks)
Section			tions (3x10=30 marks) Questions
Section Answe	r Any T	Three ques	
Section Answe Q.No	r Any T CO	Three ques K Level	
Section Answe Q.No 21	r Any T CO CO1	Fhree ques K Level K2	
Section Answe Q.No 21 22	r Any T CO CO1 CO2	Chree quesK LevelK2K3	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

(For those who joined in 2021-2022 and after)

Course Name	CLASSICAL MECHANICS										
Course Code	21PMTC15	L	Р	С							
Category	Core	6	-	4							
Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENURSH											
Course objectives:											
 To recall the basic concepts of motion of a particle. To understand D' Alembert's Principle and Lagrangian's Formulation. To derive the Lagrange's Equations from Hamilton's Principle. To apply the concept of the Equations of Motion and the Equivalent one-dimensional Problems. To understand the Kepler's law and Inverse-Square Law of Force. 											
Unit: I											
Mechanics of a	Particle, Mechanics of a System of Particles, Constraints.										
Unit: II	Tarticle, Mechanics of a System of Farticles, Constraints.		1	8							
-	principle and Lagrange's equations, Velocity – dependent potentia ction, Hamilton's principle, Some techniques of the calculus of var			the							
Unit: III			1	8							
to non-holonon	agrange's equations from Hamilton's principle, Extension of Hamil nic systems, Advantages of a variational principle formulation, metry properties.										
Unit: IV	So the state of th		1	8							
	e equivalent one – body problem. The equations of motion and first- dimensional problem and Classification of orbits, The virial theorem		grals	, The							
Unit: V			1	8							
closed orbits (B	al equation for the orbit and integrable power – law potentials, (ertrand's theorem), The Kepler problem : Inverse square law of force epler problem, The Laplace – Runge- Lenz vector.										
	Total Lecture	Hou	rs 9	0							
Books for Stud H.Goldstein, C	y: Classical Mechanics, Second Edition, Addison Wesley, Newyork, 19	980.									
Unit I Unit II Unit III - Unit IV - Unit V -	 Chapter 1 : Section 1.1 to 1.3 Chapter 1 : Section 1.4, 1.5 & Chapter 2 : Section 2.1, Chapter 2 : Section 2.3 to 2.6 Chapter 3 : Section 3.1 to 3.4 Chapter 3 : Section 3.5 to 3.9 	2.2									

Books for References: 1. Madhumangal, A Course on Classical Mechanics, Narosa Publishing Private Ltd, New Delhi, 2009. 2. B.D.Gupta, Satya Prakash, Classical Mechanics, 6th Edition, Kedar Nath Ram Nath Publications, Mearut, 1987-1988 3. R.Douglas Gregory, Classical Mechanics, Cambridge University Press. Web Resources http://staff.um.edu.mt/jmus1/diffeq1.pdf https://ocw.mit.edu/courses/physics/8-09-classical-mechanics-iii-fall-2014/lecture-notes/ http://math.huji.ac.il/~razk/Teaching/LectureNotes/LectureNotesMechanics.pdf **COURSE OUTCOMES K** Level On the successful completion of the course , the students will be able to **CO1:** Demonstrate the understanding of the fundamental concepts in dynamics of K2 system of particle. Derive D'Alembert 's principle, Lagrange's equations and Hamilton's principle. **CO2:** K4 Represent the complicated mechanical systems using the Lagrangian and K2 **CO3:** Hamiltonian principle. COLUMNA COUT Explain the concepts of one –dimensional problem and Classification of orbits. **CO4:** K3 CO5: Derive Bertrand's theorem, The Kepler problem, the Laplace – Runge- Lenz K4 vector.

CO & PO Mapping:

0000	o o o o o o o o o o o o o o o o o o o										
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7				
CO 1	2	2	1		2	E .	1				
CO 2	2	2	1	2	2	20	1				
CO 3	2	2	110	2	1 1 / 3	54 -	1				
CO 4	2	2	11/1/11/1	1	2	-	1				
CO 5	2	2 99 1	20/11/7 5	6 1	2	_	1				
			and the second se		the second se						

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

UNIT	COURSE NAME	Hours	Pedagogy
I	Mechanics of a Particle, Mechanics of a System of Particles, Constraints.	18	Chalk & Talk
II	D'Alembert 's principle and Lagrange's equations, Velocity – dependent potentials and the dissipation function, Hamilton's principle, Some techniques of the calculus of variations	18	Chalk & Talk
III	Derivation of Lagrange's equations from Hamilton's principle, Extension of Hamilton's principle to non-holonomic systems, Advantages of a variational principle formulation, Conservation theorems and Symmetry properties.	18	Chalk & Talk
IV	Reduction to the equivalent one – body problem. The equations of motion and first integrals, The equivalent one –dimensional problem and classification of orbits, The virial theorem	18	Chalk & Talk
V	The differential equation for the orbit and integrable power – law potentials, Conditions for closed orbits (Bertrand's theorem), The Kepler problem : Inverse square law of force, The motion in time in the Kepler problem, The Laplace – Runge- Lenz vector.	18	Chalk & Talk

Course Designed by: Dr.S.Andal and Dr.R.Bhavani

		00			and the second			
	Lear	ning Ou <mark>tcome</mark> B	<mark>ased</mark> Educati	ion & Assess	sment (LOB	E)		
Form	native l	Examina <mark>tion - Bl</mark>	ue Print	M Z				
Artic	culation	n Mappin <mark>g – K L</mark>	evels with Co	ourse Outco	mes (COs)	E		
Inte	Cos	K Level	Section A	17	Section B	6	Section	Section D
rnal		16	MCQs		Short Answ	vers	C	Open
		3	No. of.	K - Level	No. of.	K -	Either or	Choice
		121	Questions	11.4.2.	Questions	Level	Choice	
CI	CO1	Upto K2	2 10 0100	K1& K2	1	K1	2	3
AI	CO2	Upto K3	2	K1& K2	2	K2	2	3
CI AII	CO3	Upto K4	2	K1& K2	1	K2	2	3
AII	CO4	Upto K4	2	K1& K2	2	K2	2	3
Ques Patte		No. of Questions to be asked	4		3		4	3
CIA II	I &	No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

	Distrib	oution of Ma	rks with K	Level CIA	I & CIA I	I		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	,		4	6.67	17
	K2	2	4			6	10	
CIA	K3			10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2	2	1000	4	6.67	17
CIA	K2	2	4	55 A A	A 16	6	10	
Π	K3		10/1	10	20	30	50	50
	K4		0/ /	10	10	20	33.33	33
	Marks	4	6	20	30	60	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	MOQs	179	Short Ans	wers	Section C	Section D
		12	No. of	K –	No. of	K –	(Either /	(Open
		E	Questions	Level	Question	Level	or	Choice)
		1=1.	The second second	1 au			Choice)	
1	CO1	Upto K2	2	K1 &	1	K1	2(K1 &	1(K2)
				K2	min new second	2	K1)	
2	CO2	Upto K3	2	K1 &	1	K1	2(K3 &	1(K3)
		_		K2			K3)	
3	CO3	Upto K4	2	K1 &	1 5	K2	2(K3 &	1(K4)
				K2	551		K3)	
4	CO4	Upto K4	2	K1 &	1	K2	2(K4 &	1(K3)
				K2			K4)	
5	CO5	Upto K3	2	K1 &	1	K2	2(K2 &	1(K3)
				K2			K2)	
No. of	f Questio	ons to be	10		5		10	5
Asked	l							
No. of	f Questio	ons to be	10		5		5	3
answe	ered							
Marks	for each	n question	1		2		5	10
Total	Marks fo	or each section	10		10		25	30
(Figu	res in pa	renthesis den	otes. questior	ıs should	be asked w	ith the gi	ven K level)	

(Figures in parentnesis denotes, questions should be asked with the given K l

]	Distribution	of Marks wi	th K Level				
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	-
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NR. UI	abor loval of r	orformonco a	f the student	s is to be ass	aggad by	ottomoting	highor loval

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

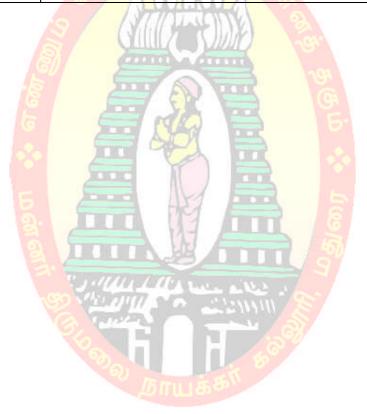
Summative Examinations - Question Paper – Format

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Academic Council Meeting Held on 29.04.2021

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19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K4	
20) b	CO5	K4	
NB: H	igher le	vel of perf	ormance of the students is to be assessed by attempting higher level
of K le	vels	-	
Section	n D (On	en Choice)	
Dection	i D (Ob	ch choice)	
		Three quest	
Answe	r Any T	Three ques	tions (3x10=30 marks)
Answe Q.No	r Any T CO	Three ques K Level	tions (3x10=30 marks)
Answe Q.No 21	r Any T CO CO1	Three ques K Level K2	tions (3x10=30 marks)
Answe Q.No 21 22	r Any T CO CO1 CO2	Three quest K Level K2 K4	tions (3x10=30 marks)







MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

(For those who joined in 2021-2022 and after)

Course N	lame	ADVANCED ALGEBRA			
Course C	Code	21 PMTC21	L	Р	С
Category	7	Core	6	-	4
Nature of	cours	e: EMPLOYABILITY 🖌 SKILL ORIENTED 🛛 ENTREPRENU	URS	HIP	
Course o	bjecti	ves:			
• To fai	miliari	ze various methods on solving algebraic equations.			
		e Schwarz's inequality.			
	•	about various transformations.			
		out determinants.			
	plain c	canonical and triangular forms.		1	0
Unit: I				1	8
Elementa	ary Bas	sic Con <mark>cepts - Dual S</mark> paces – Inner Product Spaces.			
Unit: II				1	8
The Alge	ebra of	linear transformations, Characteristic roots			
Unit: III				1	8
Canonica	al form	is, Triangular form, Nilpotent transformations			
Unit: IV				1	8
Trace and	l Trans	pose, Determinants.			
Unit: V		" J. Mar Latta men ailes .		1	8
Hermitia	n, Uni	tary and Normal transformations			
		Total Lecture 1	Hou	s 9	0
Books for	r Stud	y:			
I. N.Hers 2010.	stein, T	opics in Algebra, Second Edition, John Wiley and Sons, New Delhi,	Rep	rint	
	Unit I	- Chapter 4: Section 4.1, 4.3 ,4.4.			
	Unit I	I - Chapter 6: Section 6.1 and 6.2			
		II - Chapter 6: Sections 6.4 and 6.5			
		V - Chapter 6 : Section 6.8 and 6.9			
		<i>V</i> - Chapter 6: Section 6.10			
Books for					

- 1. Thomas W.Hungerford, Algebra, Spinger International Edition, Newyork, 2009.
- 2. M.L. Khanna, Linear Algebra, Jai PrakashNath Publications, Meerut, 1984.
- 3. Martin Isaacs ,**Algebra**, Library of Congress Cataloging-in-Publication Data, Edition, New Delhi, 2009.

Web Resources https://nptel.ac.in/courses/111/106/111106131/ https://www.youtube.com/watch?y=yKRbG9Y5pYY&

https://www.youtube.com/watch?v=yKRbG9Y5pYY&list=PLEAYkSg4uSQ3AaON5oCbS6ecwK soopBN3

https://www.youtube.com/watch?v=cDCFS68W7ZA

Cours	Course outcomes:K LevelOn the successful completion of the course , the students will be able to					
On th						
CO1:	Explain the properties of Inner Product Spaces.	K2				
CO2:	Use linear transformation for characteristic roots and vectors	К3				
CO3:	Represent Canonical forms, Triangular form, Nilpotent transformations	K2				
CO4 :	Determine the Trace and transpose, determinants	K3				
CO5:	Evaluate the normal transformation	K5				

CO & PO Mapping:

C	co a romapping.								
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	6 PO 7		
CO 1	3	2	2	2	2	2	1		
CO 2	2	3	1	2	3	2	1		
CO 3	3	2			-	_ 1	-		
CO 4	2	2	2		2	6 2	-		
CO 5	3	2	2	2	1	2	1		

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hours	Pedagogy
Ι	Elementary Basic Concepts - Dual Spaces – Inner Product Spaces.	18	Chalk &Talk
II	The Algebra of linear transformations, Characteristic roots	18	Chalk &Talk
III	Trace and Transpose, Determinants.	18	Chalk & Talk
IV	Trace and Transpose, Determinants.	18	Chalk &Talk
V	Hermitian, Unitary and Normal transformations.	18	Chalk & Talk

Course Designed by: Dr.A.Hamari Choudhi and Dr.V.Ramachandran

Inte Cos	K Level	vels with Course Outc Section A		Section B		Section C	Section D	
rnal			MCQs		Short Answ	vers	Either or	Open
			No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI AI	CO1	Upto K2	2	K1 & K2	1	K1	2	3
	CO2	Upto K3	2	K1 & K2	2	K2	2	3
CI AII	CO3	Upto K4	2	K1 & K2	1016	K2	2	3
	CO4	Upto K4	2	K1 & K2	2	K2	2	3
Ques Patte CIA 1		No. of Questions to be asked	4	$\boldsymbol{\omega}^{\prime}$	3	ĝ.	4	3
		No. of Questions to be answered	4	R	3	9.61	2	2
		Marks for each question		PL	2		5	10
		Total Marks for each section	4	N	6	È.	10	20

	Distrib	ution of <mark>Mar</mark> l	ks with K Lev	vel CIA I &	CIA II			
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2		0	4	6.67	17
	K2	2	4		- R /	6	10	
CIA	K3		Y	10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2			4	6.67	17
CIA	K2	2	4			6	10	
II	K3			10	20	30	50	50
	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	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)

Short Ans	wers	Section C	Section D
No. of	K –	(Either /	(Open
el Question	Level	or Choice)	Choice)
& 1	K1	2(K1 & K1)	1(K2)
& 1	K1	2(K3 & K3)	1(K3)
¥ 1	K2	2(K3 & K3)	1(K4)
& 1	K2	2(K4 & K4)	1(K3)
¥ 1	K2	2(K2 & K2)	1(K3)
5	Q.	10	5
5		5	3
2		5	10
10		25	30
10	10	10	

]	Distribution o	f <mark>Mar</mark> ks with	K Level				
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6	2	- 75 V	11	9.17	
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NR• Hi	pher level of n	erformance o	f the student	s is to be ass	essed by a	attemnting	higher level

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

<u> </u>			imative Examinations - Question Paper – Format
			ice Questions)
		uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	AND 5
8	CO4	K2	59 00 A
9	CO5	K1	
10	CO5	K2	D 0000 1
		ort Answer	s)
		uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	100
12	CO2	K1	
13	CO3	K2	
14	CO4	K2 0	
15	CO5	K2	
Section	C (Eit	ther/Or Ty	pe)
Answe	r All Q	uestions	$(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	CO1	K2 💿	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K2	
18) b	CO3	K2	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K4	201
20) b	CO5	K4	நாயக்க
			ormance of the students is to be assessed by attempting higher level
of K le		ľ	· · · · · · · · · · · · · · · · · · ·
		en Choice)	
		Fhree ques	
Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K2	
24	CO4	K3	
25	CO5	K5	
	000	11.5	<u> </u>

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

(For those who joined in 2021-2022 and after)

Course Name	PARTIAL DIFFERE	ENTI	AL EQUATIONS					
Course Code	21 PMTC22				L	Р	С	
Category	Core				6	-	4	
Nature of cours	e: EMPLOYABILITY	\checkmark	SKILL ORIENTED	ENTREPREN	URS	HIP		
Course objectiv	Course objectives:							
 To solve dif To classify s To derive or To solve Dir 	 To solve different types of PDEs using various methods. 							
Unit: I	and Saufa and Canadia	of E		esification of Inte	~~1~		18	
	and Surfaces – Genesis first Order – Partial 's Method.		P Division Division and Divisio		0			
Unit: II		-	ACT ES				18	
U U	es Thr <mark>ough</mark> a Given Cu	rve -	-Quasi-Linear Equation	<mark>on –Non- L</mark> inear H	First C	Order		
P.D.E.	200						10	
Unit: III				estion of Count	Orda		18	
	D.E.: Genesis of Seconal Wave Equation – V							
	on of a String of Finite					- 1111		
Unit: IV		Leng	un (internou or sepuru			1	18	
Problem – The Upper Half Plan	tion Boundary Value F Dirichlet Problem for ne – The Dirichlet Inter The Neumann Probler rem.	the tior F	Upper Half Plane – Problem for a Circle –	The Neumann Provident Prov	roblen terior	n for Prob	the olem	
Unit: V		2				1	18	
Green's function	on, Heat Conduction	Prob	lem – Heat Conduc	tion –Infinite Ro	d C	ase-	Heat	
Conduction Fini	te Rod Case – Duhame	l's P	rinciple – Wave Equa			-	tion	
				Total Lecture	e Hou	rs 9	90	
Books for Stud	•	• •			1 1 . 1			
	n Elementary Course	in Pa	artial Differential Eq	uation, Narosa Pi	iblish	ing		
Company, Chen		1 to	1.8 Unit II - Chapter	$1 \cdot \mathbf{S}_{\text{option}} = 1 \cdot 0$ to 1	1 1 1			
			2.3 (2.3.1 to 2.3.3and		1			
	- Chapter 2 : Section 2			2.3.3)				
	- Chapter 2 : Section 2							
	-		.5.1 and 2.5.2)					
			.6.1and 2.6.2)					

Books for References:

- 1. E.T. Copson, Partial differential equations, S. Chand and Company Ltd., New Delhi, 1984.
- 2. Jeffrey Raich, **Partial differential equations**, Springer Publisher, Newyork, 1991.
- 3. Ian Sneddon, Elements of Partial Differential Equations, Mc Graw-Hill Book Company, New Delhi, 1985.

Web Resources

https://www.iist.ac.in/sites/default/files/people/IN08026/Canonical_form.pdf. https://nptel.ac.in/courses/111/107/111107111/

https://nptel.ac.in/courses/122/107/122107037/

COUR	SE OUTCOMES	K Level				
On th	On the successful completion of the course, the students will be able to					
CO1:	Solve the Linear first order partial differential equations using various methods.	K3				
CO2:	Analyze the Semi-linear, Quasi-linear & Non-linear first order partial	K4				
	differential equations.					
CO3:	Classify the second order partial differential equations	K4				
CO4:	Apply the concepts of partial differential equations in solving boundary value	K3				
	problems.					
CO5 :	Determine the solutions for homogeneous and non-homogeneous partial	K3				
	differential equations.					

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	1	1	3	1	1
CO 2	3	2	1	1/	2	E. 1	-
CO 3	3	2	1	MA	2	S 1	1
CO 4	3	2	1		2	-	-
CO 5	3	2	1	1	2		-

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hours	Pedagogy
I	P.D.E –Curves and Surfaces – Genesis of First Order P.D.E – Classification of Integrals – Linear Equation of the first Order – Partial Differential Equation –Compatible Systems – Charpit's Method – Jacobi's Method.	18	Chalk & Talk
II	Integral Surfaces Through a Given Curve –Quasi-Linear Equation –Non- Linear First Order P.D.E.	18	Chalk & Talk
III	Second Order P.D.E.: Genesis of Second Order P.D.E – Classification of Second Order P.D.E - One- Dimensional Wave Equation – Vibration of an Infinite String –Vibration of a Semi – infinite String – Vibration of a String of Finite Length (Method of	18	Chalk & Talk

	Separation of Variables).		
IV	Laplace's Equation Boundary Value Problems- Maximum and Minimum Principle- The Cauchy Problem – The Dirichlet Problem for the Upper Half Plane – The Neumann Problem for the Upper Half Plane – The Dirichlet Interior Problem for a Circle – The Dirichlet Exterior Problem for a Circle – The Neumann Problem for Circle – The Dirichlet Problem for a Rectangle – Harnack's Theorem.	18	Chalk & Talk
V	Green's function, Heat Conduction Problem – Heat Conduction – Infinite Rod Case- Heat Conduction Finite Rod Case – Duhamel's Principle – Wave Equation –Heat Conduction Equation	18	Chalk & Talk

Course Designed by: Mrs.R.Sumathi and Dr.M.Saravanan

Artic	native E culation	ning Outcome Bas Examination - Blue Mapping – K Lev	<mark>e Print</mark> vels with Cou	0.1.2	comes (COs)	JE)		
Inte	Cos	K Level	Section A		Section B	1705	Section C	Section D
rnal	18	MCQs	A	Short Answ	vers	Either or	Open	
		a	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI AI	CO1	Upto K2	2	K1 & K2		K1	2	3
	CO2	Upto K3	2	K1 & K2	2	K2	2	3
CI AII	CO3	Upto K4	2	K1 & K2	A	K2	2	3
	CO4	Upto K4	2	K1 & K2	2	K2	2	3
Ques Patte CIA		No. of Questions to be asked	4			100	4	3
		No. of Questions to be answered	4		3 50		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

	Distrib	ution of Mar	ks with K Lev	vel CIA I &	CIA II			
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	, i i i i i i i i i i i i i i i i i i i		4	6.67	17
	K2	2	4			6	10	
CIA	K3			10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2	2	1000	4	6.67	17
CIA	K2	2	4	- A A A	A 16	6	10	1
Π	K3		10/1	10	20	30	50	50
	K4		0/ /	10	10	20	33.33	33
	Marks	4	6	20	30	60	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	MCQs	-15	Short Ans	wers	Section C	Section D
		12-1	No. of	K –	No. of	K –	(Either /	(Open
		13	Questions	Level	Question	Level	or	Choice)
		13		7420		U o	Choice)	
1	CO1	Upto K2	2	K1 &	1	K1	2(K1 &	1(K2)
		4.0	a distante	K2		100	K1)	
2	CO2	Upto K3 📎	2	K1 &	1	K1	2(K3 &	1(K3)
		_	0.00	K2		B)	K3)	
3	CO3	Upto K4	2	K1 &	1	K2	2(K3 &	1(K4)
			0	K2	1. 2		K3)	
4	CO4	Upto K4	2	K1 &	1	K2	2(K4 &	1(K3)
				K2			K4)	
5	CO5	Upto K3	2	K1 &	1	K2	2(K2 &	1(K3)
				K2			K2)	
No. of	Questio	ns to be	10		5		10	5
Asked	l							
No. of	Questio	ns to be	10		5		5	3
answe	red							
Marks	for each	question	1		2		5	10
Total Marks for each section			10		10		25	30
(Figu	res in pa	renthesis den	otes. questioi	ıs should	be asked w	ith the gi	ven K level)	

]	Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100
NB: Hig	NB: Higher level of performance of the students is to be assessed by attempting higher level						
of K lev	vels.		D 000	001			

Section	Section A (Multiple Choice Questions)							
		uestions	Freedom and an and a second seco					
			(10x1=10 marks)					
Q.No	CO	K Level	Questions					
1	C01	K1						
2	CO1	K2						
3	CO2	K1 🕞						
4	CO2	K2						
5	CO3	K1						
6	CO3	K2						
7	CO4	K1	P will fill filler and the second					
8	CO4	K2						
9	CO5	K1						
10	CO5	K2						
Section	B (Sho	ort Answer	rs)					
Answei	r All Qu	uestions	(5x2=10 marks)					
Q.No	CO	K Level	Questions					
11	CO1	K1						
12	CO2	K1						
13	CO3	K2						
14	CO4	K2						
15	CO5	K2						
Section	C (Eit	her/Or Ty	pe)					
Answei	Answer All Questions (5 x 5 = 25 marks)							
Q.No	CO	K Level	Questions					
16) a	CO1	K3						
16) b	CO1	K3						
17) a	CO2	K4						

Summative Examinations - Question Paper – Format

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Page 108

17) b	CO2	K4	
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hi	igher le	vel of perf	rmance of the students is to be assessed by attempting higher level
of K lev	vels		
		en Choice)	
Section	D (Op	en Choice) Three quest	ions (3x10=30 marks)
Section	D (Op		ions (3x10=30 marks) Questions
Section Answer	n D (Op r Any T	Three ques	
Section Answer Q.No	n D (Op r Any T CO	Three quest K Level	
Section Answer Q.No 21	n D (Op r Any T CO CO1	K Level	
Section Answer Q.No 21 22	D (Op r Any T CO CO1 CO2	KLevelK3K4	





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

(For those who joined in 2021-2022 and after)

Course Name	NUMERICAL ANALY	SIS				
Course Code	21 PMTC23			L	P	С
Category	Core			6	-	4
Nature of cours	e: EMPLOYABILITY	✓ SKILL ORIENTED	ENTREPREN	URS	HIP	
Course Objecti	ves:	ALL BANK				
To develop	Numerical computational	skills.				
-	Numerical computational					
	e difference equations and					
	rate understanding and im		al solution of algo	rithm	s bas	ed
for employa			1981			
• To find the	errors in the approximation	n				
Unit: I	5		1.04		1	8
Bisection metho	d – Iteration method (app	proximation method) base	ed on first degree e	equati	on,	
	quation, General Iteration	Methods .	1 5.			
Unit: II		AN ES				8
	: for <mark>ward substitution n</mark>					
	hod, <mark>Gauss Jordan metho</mark>	d – triangulation method	<mark>l – LU dec</mark> omposi	tion-	Cho	lesky
method – Partiti	on method.		5			
Unit: III			S			8
Iterative metho		methods, Gauss-Seide			Simi	larity
Unit: IV	- Eigen values – Eigen ved	clors –Jacobi method for	symmetric matric	es.	1	8
I	1 1.11400	1.000				0
0 0	Newton Interpolation, Fin ferences, Hermite Interpol	// share shares a single share shares a second shares a second shares a second share shares a second share shares a second share shares a second share	, Interpolating Pol	ynom	nials	
Unit: V	10 Caller		27		1	8
Numerical Diff	erentiation, Partial Diffe	erentiation, Numerical	Integration, Metl	nods	base	d on
Interpolation, C	omposite Integration meth	nods.				
		ராய கல்	Total Lecture	Hou	rs 9	0
Books for Stud						
	K.Iyengar, R.K.Jain, N			l En	gine	ering
computation –	4th edition, New age inter	rnational Pvt limited, Ne	w Delhi, 2009.			
_						
	Init I - Chapter 2 : Sectio					
	Unit II - Chapter 3 : Sectio					
	Unit III - Chapter 3 : Section					
	Unit IV - Chapter 4 : Section					
	Unit V - Chapter 5 : Sectio	on 5.1, 5.2, 5.5 - 5.7, 5.9.				
Books for Refe		Nous A an International	nublishers Nor-F		1007	
1. O.Snankar F	Rao, Numerical Analysis ,	, new Age International	publishers, new L	veini,	1997.	

- 2. Rainer Kress, Numerical Analysis, Springer international Edition, New Delhi, 2010.
- 3. S.R.K.Iyengar ,R.K.Jain ,**Numerical Methods**, , New age international Pvt limited, New Delhi, 2008

Web Resources

http://www.ece.mcmaster.ca/~xwu/part6.pdf http://www.cis.upenn.edu/~cis515/cis515-12-sl2.pdf https://wiki.math.ntnu.no/_media/tma4215/2012h/note.pdf

COUR	SE OUTCOMES	K Level			
On the successful completion of the course , the students will be able to					
CO1:	Demonstrate the understanding of direct methods and iterative methods for	K2			
	equations				
CO2:	Apply proper methods for solving transcendental, algebraic and system of	K3			
	equations				
CO3:	Evaluate interpolation and extrapolation using tabular values	K5			
CO4:	Associate tabular values with integration and differentiation	K2			
CO5:	Use iterative methods for PDE	K3			

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	3	2	3	2	-
CO 2	3	2	3	2	2	2	1
CO 3	2	2	2	2	3	2	2
CO 4	2	3	2		2	2	2
CO 5	2	2	-		2	ē.	-

CONTRA COUNT

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hours	Pedagogy
Ι	Bisection method – Iteration method (approximation method) based on first degree equation, second degree equation, General Iteration Methods.	18	Chalk & Talk
Π	Direct methods: forward substitution method, back substitution method, Cramer rule, Gauss elimination method, Gauss Jordan method – triangulation method – LU decomposition– Cholesky method – Partition method.	18	Chalk & Talk
III	Iterative methods - Jacobi iteration methods, Gauss-Seidel iteration methods, Similarity transformation – Eigen values – Eigen vectors – Jacobi method for symmetric matrices.	18	Chalk & Talk
IV	Lagrange's and Newton Interpolation, Finite Difference Operators, Interpolating Polynomials using Finite Differences, Hermite Interpolation.	18	Chalk & Talk
V	Numerical Differentiation, Partial Differentiation, Numerical	18	Chalk &

		gration, Methods b	based on Inter	polation	, Composite	Integrati	on	Talk
	meth	ods.						
Forma	Learı ative E	gned by: Dr.M.Sar ning Outcome Bas xamination - Blue	sed Education e Print	n & Asse	essment (LOI	BE)		
	ulation Cos	Mapping – K Lev K Level	vels with Cou Section A	rse Out	comes (COs) Section B		Section C	Section I
rnal	COS	K Level					Either or	Open
1 mai			MCQs No. of.	K -	Short Answ No. of.	vers K -	Choice	Choice
			Questions	Level	Questions	Level		
CI AI	CO1	Upto K2		K1 & K2	1	K1	2	3
	CO2	Upto K3	2 (11)	K1 & K2	2	K2	2	3
CI AII	CO3	Upto K4	2	K1 & K2	1	K2	2	3
-	CO4	Upto K4	2	K1 & K2	2	K2	2	3
Quest Patter CIA I	n	No. of Questions to be asked		B	3	**	4	3
		No. of Questions to be answered	4	T	3	ிரை	2	2
		Marks for each question	1	B	2	69	5	10
		Total Marks for each section	4		6-10-	5	10	20

	Distrib	ution of Mar	ks with K Lev	vel CIA I &	CIA II			
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	6.67	17
	K2	2	4			6	10	
CIA	K3			10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2	2	1000	4	6.67	17
CIA	K2	2	4	~^ ^ A	A	6	10]
II	K3		10/1	10	20	30	50	50
	K4		9/ /	10	10	20	33.33	33
	Marks	4	6	20	30	60	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)

		/	MCO	The state				
S.No	COs	K - Level	MCQs	- 117	Short Ans		Section C	Section D
		6	No. of	K –	No. of	K –	(Either /	(Open
		121	Question	Level	Question	Level	or	Choice)
		14.	S. MAL	and and	and the second	B	Choice)	
1	CO1	Upto K2	2	K1 &	1	K1	2(K1 &	1(K2)
			Carlo	K2		2	K1)	
2	CO2	Upto K3	2	K1 &	1	K1	2(K3 &	1(K3)
		_		K2			K3)	
3	CO3	Upto K4	2	K1 &	1	K2	2(K3 &	1(K4)
		-		K2	551		K3)	
4	CO4	Upto K4	2	K1 &	1	K2	2(K4 &	1(K3)
		-		K2			K4)	
5	CO5	Upto K3	2	K1 &	1	K2	2(K2 &	1(K3)
		-		K2			K2)	
No. of	Questio	ns to be Asked	10		5		10	5
No. of	Questio	ons to be	10		5		5	3
answe	red							
Marks	for each	n question	1		2		5	10
Total	Marks fo	or each section	10		10		25	30
(Figu	res in pa	renthesis deno	tes, question	ns should	be asked w	ith the gi	ven K level)	•

K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4			9	7.5	17
K2	5	6			11	9.17	-
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100

Summative Examinations - Question Paper – Format

G (1			
			ice Questions)
		uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1 🗧	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	P witten / the second second
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answer	s)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions 6 m 5 P
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answe	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	

		-	
17) b	CO2	K3	
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K2	
19) b	CO4	K2	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hi	igher le	vel of perf	rmance of the students is to be assessed by attempting higher level
0		_	
of K lev	vels		
		en Choice)	
Section	D (Op	en Choice) Three quest	ions (3x10=30 marks)
Section	D (Op		ions (3x10=30 marks) Questions
Section Answer	n D (Op r Any T	Three ques	
Section Answer Q.No	n D (Op r Any T CO	Three quest K Level	
Section Answer Q.No 21	n D (Op r Any T CO CO1	hree ques K Level K2	
Section Answer Q.No 21 22	D (Op r Any T CO CO1 CO2	KLevelK2K3	





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

(For those who joined in 2021-2022 and after)

Course Name	FUZZY ALGEBRA A	ND ITS APPLICATIO	NS			
Course Code	21PMTC24			L	Р	С
Category	Core			6	-	4
Nature of cour	se: EMPLOYABILITY	✓ SKILL ORIENTED	ENTREPREN	IURS	HIP	
Course Object	ives:	ALL BAS				
• To familiar	ize the concept of crisp set	et and its properties				
• To learn th	e basics of fuzzy sets and	its operations				
To different	tiate crisp logi <mark>c, multi-va</mark>	lued logic and fuzzy logic				
• To use infe	rence theory <mark>in fuzzy lo</mark> g	ic				
• To learn th	e application in real life		1.62.1			
Unit: I					1	8
•	• •	s – Add <mark>iti</mark> onal prope <mark>rties</mark> (-			of
fuzzy sets – Ex	tension principle for fuzz	y sets – Types of operatio	<mark>ns – Fuzz</mark> y comple	ement		
Unit: II					1	8
Fuzzy number	s – Li <mark>nguist</mark> ic variables -	– Arithmetic operation or	<mark>i intervals</mark> – Arith	metic	oper	ation
on fuzzy numb	ers		1.00			
Unit: III	a. 📻				1	8
		ation – projection and cyc		s- Bi	nary	fuzzy
	ngie set – iużzy equivalei	nce relations – Fuzzy com	pationity relation		1	8
Unit: IV	and the second	1 Lill's were alled .				
quantifiers - L	inguistic hedges – Infere	r view – multi valued lo ence from conditional fuz	zy propositions -			
	quantified propositions -	- Inference from quantifie	d propositions		1	0
Unit: V					1	8
		ngineering –Computer E	ngineering – Relia	ability	y the	ory –
Kobolics – Me	dicine – Economics.		Total Lecture	Ноц	re C	90
Books for Stu	ıdv.			1100	10 /	5
		nd Fuzzy logic – Theory	and application	Seco	nd	
-	e Hall, New Delhi, 1995.	inu r <i>uzz</i> y iogie – rneory	and application,	5000	nu	
Unit I		ons 1.2 to 1.4				
	Chapter 2 : Sectio					
	Chapter 3 : Sectio					
Unit II	-					
Unit II	L					
Unit IV	1					
Academic Coun	cil Meeting Held on 29.04	.2021			Page	e 116

Unit V - Chapter 16 : Sections 16.1 , 16.2, 16.5 to 16.7, Chapter 17 : Sections 17.1 to 17.3.	
Books for References:	
1. H.J.Zimmermann, Fuzzy Set Theory and its Applications, Fourth	Edition, Springer
Publishers, New Delhi, 2006.	
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", 3rd Edition	n, Willey, 2010.
3. Michal Baczynski and Balasubramaniam Jayaram, Fuzzy Implications,	Springer Verlag,
Heidelberg, 2008	
Web Resources	
https://www.thesisscientist.com/docs/Study%20Notes/66860129-5a91-459d-810)f-54e0fc41175d
https://ocw.mit.edu/courses/health-sciences-and-technology/hst-951j-medical-de	cision-support-
spring-2003/lecture-notes/lecture4.pdf	
https://www.iitk.ac.in/eeold/archive/courses/2013/intel-info/d1pdf3.pdf	
https://nptel.ac.in/courses/106105173/2	
https://www.cse.iitb.ac.in/~cs621-2011/lectures_2009/cs621-lect38-fuzzy-logic-2	
COURSE OUTCOMES	K Level
On the successful completion of the course , the students will be able to	
CO1: Interpret fuzzy set theory, representation, operation and extension princip	ole K2
CO2: Identify fuzzy numbers and its linguistic variables	K2
CO3: Validate fuzzy relation, projections and its equivalence.	K5
CO4: Analyse multi valued logic and fuzzy logic with inference theory	К3
CO5: Apply fuzziness in real valued problems	K3
CO & PO Mappings:	I

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2		-1	2	-	-
CO 2	2	2			2	-	-
CO 3	2	1		2	2	1	2
CO 4	2	1		2	2	1	2
CO 5	2	1	1	1	-	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

UNIT	COURSE NAME	Hours	Pedagogy
Ι	$\begin{array}{l} Fuzzy \ sets: \ Basic \ types-Basic \ concepts-Additional \ properties \ of \ \alpha-cuts-Representation \ of \ fuzzy \ sets-Extension \ principle \ for \ fuzzy \ sets-Types \ of \ operations-Fuzzy \ complements \end{array}$	18	Chalk & Talk
II	Fuzzy numbers – Linguistic variables – Arithmetic operation on intervals – Arithmetic operation on fuzzy numbers	18	Chalk & Talk
III	Fuzzy relation : Crisp versus Fuzzy relation – projection and cyclinderic extensions- Binary fuzzy relation on a single set – fuzzy equivalence relations – Fuzzy compatibility relation	18	Chalk & Talk
IV	Fuzzy logic: Classical logic – An over view – multi valued logic – Fuzzy propositions –Fuzzy quantifiers – Linguistic hedges – Inference from conditional fuzzy propositions – Inference from conditional and quantified propositions – Inference from quantified propositions	18	Chalk & Talk
V	Applications : Applications to Civil Engineering –Computer Engineering – Reliability theory – Robotics – Medicine – Economics.	18	Chalk & Talk

LESSON PLAN

Course Designed by: Dr.M.Saravanan and Dr.P.Chitra Devi

-	native	E	ning Out <mark>come</mark> xamination - B Mapping <u>– K</u>	lue Prin			BE) (5)		
Inte	Cos	- 1	K Level	Section		Section B	131	Section C	Section D
rnal				MCQs		Short Answ	vers	Either or	Open
				No. of. Questic	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO	1	Upto K2	2	K1&K2	1 // 6/	K1	2	3
AI	CO	2	Upto K3	2	K1&K2	2	K2	2	3
CI	CO	3	Upto K4	2	K1&K2	1	K2	2	3
AII	CO	4	Upto K4	2	K1&K2	2	K2	2	3
Ques n	tio		o. of Questions asked	to 4		3		4	3
Pattern CIA I &		No. of Questions to be answered		to 4		3		2	2
II		Marks for each question Total Marks for each section		1		2		5	10
				4		6		10	20

	Distrib	ution of Mar	ks with K Lev	vel CIA I &	CIA II			
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	,		4	6.67	17
	K2	2	4			6	10	
CIA	K3			10	20	30	50	50
Ι	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2	3	0007	4	6.67	17
CIA II	K2	2	4	- A A A		6	10	
	K3		10/1	10	20	30	50	50
	K4		0/ /	10	10	20	33.33	33
	Marks	4	6	20	30	60	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)

<u>(COs)</u> S.No	COs	K - Level	MCQs	151	Short Ans	wers	Section C	Section D
0.110	005		No. of	K –	No. of	K –	(Either /	(Open
		Ten	Question	Level	Question	Level	or Choice)	Choice)
1	CO1	Upto K2	2 3 144	K1&K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K1 & K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K1 & K2	1,50	K2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1 & K2	1	K2	2(K4 & K4)	1(K3)
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
No. of Asked	Question	ns to be	10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question		question	1		2		5	10
Total section	Marks fo n	r each	10		10		25	30
(Figu	res in pa	renthesis den	otes, questi	ons should	be asked wi	th the giv	ven K level)	-

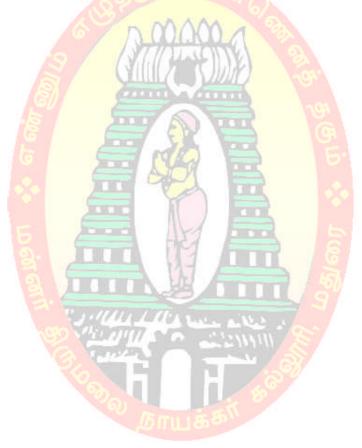
]	Distribution	of Marks wi	th K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5	4			9	7.5	17			
K2	5	6			11	9.17				
K3			25	20	45	37.5	37			
K4			25	30	55	45.83	46			
Marks	10	10	50	50	120	100	100			
	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

Solo Contraction C

Summative Examinations - Question Paper – Format

			ice Questions)
		uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1 6	
4	CO2	K2 G	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
		ort Answer	
	~	uestions 🧧	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	IS IT I I I I I I I I I I I I I I I I I
		her/Or Ty]	pe)
		uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K2	
17) b	CO2	K2	
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K3	
19) b	CO4	K3	

20) a	CO5	K3									
20) b	CO5	K3									
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher level								
of K le	vels										
	Section D (Open Choice)										
Answe	r Any T	Three quest	tions (3x10=30 marks)								
Q.No	CO	K Level	Questions								
21	CO1	K2									
22	CO2	K2									
23	CO3	K5									
24	CO4	K3									
25	CO5	K3	A BUT O BODY								





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

(For those who joined in 2021-2022 and after)

Course Name MATHEMATICS FOR COMPETITIVE EXAMINATIONS	
Course Code21PMTN21LP	С
CategoryNon Major Elective Course6-	6
Nature of course: EMPLOYABILITY Image: Skill oriented Image: Employability Image: Skill oriented Image: S	
Course objectives:	
To develop knowledge on numbers, data interpretation.	
 To familiarize the application through various statistical methods. 	
• To convert real data into a statistical data interpretation.	
• To use these concepts in competitive examinations.	
To develop the computational skills.	
Unit: I 18	8
H.C.F. and L.C.M. of numbers – Simplifications.	
Unit: II 18	3
Percentage – Profit and loss – Ratio and proportion.	
Unit: III 18	8
Time and work – Time and distance – Problems on Trains.	
Unit: IV 18	8
Simple interest – Compound interest – Permutation and Combination.	
Unit: V 18	3
Data interpretation: Tabulation – Bar Graphs – Pie charts.	
Total Lecture Hours 90)
Books for Study:	
Aggarwal. R.S, Quanti<mark>tative</mark> Aptitude , S.Chand and Company Ltd, 2009, New Delhi.	
Unit I – Chapters 2 & 4 (Except exercises)	
Unit II – Chapters 10, 11 & 12 (Except exercises)	
Unit III – Chapters 15, 17 & 18 (Except exercises)	
Unit IV – Chapters 21, 22 & 30 (Except exercises)	
Unit V – Chapters 36, 37 & 38 (Except exercises)	
Books for References:	
1. Abhigit Guha, Quantitative Aptitude , 4 th Edition, Tata McGraw Hill Publications, 2011, N	Jow
Delhi.	NCW
2. Mohan Rao.U, Quantitative Aptitude, Scitech Publications, Reprint 2013, Chennai.	
3. Aggarwal. R.S, Verbal & Non Verbal Reasoning, S.Chand & Co, 2009, New Delhi.	
Web Resources https://thecompanyboy.com/rs-aggarwal-quantitative-aptitude-pdf-free-download	
https://www.toprankers.com/exams/quantitative-aptitude-questions-pdf/	n d
https://www.sawaal.com/aptitude-reasoning/quantitative-aptitude-arithmetic-ability-questions-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-ability-arithmetic-arithmetic-arithmetic-arithmetic-arithmetic-arithmetic-arithmetic-arithm	<u>110-</u>

Academic Council Meeting Held on 29.04.2021

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COUR	COURSE OUTCOMES								
On th	On the successful completion of the course , the students will be able to								
CO1:	Understand the concepts of Mathematics along with analytical ability	K2							
CO2:	Develop the mathematical problem solving skill	K3							
CO3:	Evaluate the problems on data interpretation	K5							
CO4:	Identify the time related problems and solving	K4							
CO5:	Illustrate appropriate methods for solving Permutation and Combination	K2							

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	3	3 00	3	2	1
CO 2	3	2	3	3	3	3	1
CO 3	3	2	3	3	3	2	2
CO 4	3	3	2	3	3	2	1
CO 5	2	3	2	3	3	2	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COURSE NAME	Hours	Pedagogy
Ι	H.C.F. and L.C.M. of numbers – Simplifications.	18	Chalk & Talk
II	Percentage – Profit and loss – Ratio and proportion.	18	Chalk & Talk
III	Time and work – Time and distance – Problems on Trains.	18	Chalk & Talk
IV	Simple interest – Compound interest – Permutation and Combination.	18	Chalk & Talk
V	Data interpretation: Tabulation – Bar Graphs – Pie charts.	18	Chalk & Talk

Course Designed by: Mrs.S.Ragavi and Mrs.S.Andal

Inte	e Cos		K Level	Section A		comes (COs) Section B		Section C	Section D		
rnal				MCQs		Short Answ	vers	Either or	Open		
				No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice		
CI AI	CO	1	Upto K2	2	K1 & K2	1	K1	2	3		
	CO	2	Upto K3	2	K1 & K2	2	K2	2	3		
CI AII	CO	3	Upto K4	2 65	K1 & K2	1 oor	K2	2	3		
	CO	4	Upto K4	2	K1 & K2	2	K2	2	3		
Ques n	estio No. of Questions to be asked		4	24	3	94.	4	3			
			THU. OF QUESTIONS IO			4		3	191	2	2
11		Marks for each question Total Marks for each section			E.	2	55	5	10		
				4 2 2	EL	6		10	20		

	Distrib	oution o <mark>f Ma</mark>	rks with K	Level CIA	I & CIA I	I		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2			4	6.67	17
	K2	2	4			6	10	
CIA	K3		3	10	20	30	50	50
Ι	K4		200	10	10	20	33.33	33
	Marks	4	6	20	30	60	100	100
	K1	2	2			4	6.67	17
CIA	K2	2	4			6	10	
II	K3			10	20	30	50	50
	K4			10	10	20	33.33	33
	Marks	4	6	20	30	60	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

S.No	COs	K - Level	MCQs		Short Answers		Section C	Section D
			No. of Questions	K – Level	No. of Question	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Upto K2	2	K1 & K2	1	K1	2(K1 & K1)	1(K2)
2	CO2	Upto K3	2	K1 & K2	1	K1	2(K3 & K3)	1(K3)
3	CO3	Upto K4	2	K1 & K2	1	K2	2(K3 & K3)	1(K4)
4	CO4	Upto K4	2	K1 & K2	1	K2	2(K4 & K4)	1(K3)
5	CO5	Upto K3	2	K1 & K2	1///	K2	2(K2 & K2)	1(K3)
No. of Questions to be Asked		10		5	े जि	10	5	
No. of Questions to be answered			10	da	5	E	5	3
Marks	s for each	questi <mark>on</mark>	1	The second	2		5	10
Total	Marks fo	r each section	10	IT.	10		25	30

•	Distribution	o <mark>f Mar</mark> ks wi	th K Level			, w	
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4		168	9	7.5	17
K2	5	6	5 Jam	\$51	11	9.17	-
K3			25	20	45	37.5	37
K4			25	30	55	45.83	46
Marks	10	10	50	50	120	100	100

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

Sectior	ı A (Mı		ice Questions)
		uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	ALL SOL
9	CO5	K1	
10	CO5	K2	
Sectior	B (Sho	ort Answer	s)
		uestions	$(5x^2=10 \text{ marks})$
Q.No	CO	K Level	Questions
11	C01	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Ty	
		uestions	$(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3 📀	
17) b	CO2	K3	
18) a	CO3	K4	" sulley fill a second second
18) b	CO3	K4	SP MULL P STAND
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K2	
20) b	CO5	K2	NOU LINE TAIL
		vel of perf	ormance of the students is to be assessed by attempting higher level
of K le	vels		
	$D \overline{O}$	en Choice)	
			tions (3x10=30 marks)
		Three ques	
	r Any T CO	K Level	Questions
Answe	r Any T		
Answe Q.No	r Any T CO	K Level	
Answe Q.No 21	r Any 7 CO CO1	K Level K2	
Answe Q.No 21 22	r Any CO CO1 CO2	K Level K2 K3	

Summative Examinations - Question Paper – Format