MATHEMATICS



Program Code: UMT

2021-2022 onwards



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) Re-accredited with "A" Grade by NAAC PASUMALAI, MADURAI – 625 004

Eligibility for Admission

should have passed the Higher Secondary Examination conducted by the Candidate Higher Secondary Education, Government of Tamil Nadu CBSE Board with Board of Mathematics as one of the Courses in Higher Secondary Education. The duration of the course shall be three academic years comprising six semesters with two semesters in each academic year.

Subjects of Study

Part I	: Tamil / Company Secretarial Practice and Modern Office Management
Part II	: English

Part III

:

:

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

Part IV

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

Part V

Extension Activities

Pattern of the question paper for the Continuous Internal Assessment Note: Duration – 1 hour

(For Part I, Part II & Part III)

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The components for continuous internal assessment are: Part –A Four multiple choice questions (answer all) 4 x01= 04 Marks Part –B Three short answers questions (answer all) 3 x02 = 06 MarksPart –C 2 x 05=10 Marks Two questions ('either or 'type) Part –D Two questions out of three 1 x 10 =10 Marks -----30 Marks

Total

The scheme of Examination for Part-I, II & III

 The components for continuous internal assessment are:

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

 Two tests and their average
 --15 marks

 Seminar /Group discussion
 --5 marks

 Assignment
 --5 marks

 Total
 25 Marks

Pattern of the question paper for the Summative Examinations: Note: Duration- 3 hours

rart –A		
Ten multiple choice questions	10 x01	= 10 Marks
No Unit shall be omitted: not more than two qu	uestions from each unit.)
Part –B		
Short answer questions (one question from eac	ch unit) 5 x02	= 10 Marks
Part –C		
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)		
Total		75 Marks

Part-IV- Skill Based Papers / NME:

The Scheme of Examination for Skill Based Papers: (Except Practical Lab Subjects) Pattern of the questions paper for the continuous Internal Assessment

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

The components for continuous internal assessment are:

Two tests and their average	15 marks
Seminar /Group discussion	5 marks
Assignment	5 marks
Total	25 Marks

Summative Examination Pattern

Pattern of the Question Paper for Skill Based Papers (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part-IV- Environmental Studies and Value Education

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	15 marks
Project Report	10 marks*
Total	25 marks

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

Question Paper Pattern

(Internal Assessment)

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

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

Two tests and their average		 15 marks
Project		 10 marks
	Total	25 Marks

Summative Examination Pattern

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

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part V Extension Activities: (Maximum Marks: 100)

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

Pattern of the Question Paper for (Internal Examination & Summative Examination)

Internal Examinations- - 40 MarksSummative Examinations- - 60 Marks

100

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).No separate pass minimum for the Internal Examinations.27 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 maintain the standard of teaching in various areas of Pure and Applied Mathematics
- To provide an excellent learning environment with theoretical and practical knowledge where students can explore mathematical concepts.
- > To mold the students to become a competent users of Mathematics and its applications.
- > To instill the spirit of research through innovative teaching and research facilities.
- > To qualify the students to meet the industry expectations.

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 sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.	A knowledge base for engineering
2	An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions	Problem analysis
3	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.	Investigation
7	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.	Communicat ion skills
6	An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.	Individual and teamwork
10	An ability to apply professional ethics, accountability, and equity.	Ethics and equity
12	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	Life-long learning

PROGR	AM EDUCATIONAL OBJECTIVE (PEOs) are:
PEO1:	Enhance the entrepreneurial abilities, life skills and research initiates 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
PFO3.	Equip with soft skills and critical thinking to produce an erudite and trustworthy
I E05.	generation to fit into versatile situations
PFO4·	Adhere to the ethical and environmental sustainability to create morally upright and
1 204.	empowered citizens to face industry/ Institution
DEO5.	Up-skill / Re-skill their primary knowledge and potentials to compete in the
TEOS.	dynamic global environment.
DEUC:	To build confidence to appear for Competitive / Civil Service examinations and to
I EOU.	conquer commanding positions in organizational level.

PO NO	PROGRAMME OUTCOMES (POs)	
At the end	l of the programme, the students will be able to	
PO – 1	Demonstrate the knowledge and understanding of Science concepts and its relevant fields.	Disciplinary Knowledge
PO – 2	Identify, formulate, analyse complex problems and reach valid conclusions using the methodologies of Science.	Problem Solving
PO – 3	Employ critical and analytical thinking in understanding the concepts and apply them in various problems appearing in different branches of Science.	Analytical Reasoning & Critical Thinking
PO - 4	Communicate the known concepts effectively within the profession and with any forum	Communication Skills
PO - 5	Function successfully as a member/leader in any team and to apply ethics, accountability and equity in their life.	Team Work and Moral/Ethical Awareness
PO - 6	Use ICT tools in various learning situations, related information sources, suitable software to analyze data and furthermore participating in learning activities throughout life to meet the demands of work place through knowledge /up-skilling / re-skilling	Digital Literacy & Life-long Learning

PROG	RAM SPECIFIC OUTCOME (PSOs)
PSO1:	Demonstrate a knowledge and understanding of the concepts of Mathematics and other
	relevant fields.
PSO2:	Apply the acquired knowledge to solve different kinds of problems in real life situations.
PSO3-	Employ critical and analytical thinking in knowledge development and face various
1505.	competitive examinations.
PSO4.	Listen, read carefully and express Mathematical concepts/views effectively by using
1504.	appropriate media in writing and orally within the profession / any forum.
PSO5:	Work efficiently as a member/leader in any team and use ethical practices in all work.
	Use ICT tools in various learning situations and appropriate mathematical software to
PSO6 :	analyze data; take part in learning activities over course of life time to meet the demands of
	work place through knowledge /up-skilling / re-skilling

Bloom's Taxonomy



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS), MADURAI MATHEMATICS CURRICULUM

Course				Maximum Marks			
Code	Title of the Course	Hrs	Credits	Int	Ext	Total	
	FIRST SEMES	ΓER					
Part – I	Tamil / Alternate Course						
21UTAG11	இக்காலக் கவிதையும் நாடகமும்	6	3	25	75	100	
Part – II	English						
21UENG11	Communicative English - I	6	3	25	75	100	
Part - III	Core Courses						
21UMTC11	Differential Calculus	4	4	25	75	100	
21UMTC12	Theory of Equations and Its Application	4	4	25	75	100	
Part III	Allied Course						
21UPHA11	Allied Physics – I (Mechanics, Properties of Matter, Heat and Sound)	4	4	25	75	100	
21UPHAP1	Allied Physics Practical - I	2	-	-	-	-	
Part IV	Skill Based Course						
21UMTS11	Quantitative Aptitude	2	2	25	75	100	
Part IV	Mandatory Course						
21UEVG11	Environmental Studies	2	2	25	75	100	
	Total	30	22	175	525	700	
	SECOND SEMES	STER	r	-	1	r	
Part – I	Tamil / Alternate Course						
21UTAG21	இடைக்கால இலக்கியமும் சிறுகதையும்	6	3	25	75	100	
Part – II	English						
21UENG21	Communicative English - II	6	3	25	75	100	
Part - III	Core Courses						
21UMTC21	Integral Calculus	4	4	25	75	100	
21UMTC22	Analytical Geometry of Three Dimensions	4	4	25	75	100	
Part III	Allied Course						
21UPHA21	Allied Physics – II (Electricity, Electronics, Optics and Modern Physics)	4	3	25	75	100	
21UPHAP1	Allied Physics Practical - I	2	1	40	60	100	
Part IV	Skill Based Course						
21UMTSP1	M.S Office - Lab	2	2	40	60	100	
Part IV	Value Education						
21UVLG21	Value Education	2	2	25	75	100	
	Total	30	22	230	570	800	

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

THIRD SEMESTER						
Part – I	Tamil / Alternate Course					
21UTAG31	காப்பிய இலக்கியமும்	6	3	25	75	100
	உரைநடையும;				,,,	100
Part – II	English					
21UENG31	Communicative English - III	6	3	25	75	100
Part - III	Core Courses					
21UMTC31	Mechanics	5	5	25	75	100
21UMTC32	Trigonometry and Vector Calculus	4	4	25	75	100
Part III	Allied Course					
21UMTA31	Operations Research	5	5	25	75	100
Part IV	Skill Based Course					
21UMTS31	Transform Techniques	2	2	25	75	100
Part IV	Non – Major Elective Course					
21UMTN31	Mathematics for Competitive Examinations - I	2	2	25	75	100
	Total	30	24	175	525	700
	FOURTH SEME	STER				
Part – I	Tamil / Alternate Course					
21UTAG41	பண்டைய இலக்கியமும் புதினமும்	6	3	25	75	100
Part – II	English					
21UENG41	Communicative English - IV	6	3	25	75	100
Part - III	Core Courses					
21UMTC41	Modern Algebra	5	5	25	75	100
21UMTC42	Sequence and Series	4	4	25	75	100
Part III	Allied Course					
21UMTA41	Programming in C++	3	3	25	75	100
21UMTAP1	Programming in C++ Lab	2	1	40	60	100
Part IV	Skill Based course					
2111MTS41	Fourier Series and Fourier	2	2	25	75	100
210111541	Transform	2	2	23	15	100
Part IV	Non – Major Elective Course					
21UMTN41	Mathematics for Competitive Examinations - II	2	2	25	75	100
Part V	Extension Activities					
21UEAG40	NSS, NCC, YRC, RRC, PHY	-	1	40	60	100
21UEAG44		30	24	255		000
	Total	- 30	24	255	045	900

	FIFTH SEMESTER					
Part - III	Core Courses					
21UMTC51	Linear Algebra	6	4	25	75	100
21UMTC52	Real Analysis	6	4	25	75	100
21UMTC53	Differential Equations	6	4	25	75	100
Part III	Core Elective Courses					
21UMTE51	<mark>Statistics – I</mark>					
21UMTE52	Astronomy	5	5	25	75	100
21UMTE53	Optimization Techniques					
21UMTE54	Numerical Methods					
21UMTE55	Mathematical Modeling	5	5	25	75	100
21UMTE56	Combinatorics					
Part IV	Skill Based Course					
21UMTSP2	R Language Lab	2	2	40	60	100
	Total	30	24	165	435	600
SIXTH SEMESTER						
Part - III	Core Courses					
21UMTC61	Complex Analysis	6	4	25	75	100
21UMTC62	Graph Theory and its Applications	6	4	25	75	100
21UMTPR1	Project	6	4	40	60	100
Part III	Core Elective Courses					
21UMTE61	<mark>Statistics – II</mark>					
21UMTE62	Data Structures and Algorithm	5	5	25	75	100
21UMTE63	Number Theory					
21UMTE64	Discrete Mathematics					
21UMTE65	Fuzzy Sets Theory	5	5	25	75	100
21UMTE66	Formal Languages and Automata					
Part IV	Skill Based Course					
21UMTSP3	SPSS Lab	2	2	40	60	100
	Total	30	24	180	420	600
	Grand Total	180	140	1180	3120	4300





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

Course Name	DIFFERENTIAL CALCU	ULUS						
Course Code	21UMTC11			L	Р	С		
Category	Core			4	-	4		
Nature of cours	e: EMPLOYABILITY	✓ SKILL ORIENTED	ENTREPREI	NEUF	RSHI	Р		
Course Objecti	ves:							
• To develop j	problem solving skills							
• To familiariz	• To familiarize the applications of differential calculus.							
• To explain a	bout the nature and its types.							
• To provide t	he capability of finding the ci	rcle, radius and centre of	curvatures.					
• To identify a	and solve the higher derivative	es				-		
Unit: I	the second	~			1	2		
Successive diff	erentiation - n ^m derivative –	Standard results – Trigo	nometrical tra	ansfo	mati	on –		
Formation of eq	uations involving derivatives	– Leibnitz formula.			1	2		
Unit: II	Civing of the second line	T		1		2		
Maxima and F	ant and normal at any point	Lagrange's method of	undetermined	i mu	tiplie	ers -		
Equations of tan	gent and normal at any point	of the curve.			1	2		
Angle of inters	action of curves. Sub tange	ont and Sub Normal Cu	ryatura Cir	cla r	1 auibe	2 and		
centre of curvat	ures - Cartesian formula for r	radius of curvature – The	coordinates of	of the	cent	anu re of		
curvature	ares - Cartesian formula for i	actus of curvature – The	coordinates	n uic	cent			
Unit: IV					1	2		
Envelopes - Evo	olute and Involute – Radius of	f curvature in Polar co-or	dinates- p-r e	quatio	n -	_		
Pedal equation of	of curves.		I III	1				
Unit: V					1	2		
Meaning of the	e derivative – Geometrical	interpretation - Meaning	ng of the sig	n of	the			
differential coef	ficient – rate of change of var	iable.						
		Γ	Cotal Lecture	Hou	s 6	0		
Books for Stud	y:							
T.K.Manickava	shagam Pillai and S.Narayana	an, Calculus, Volume I , S	S.Viswanatha	n				
Publishers, Cher	nnai, 1996.							
Unit-I – Chapter	3, Sections: 1.1, 1.2, 1.3, 1.4	, 1.5, 1.6, 2.1						
Unit-II – Chapte	er 8, Sections: 4, 5 & Chapter	9, Sections: 1.2, 1.3,						
Unit–III – Chap	ter 9, Section: 1.4, Section 2,	& Chapter 10, Sections: 2	2.1, 2.2, 2.3, 2	.4.				
Unit-IV – Chapt	er 10, Sections: 1.1, 1.2, 1.3,	1.4, 2.5, 2.6, 2.7.						
Unit- V – Chapt	er 4, Sections: 1, 2, 3.							
BOOKS IOR Refe	rences:	mma Dublishing Uausa	Dolovomkotto	: 2000	2			
	Diff and LO had a G			070	5.			
2. Snantni Nara	yan, Differential Calculus, S	Chand & Company Ltd	, new Delhi, l	979.	- 1			
3. George B.Th Company, 12	omas, Thomas' Calculus, ¹ th Edition, 2015.	Maurice D.Weir and Jo	el Hass, Pear	son l	Educa	ation		

Web I	Resources	
1.	https://nptel.ac.in/courses/111/104/111104085/	
2.	https://nptel.ac.in/courses/122/104/122104017/	
COU	RSE OUTCOMES	K Level
On th	e successful completion of the course, the students will be able to	
CO1.	Make use of Leibnitz formula to find the nth derivative of algebraic and	K3
COI:	trigonometric functions and formation of equations involving derivatives	КJ
cor.	Apply partial differentiation to determine the maxima and minima of functions of	K3
02.	two variables and Lagrange's method of undetermined multipliers.	KJ
CO3:	Understand the equations of the tangent, normal, Sub tangent and Sub Normal.	K4
CO4:	Determine envelope, curvatures, involute and evolute of the curve.	K4
CO5 :	Analyze the Applications of Differential Calculus	K4

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	COURSE NAME	Hrs	Pedagogy
I	Successive differentiation - n th derivative – Standard results – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula.	12	Chalk, PPT & Talk
II	Maxima and Minima of two variables – Lagrange's method of undetermined multipliers - Equations of tangent and normal at any point of the curve.	12	Chalk & Talk
III	Maxima and Minima of two variables – Lagrange's method of undetermined multipliers - Equations of tangent and normal at any point of the curve.	12	Chalk & Talk
IV	Envelopes - Evolute and Involute – Radius of curvature in Polar co- ordinates- p-r equation – Pedal equation of curves.	12	Chalk, PPT & Talk
V	Meaning of the derivative – Geometrical interpretation – Meaning of the sign of the differential coefficient – rate of change of variable.	12	Chalk & Talk

Course Designed by: Dr.V.Ramachandran and Mrs.R.Sumathi

	Learning Outcome Based Education & Assessment (LOBE)										
	Formative Examination - Blue Print										
Aruculation Mapping – K Levels with Course Outcomes (COS)											
Inte rnal C				MC		Short An		Section C	Section D		
	C	0S	K Level	No of	<u>ү</u> » К.	No of	K -	Either or	Open		
				Questions	Level	Questions	Level	Choice	Choice		
CI	CO	D1	Upto K3	2	K1&K2	1	K1	2	1		
AI	CO)2	Upto K3	2	K1&K2	2	K2	2	1		
CI	CO)3	Upto K4	2	K1&K2	1	K2	2	1		
AII	CO)4	Upto K4	2	K1&K2	2	K2	2	1		
		N	lo. of Questions to be asked	4		3		4	2		
Questio n Pattern CIA I & II		No. of Questions to be answered		4		3		2	1		
		l	Marks for each question	1		2		5	10		
]	Total Marks for each section	4		6		10	10		

	Distribution of Marks with K Level 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	8	20		
	K2	2	4			6	12	20		
СТА	K3			10	10	20	40	40		
	K4			10	10	20	40	40		
-	Marks	4	6	20	20	50	100	100		
	K1	2	2			4	8	20		
	K2	2	4			6	12	20		
CIA	K3			10	10	20	40	40		
II	K4			10	10	20	40	40		
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes								
(COs)								
		K - Level	MO	Qs	Short Answers		Section C	Section D
S.No	COs		No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Upto K3	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 K4	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No. o	of Questi	ions to be	10		Ľ		10	5
	Aske	d	10		5		10	5
No. o	of Questi	ions to be	10		5		5	3
	answei	red	10		3		3	3
Marks for each question		1		2		5	10	
Total Marks for each		10		10		25	30	
	sectio	on	10		10		23	50
	(Figure	s in parentl	hesis denotes	, questions	should be a	asked wit	h the given 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	1/			
K3			25	20	45	37.5	37			
K4			25	30	55	45.83	46			
Marks	10	10	50	50	120	100	100			
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

Section	Section A (Multiple Choice Questions)						
Answei	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					
Section	B (Sho	ort Answei	rs)				
Answei	r All Q	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	r All Q	uestions	(5 x 5 = 25 marks)				
Q.No	CO	K Level	Questions				
16) a	CO1	K3					
16) b	COl	K3					
17) a	CO2	K2					
17) b	CO2	K2					
18) a	CO3	K3					
18) b	CO3	K3					
19) a	CO4	K3					
19) b	CO4	K3					
20) a	CO5	K4					
20) b	<u>CO5</u>	<u>K4</u>					
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher				
level of	K leve						
Section	D (Op	en Choice					
Answei	r Any 'l	nree ques	uons (3x10=30 marks)				
Q.N0	CO_1	K Level	Questions				
21		K3 K2					
22	CO2	K2					
25	CO3	K3 V2					
24	CO4	K5 K4					
25	005	К4					

Summative Examinations - Question Paper – Format



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

Course Name THEO	RY OF EQUATION	S AN	ND ITS APPLICATIO	N			
Course Code 21UMT	TC12				L	P	С
Category Core					4	-	4
Nature of course: EMP	LOYABILITY	✓	SKILL ORIENTED	ENTREPRE	NEU	JRSH	IIP
Course Objectives:		·		•			
• To familiarize with the	he theory of equations	5.					
• To introduce the tran	sformation of equatio	ns.					
• To write the standard	form of reciprocal ec	quation	on.				
• To develop the know	ledge of algebraic con	ncept	ts on mathematics.				
• To find the approxim	nate solution using Ne	wton	i's and Horner's method			1	2
Unit: I Theory of equations E	ormation of Equation	De	lation between the root	and cooffici	onta		2
Ineory of equations – F	ormation of Equation	- KC			ents.	1	2
Sum of the power of the	roots of an equation	– Ne	wton's theorem – Recir	procal equation	ons –	Stan	2 dard
Reciprocal Equations.		1.0		oquun		~ ~ ~	
Unit: III						1	2
Transformations of equat	tions - Removal of ter	rms -	- Multiple roots –Nature	e & Position	of ro	ots	
- Descarte's rule of sign.							
Unit: IV						1	2
Roll's theorem (only sta	itement) – Strum's th	neore	m (only problems) –Cu	ibic equation	s – (Cardo	on's
method for solving a cub	oic equation.					1	2
Approximate solutions of	f Numerical equation	s- Ne	witon's method - Horne	er's method		1	2
Total Lectu	re Hours	3- 110	with s method – Home	a sinctiou.		6	0
Books for Study:							0
S. Arumugam and Isaac	c, Classical Algebra	, Nev	w Gamma Publishing 1	House, Palay	amk	ottai,	
2016.	-		-				
Unit I : P	Page 08 – 31						
Unit II : P	Page 32 – 56						
Unit III : P	Page 56 – 77						
Unit IV : P	Page 78 – 100						
Unit V : P	Page 103 – 112						
BOOKS FOR KEIERENCE:	n Dillai and S. Nara	vono	n Algobra Volumo	I S Viewon	athai	Dri	ntare
Publishers Pyt I td (Thennai 2007	yana	n, Algebra – Volume	1 , 5. v iswall	atilai	1 1 1 1	liters
2. Hari kishan, Theory	of equations. Atlantic	publ	lishers and Distributers l	Pvt Ltd. Dece	mbe	r 201	3.
3. MacDuffee, C.C T	heory of Equations, Jo	ohn V	Wiley & Sons Inc., 1954	ļ.			
Web Resources							
1. https://www.khanaca	ademy.org/math/line	ear-a	lgebra				
2. https://nptel.ac.in/co	ourses/111/105/1111	0511	<u>12/</u>				
COURSE OUTCOME	S					KL	evel
Academic Council N	Meeting Held On 29.	.04.2	021		P	age 7	7

On the successful completion of the course, the students will be able to						
CO1:	Relate the roots of the equation with its coefficients	K2				
CO2.	Determine the powers of the roots by Newton's theorem and roots of reciprocal	к3				
02.	equations	N.				
CO3:	Analyse the nature and position of the roots using Descarte's rule of sign.	K4				
CO4:	Solve equations using various method.	K4				
CO5.	Predict approximate solutions to Numerical equations using Newton's and	K A				
C05:	Horner's method.	N 4				

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	COURSE NAME	Hrs	Pedagogy
Ι	Theory of equations – Formation of Equation – Relation between the	12	Chalk &
II	Sum of the power of the roots of an equation – Newton's theorem – Reciprocal equations – Standard Reciprocal Equations.	12	Chalk & Talk
III	Transformations of equations - Removal of terms – Multiple roots – Nature & Position of roots - Descarte's rule of sign.	12	Chalk & Talk
IV	Roll's theorem (only statement) – Strum's theorem (only problems) – Cubic equations – Cardon's method for solving a cubic equation.	12	Chalk & Talk
V	Approximate solutions of Numerical equations- Newton's method – Horner's method.	12	Chalk & Talk

Course Designed by: Mrs.S.Ragavi and Dr.A.Hamari Choudhi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print											
		Articulat	ion Mapping –	K Levels v	vith Course	Outcomes	(COs)					
			Section	h A	Sectio	n B	Section	Section				
Inte	Car	K L aval	MCQ	S	Short Ar	nswers	Section C	Section				
rnal	Cos	S K Level	No. of. K - No. of. K -		К-	Either or	D					
			Questions	Level	Questions	Level	Choice	Choice				
CI	CO	1 Upto K2	2	K1&K2	1	K1	2	1				
AI	CO	2 Upto K3	2	K1&K2	2	K2	2	1				
CI	CO	3 Upto K4	2	K1&K2	1	K2	2	1				
AII	CO	4 Upto K4	2	K1&K2	2	K2	2	1				
		No. of			2		4	•				
0	4.	Luestions to be	4		3			2				
Ques	u	No. of										
011 Patte	r (Juestions to be	4		3		2	1				
n		answered	-		5		2	I				
CIA	II	Marks for each					_					
& I]	[question	1		2		5	10				
	Г	Total Marks for each section	4		6		10	10				

	Distribution of Marks with K Level 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	8	20				
	K2	2	4			6	12	20				
СТА	K3			10	10	20	40	40				
	K4			10	10	20	40	40				
-	Marks	4	6	20	20	50	100	100				
	K1	2	2			4	8	30				
	K2	2	4			6	12	20				
CIA	K3			10	10	20	40	40				
II	K4			10	10	20	40	40				
	Marks	4	6	20	20	50	100	100				

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes										
(COs)											
		K -	MO	Qs	Short An	swers	Section C	Section D			
S.No	COs		No. of	К –	No. of	К –	(Either / or	(Open			
		Level	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	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 K4	2	K1&K2	1	K2	2(K2 & K2)	1(K3)			
No.	of Questi Aske	ons to be d	10		5		10	5			
No. of Questions to be answered			10		5		5	3			
Marks for each question			1		2		5	10			
Total Marks for each section			10		10		25	30			

(.	(Figures in parenthesis denotes, questions should be asked with the given K level)										
Distribution of Marks with K Level											
K Level	Section A (Multiple Choice Questions)	Section B (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	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 of K lev	gher level of p els.	erformance o	of the students	s is to be asso	essed by a	attempting	higher level				

Section	Section A (Multiple Choice Questions)								
Answei	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							
Section	B (Sho	ort Answei	rs)						
Answei	r All Q	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	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	K3							
19) b	CO4	K3							
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 leve	ls							
Section	D (Op	en Choice							
Answe	r Any '	Three ques	stions (3x10=30 marks)						
Q.No		K Level	Questions						
21		K2							
22	CO2	K3							
23	CO3	K4							
24	004	K3							
25	CO5	K4							

Summative Examinations - Question Paper – Format



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

Course Name	e ALLIED PHYSICS-I: Mechanics, Properties of Matter, Heat and Sound										
Course Code	21UPHA11	L	Р	С							
Category	Allied	4	-	4							
Nature of cours	e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPRE	NEU	RSH	IP							
Course Objecti	ives:										
The learners will	ll be able:										
1. To recollect Newton's law of motion											
2. To understand the elasticity property and types of modulus											
3. To unde	rstand the viscosity and application of Bernoulli's theorem										
4. To recol	lect Kinetic theory of gases										
5. To unde	rstand the concepts of S.H.M										
Unit: I Me	<i>chanics</i>		13)							
Torque – Angu	lar momentum -Moment of Inertia -Perpendicular and Parallel as	kes th	leore	m -							
Kepler's laws of	of planetary motion - Newton's laws of gravitation-Mass and densit	y of	Eart	h –							
Boy's method for	or G-Compound pendulum-Expression for period-Experiment to find	"g"									
Unit: II Ela	sticity		12								
Stress and Stra	in - Elasticity–Different moduli of Elasticity-Poisson's ratio–Bendir	ng of	bear	ms–							
Expression for	bending moment–Determination of Young's modulus by uniform and	l non	unif	orm							
bending-Torsio	n-Expression for couple per unit twist-Work done in twisting	- T	orsio	onal							
oscillations of a	body - Workdone in twisting-Rigidity modulus by torsion pendulum										
Unit: III Vis	cosity		11								
Coefficient of v	iscosity -Derivation of Poiseuille's formula - coefficient of viscosity	of a l	iquic	l by							
Poiseuille's me	thod – Equation of continuity-Bernoulli's theorem-derivation-A	oplica	tions	of							
Bernoulli's theo	brem (Venturimeter and Pitot tube).			-							
Unit: IV Hea	at		12								
Kinetic theory of	of gases – Mean free path – Transport phenomena – Expression for t	he co	effic	ient							
of Diffusion, v	iscosity and thermal conductivity – Degrees of freedom – Boltzi	man's	s law	of of							
equipartition of	energy – calculation of Υ for mono atomic and diatomic gases - The	ermod	lynan	nics							
– First and sec	ond laws of thermodynamics (statement only) – Entropy – change	of en	trop	v in							
Carnot's cycle -	- Change of entropy in conversion of ice into stream		1.	,							
Unit: V Sou	und 19		12								
Simple harmon	ic motion – Composition of two S.H.M's of equal time periods at 1	right	angle	es –							
Stationary wave	es – Properties of stationary waves – Melde's experiment for the	freat	iency	z of							
electrically main	ntained tuning fork (Transverse and Longitudinal modes) - Ultrasonics	s - Pr	oduc	tion							
–Piezoelectric n	nethod – Detection – Kundt's tube and Piezoelectric - Properties – Apr	olicat	ions								
	Total Lecture Ho	irs	60 H	rs							
Books for Stud	y:										
1 D.Manager Machanica Dramatica of Matter 10 1 Matter 10 1											
1. K.Wuruges	an, we channes, riopernes of watter and Sound, Madural, first										
eution, july											
* (Jnit-1: 1.1, 2.1–2.7, 2.13-2.15, 3.1-3.5										
J *	Jnit-II: 4.1-4.5, 4.7, 4.8, 4.10-4.13										

	* Unit–III: 5.2-5.7 -						
	* Unit-V: 6.1, 6.3,6.4, 6.7-6.9, 6.12						
2. RMurugeshan, Thermal Physics, Madurai, First edition July, 2016. (B.Sc., Ancillary Physics)							
	* Unit–IV: 6.1, 6.3-6.7, 6.9-6.11, 7.4-7.7						
Books	for References:						
1. S.L	.Kakani,C.Hemarajani,S.Kakani,Mechanics,IIIedition,VivaBooks Ltd,NewDelhi	,2011.					
2. Hal	lidayResnic,JearlWalker, PrinciplesofPhysics ,9 th Edition,WileyIndia Pvt.Ltd, New	Delhi,					
2012.							
3. D.S	S.Mathur, Mechanics, S.ChandandCo., NewDelhi, 2008						
4. Bri	jlaland N.Subramanyam, Propertiesofmatter, S.ChandandCo., New Delhi, 2004						
5. Bri	jlalandN.Subramanyam,HeatandThermodynamics, S.Chandand Co, New Delhi,	, 2004.					
Web R	Resources:						
1. <u>h</u>	ttps://latestcontents.com/bsc-physics-mechanics-notes/						
2. <u>w</u>	ww.khanacademy.org/science/physics/elasticity/surface_tension						
3. <u>h</u>	ttps://www.askiitians.com/revision-notes/physics/kinetic-theory-of-gases/						
4. https://www.askiitians.com/revision-notes/physics/thermodynamics/							
Course Outcomes K Level							
After	successful completion of the course, the student is expected to						
	Understand the concepts of Newton's law of Gravitation, different modulus of						
CO1:	elasticity, mean free path, degrees of freedom, laws of thermodynamics and	K2					
	stationary waves						
	Define centripetal and centrifugal force, angular velocity, moment of inertia,						
CO2:	elasticity, Poisson's ratio, bending of beams, Bernouli's theorem, Transport	K3					
	Phenomena, mono and diatomic gases, S.H.M, properties of Ultrasonic waves						
	Apply torque, angular momentum, expression for bending moment, couple per						
CO3.	unit twist, Bernouli's theorem, Boltzmann's law of equipartition of energy,	К3					
000	change of entropy in conversion of ice to steam, applications of Ultrasonic	IX					
	waves						
	Analyze parallel and perpendicular axis theorem, Boy's method for G,						
CO4:	determine and analyze uniform and non-uniform bending, Poiseuille's	K4					
	formula to find the coefficient viscosity of liquid						
	Analyze the change of entropy in Carnot's cycle, Kundt's tube and Piezo						
CO5:	electric method for the production of Ultrasonic waves, Melde's experiment	K4					
	for the frequency of tuning fork						

CO & PO Mapping:

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

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

LESSON PLAN

Unit	ALLIEDPHYSICS-I	Hrs	Pedagogy
	Mechanics, Properties of Matter, Heat and Sound		- caugogj
I	Mechanics Torque – Angular momentum –Moment of Inertia –Perpendicular and Parallel axes theorem - Kepler'slawsofplanetarymotion- Newton'slawsofgravitation–Massanddensityof Earth–Boy's method for G–Compound pendulum-Expression for period- Experiment to find "g"	13	Lecture method, PPT, Demonstration
п	Elasticity Different moduli of Elasticity-Poisson'sratio–Bendingofbeams– Expression for bending moment–Determination of Young's modulus by uniform and non uniform bending – Torsion– Expression for couple per unit twist – Workdone in twisting Torsional oscillations of a body - Workdone in twisting– Rigidity modulus by torsion pendulum	12	Lecture method, PPT, Demonstration
ш	Viscosity Viscosity - Derivation of Poiseuille's formula - coefficient of viscosity of a liquid by Poiseuille's method – Equation of continuity - Bernoulli's theorem – derivation – Applications of Bernoulli's theorem (Venturimeter and Pitot tube)	11	Lecture method, PPT, Model
IV	Heat Kinetic theory of gases – Mean free path – Transport phenomena – Expression for the coefficient of Diffusion, viscosity and thermal conductivity – Degree of freedom – Boltzman's law of equipartition of energy – calculation of Υ for mono atomic and diatomic gases - Thermodynamics – First and second laws of thermodynamics (statement only) – Entropy – change of entropy in Carnot's cycle – Change of entropy in conversion of ice into stream	12	Lecture method, PPT
V	Sound Simple harmonic motion — Composition of two S.H.M's of equal time periods at right angles - Stationary waves –Properties of stationary waves – Melde's experiment for the frequency of electrically maintained tuning fork (Ttransverse and Longitudinal modes) - Ultrasonics – Production – Piezo electric method – Detection – Kundt's tube and Piezo electric - Properties – Applications	12	Lecture method, PPT

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.S.S.Jayabalakrishnan

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print												
]	K	Articul	ation Mappi Section	ing – K L 1 A	evels with C Sectio	ourse Out n B	tcomes (Secti (Eith Cho	COs) on C er or oice)	Secti (O) Cho	on D pen bice)	
Inte rnal	CC	s I	- Le	Um t	MCQ)s	Short An	iswers	No.	V	No. of	K -	
		v	vel		No. of. Questions	K - Level	No. of. Questions	K - Level	Ques tions	Level	Ques tions	Level	
CI CO		01 K1		Ι	2	K1&K 2	1	K1	2	K2	1	K2	
AI	CO	5 K4		Π	2	K1&K 2	2	K2	2	K3	1	К3	
CI	CO	01 K1		III	2	K1&K 2	1	K2	2	K3	1	К3	
AII	CO) 5 F	ιο 34	IV	2	K1&K 2	2	K2	2	K4	1	K4	
		No. of Questions to be asked		of ons to ked	4		3		4			2	
Quest Patte	tion ern	N Que be a	No. of Questions to be answered		4		3		2		1		
CIA I II	CIA I & II		Marks for each question		1		2			5		10	
		Tota fc	al M or ea ecti	larks ach on	4		6		1	0	10		

	Distribution of Marks with K Level 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	8	60					
	K2	2	4	10	10	26	52	00					
СТА	K3			10	10	20	40	40					
	K4												
1	Marks	4	6	20	20	50	100	100					
	K1	2	2			4	8	20					
	K2	2	4			6	12	20					
CIA	K3			10	10	20	40	40					
II	K4			10	10	20	40	40					
	Marks	4	6	20	20	50	100	100					

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

<u>UNIT-V</u> will be allotted for individual Assignment in <u>CO5 - K4</u> level which carries five marks as part of CIA component.

Sı	ummati	ive Exar	ninatio	n – Blue	Print A Outco	rticulati mes (CC	ion Map Ds)	ping – H	K Level	with Co	ırse
S No	COs	К-	Ilmit	MO	Qs	Sh Ans	ort wers	Secti (Eithe Cho	on C er / or bice)	Sect (Open	tion D Choice)
3.110.	COS	Level	Omt	No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level
1	CO1 - CO5	K1 to K4	Ι	2	K1 & K2	1	K1	2	K2 & K2	1	K2
2	CO1 - CO5	K1 to K4	п	2	K1 & K2	1	K1	2	K3 & K3	1	K3
3	CO1 - CO5	K1 to K4	III	2	K1 & K2	1	K2	2	K3 & K3	1	K3
4	CO1 - CO5	K1 to K4	IV	2	K1 &K2	1	K2	2	K4 & K4	1	K4
5	CO1 - CO5	K1 to K4	V	2	K1 & K2	1	K2	2	K4 & K4	1	K4
No. of Questions to be Asked		10		5		1	0		5		
No. of Questions to be answered		10		5			5		3		
Marl	ks for ea	ach ques	tion	1		2		4	5		10
Total N	Marks fo	or each s	ection	10		10		2	5		30

K	Section A	Section B			Distribution of Marks with K Level								
Level	(Multiple Choice Questions)	(Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %						
K1	5	4			9	12	47						
K2	5	6	10	10	31	34.66	47						
K3			20	20	40	27	27						
K4			20	20	40	26.66	26						
Marks	10	10	50	50	120	100	100						
NB: High	NB: Higher level of performance of the students is to be assessed by attempting higher level												

Section	A (Mu	ltiple Cho	ice Questions)
Answei	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	
Section	B (Sho	ort Answei	rs)
Answei	r All Q	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	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	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
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 leve	ls	
Section	D (Op	en Choice	
Answei	r Any 'l	nree ques	uons (3x10=30 marks)
Q.No		K Level	Questions
21	COI	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



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

Course Name	ALLIED PHYSICS PRA	ACTICAI	Course Name ALLIED PHYSICS PRACTICAL - I						
Course Code	21UPHAP1					L	Р	С	
Category	Allied				-	2	-		
Nature of cours	se: EMPLOYABILITY	✓ SKIL	L ORIENTED	✓	ENTREPR	ENE	URSI	HIP	
Course Object	ives:	I I							
The learners wi	The learners will be able:								
1. To gain knov	vledge about the experiment	nts based o	on Optics, Electric	city	and Electron	nics			
2. To demonstra	ate modulus of elasticity								
3. To understan	d the bending of beam, for	ward and	reverse biasing, f	requ	ency respon	ce			
4. To understan	d current conduction in ele	ectrical cir	cuits.						
5. To learn about	ut transistor amplifier, osci	llator and	Operational ampl	lifiei	ſ				
	ST OF EXPERIMENTS ((Any Four	teen Experiments	5)					
1 Uniform ben	ding	` `	- (Pin & Microsc	ope)				
2. Torsion Pend	lulum		- Determination	of R	igidity modu	lus ar	nd M.I	[
3. Thermal cond	ductivity of Bad conductor	•	- Lee's disc						
4. Sonometer	•		- Verification of	laws	8				
5. Calibration o	f low range Voltmeter		- Potentiometer						
6. Carey Foster	Bridge		- Resistance & re	esisti	ivity of a wi	re.			
7. Spectrometer			- Refractive inde	xof	a Prism				
8Mirror Galva	nometer		- Voltage and cur	rrent	t sensitivene	SS			
9.LCR – Series	resonance		- Determination of	of L	& Q factor				
10.Air wedge			- Thickness of a v	vire					
11.Grating N by	y λ Normal incidence	-	Spectrometer						
12.Single stage	transistor amplifier	-	CE mode						
13.Hartley oscil	llator	-	Determination of	f fre	quency				
14.Logic gates	– NAND and NOR	-	Using Discrete	Com	ponents.				
15.Zener diode		-	Forward & Reve	erse	Characterist	ics			
16.OP AMP		-	Adder and Subtr	acto	r				
			Tot	al P	ractical Ho	urs	30 H	rs	
Books for Stud	ly:								
1. Srinivasar	n.M.N.,Balasubramanian	.S.,Ranga	anathan.R., A	Tey	kt Book	of P	'ract	ical	
Physics, 2	2017 Edition Sultan Char	nd & Son	8						
Books for Refe	erences:								
1. Ouseph	.C., Practical Physics and	d Electro	nics,2013.S.Visy	wan	athan.P.Ltc	l			
2. Practica	l Physics and Electronics.	C.C.Ouse	oh, U.J.Rao, V.Vi	ijave	endran, S.Vi	swana	athan		
Publishe	ers(2007)	1		55	,				
Web Resource	s:								
1. https://nptel.ac.in/course.html/physics/experimental physics I. II and III									
2. https://nptel.ac.in/courses/115/105/115105110/									
3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK									
Course Outcor	nes]	K Le	vel	
Academic (ouncil Meeting Hold On	29 04 202	1			Da	age 1	9	
Academic C	ounch micening field Oll	<i></i> ,0 7 , <i>4</i> 04	•			16	ige I	,	

On su	On successful completion of the course, the learners should be able to				
	Understand and evaluate the Young's modulus and Rigidity modulus of the				
CO1:	given material, the ways to calibrate a low range voltmeter using	K4			
	potentiometer				
CO2:	Acquire the knowledge of the characteristics of an operational amplifier	K3			
CO3:	Apply the basic principles of optics to determine the thickness of a wire	K4			
CO4.	Analyze the electrical parameters like resistance and resistivity using Carrey	K/			
CO4:	Foster bridge and characteristics of Zener diode	N 4			
CO5:	Construct Amplifier and Oscillator	K4			

CO & PO Mapping:

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

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

LESSON PLAN

Semester	Allied Physics Practical - I	Hrs	Pedagogy
	1. Uniform bending - Pin & Microscope		
	2. Torsion Pendulum - Determination of Rigidity modulus and		
	M.I		
	3. Thermal conductivity of Bad conductor - Lee's disc		
Ι	4. Sonometer - Verification of laws	30	Demonstration
	5. Calibration of low range Voltmeter - Potentiometer		
	6. LCR – Series resonance - Determination of L & Q factor		
	7. Logic gates – NAND and NOR - (Discrete Components).		
	8. Zener diode - Forward & Reverse Characteristics		

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha



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

Course Name	QUANTITATIVE AP	QUANTITATIVE APTITUDE						
Course Code	21UMTS11				L	Р	С	
Category	Skill				2	-	2	
Nature of course:	EMPLOYABILITY	~	SKILL ORIENTED	ENTREPRENE	EURS	HIP		
Course Object	ives:							
 To understa To demonst To improve To face the To solve pr 	 To understand concepts of Mathematics along with analytical ability. To demonstrate the computational skills needed. To improve the ability to face the competitive examinations. To face the Competitive Examination bravely in future on employability. To solve problems using mathematical shortcuts. 							
	oblems using maneman	ai si	noncuis.			6		
Pro	oblems on ages.							
Unit: II	<u> </u>					6		
Pr	ofit and Loss							
Unit: III						6		
Ra	tio and proportion.							
Unit: IV						6		
Ti	me and Work.							
Unit: V						6		
Pe	rmutations and Combina	tions	S.					
				Total Lecture	Hour	·s 3	0	
Books for Stud R.S.Agg publicati Unit I: Cl Unit II: C Unit III: C Unit III: C Unit IV: C	Books for Study: 30 R.S.Aggarwal, Quantitative Aptitude, Revised and Enlarged Edition, S.Chand 90 Unit I: Chapter 8 (Examples and Exercise first ten problems) 90 Unit II: Chapter 11 (Examples and Exercise first ten problems) 90 Unit III: Chapter 12 (Examples and Exercise first ten problems) 90 Unit IV: Chapters 15 (Examples and Exercise first ten problems) 90 Unit IV: Chapters 15 (Examples and Exercise first ten problems) 90							
Books for Refr	ences:		•					
 Abhigit Guha, Quantitative Aptitude, 4th Edition, Tata Mc Graw Hill Publication, New Delhi, 2011. U.Mohan Rao, Quanlitative Aptitude, Scitech Publications, Chennai, Reprint 2013. Rajesh Verma, Fast Track Objective Arithmetic Paperback, Arihant Publications, 2018 								
https://lecture	o notes.in/nlacement.prer	arat	tions					
https://www.vo	outube.com/watch?v=-i	2PDe	eEOmFA					
https://www.ib	psguide.com/important	-apt	itude-shortcuts-and-n	nind-tricks-for-p	oroble	ems-	on-	
ages-ibps-po-2	017-18/							

COUH	COURSE OUTCOMES K Level					
On the	On the successful completion of the course, the students will be able to					
CO1:	Solve problems on ages.	K3				
CO2:	Find profit / loss	K3				
CO3:	Develop problem solving skills using ratio and proportion	K3				
CO4:	Relate various concepts in solving time and work	K3				
CO5 :	Choose the suitable method to solve permutation and combination	K3				

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	COURSE NAME	Hrs	Pedagogy
Ι	Problems on ages.	6	Chalk & Talk
II	Profit and Loss	6	Chalk & Talk
III	Ratio and proportion.	6	Chalk & Talk
IV	Time and Work.	6	Chalk & Talk
V	Permutations and Combinations.	6	Chalk & Talk

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





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

Course Name	INTEGRAL CALCUL	US					
Course Code	21UMTC21				L	Р	С
Category	Core				4	-	4
Nature of cours	e: EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRE	NEUF	RSHI	Р
Course Objecti	ves:						
• To give an io	dea about the properties o	f def	inite integrals.				
• To evaluate	• To evaluate double and triple integrals.						
• To interchan	ige Cartesian to polar co-	ordin	ates.				
• To understan	nd the relation between th	e der	ivative and definite inte	grals			
• To know the	e properties of Beta and G	amm	a functions.				_
Unit: I		9				1	5
Integration of ra	itional algebraic functions	s –Sp	ecial cases – Integration	n of irrational	algeb	raic	
Tunctions – Prop	perties of definite integrals	5.				1	5
Unit: II Integration by n	arta Daduction formulas	for	$\sin^n x \cos^n x \tan^n x \cos^n x$	n sin ^m y or	n	1	5
-Bernoulli's for	nula	101 8	$\sin x, \cos x, \tan x, \cos x$	sec x, sill x co	98 X		
	ilulu.					1	5
Evaluation of d	louble integral – Changin	lg of	order of integration – [Double integral	in P	olar	5
co- ordinates - 7	Triple integral.	5 01	order of integration 1			onui	
Unit: IV						1	5
Jacobian – Cha	nge of variables in the ca	se of	f two variable and three	variables – T	ransfo	ormat	tion
from Cartesian t	o polar coordinate – Tran	sforn	nation from Cartesian to	spherical coo	rdinat	es.	
Unit: V						1	5
Properties – rela	tion between Beta and Ga	amma	a functions – Recurrence	e formula.			
			r	Fotal Lecture	Hou	s 7	5
Books for Stud	y:						
Naray	anan. S and Manickavasa	igam	Pillai. T.K, Calculus Vo	plume II, (201	5)		
Ui	nit I : Chapter I : $7.3, 7.4,$	7.5,	8, 11				
	nit II : Chapter 1: 12,13,13	5.1	Λ				
	nit III: Chapter 5 : 2.1, 2.2 nit IV : Chapter 6: 1 1 1 2	2, 3.1) 7 1	,4 111314				
	nit IV : Chapter 7. 2 1 2 2	2, 2.1	,2.2,2.3,2.4				
Books for Refe	rences:	2.3,	5, 1, 5				
1. Bali. N. P. In	tegral Calculus, Laxmi I	Publi	cations, (1991), Delhi.				
2. Arumugam. S	S and Isaac, Calculus, Ne	w Ga	amma Publishing House	, 2008, Palaya	mkot	tai.	
3. George B.Th	omas, Maurice D.Weir a	and J	oel Hass Calculus 12th	h Edition, Pea	rson		
Education, 20	015.						
Web Resources	5						
1. <u>https://www</u>	w.khanacademy.org/mat	<u>th/int</u>	<u>tegral-calculus/ic-integ</u>	ration/ic-inte	<u>gral-c</u>	<u>alc-</u>	
intro/v/intr	oduction-to-integral-cal		5				
2. <u>nttps://npte</u>	ei.ac.in/courses/111/10//	1111	<u>0/108/</u>				
COU	RSE OUTCOMES	K Level					
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On th	e successful completion of the course, the students will be able to						
CO1:	Demonstrate the understanding of basic concepts of integration.	K2					
CO2:	Examine various techniques of integration	K4					
CO3:	Apply the various concepts in solving definite and improper integrals.	K3					
CO4:	Solve problems using transformation of one coordinate system to another	K4					
CO5:	Analyze the properties of Beta and Gamma functions.	K4					

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	COURSE NAME	Hrs	Pedagogy
Ι	Integration of rational algebraic functions –Special cases – Integration of irrational algebraic functions – Properties of definite integrals.	15	Chalk & Talk
II	Integration by parts– Reduction formulae for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\csc^n x$, $\sin^m x \cos^n x$ -Bernoulli's formula.	15	Chalk & Talk
III	Evaluation of double integral – Changing of order of integration– Double integral in Polar co– ordinates – Triple integral.	15	Chalk & Talk
IV	Jacobian – Change of variables in the case of two variable and three variables – Transformation from Cartesian to polar coordinate – Transformation from Cartesian to spherical coordinates.	15	Chalk & Talk
V	Properties – relation between Beta and Gamma functions – Recurrence formula.	15	Chalk & Talk

Course Designed by: Mrs.R.Sumathi and Dr.V.Ramachandran

		Learning Outcome Based Education & Assessment (LOBE)								
	Formative Examination - Blue Print									
		Articulation	Mapping –	K Levels w	ith Course (Outcomes	s (COs)	1		
			Sectio	on A	Section	n B	Section	Section		
Inte	Cos	K Level	MC	Qs	Short An	swers	Section C	Section D		
rnal	005	IX Level	No. of.	К-	No. of.	К-	Either or	Open		
			Questions	Level	Questions	Level	Choice	Choice		
CI	CO1	Upto K2	2	K1&K2	1	K1	2	1		
AI	CO2	Upto K3	2	K1&K2	2	K2	2	1		
CI	CO3	Upto K4	2	K1&K2	1	K2	2	1		
AII	CO4	Upto K4	2	K1&K2	2	K2	2	1		
		No. of								
		Questions to be	4		3		4	2		
		asked								
		No. of								
Que	stion	Questions to be	4		3		2	1		
Pat	tern	answered								
CIA	I & II	Marks for each	1		2		5	10		
		question	I		2		5	10		
		Total Marks								
		for each	4		6		10	10		
		section								

	Distribution of Marks with K Level 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	8	20		
	K2	2	4			6	12			
CIA	K3			10	10	20	40	40		
I	K4			10	10	20	40	40		
	Marks	4	6	20	20	50	100	100		
	K1	2	2			4	8	20		
CIA	K2	2	4			6	12]		
II	K3			10	10	20	40	40		
	K4			10	10	20	40	40		
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course							
		-		Outcomes	(COs)			
		V	MO	Qs	Short An	swers	Section C	Section D
S.No	COs	K- Laval	No. of	K –	No. of	K –	(Either /	(Open
		Level	Questions	Level	Question	Level	or Choice)	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 Questi Aske	ons to be d	10		5		10	5
No. of Questions to be answered		ons to be red	10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section		10		10		25	30	
	(Figures	in parenthe	esis denotes,	questions s	hould be as	ked wit	h the given 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	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 of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

Section	A (Mul	tiple Choic	e Questions)
Answer	All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	All Qu	estions	(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 (Eith	er/Or Type	
Answer	All Qu	estions	(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	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels			
Section	D (Ope	n Choice)	
Answei	r Any T	hree questi	ons (3x10=30 marks)
Q.No	CO	K Level	Questions
21	COl	K2	
22	CO2	K4	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



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

Course Name	ANALYTICAL GEOMETRY OF THREE DIMENSIONS						
Course Code	21UMTC22				L	Р	С
Category	Core				4	-	4
Nature of cours	e: EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPREN	NEUF	SHI	Р
Course Objectiv	res:						
• To recall the	basic concepts of two dir	nensi	ions				
• To understan	nd about lines, planes, sph	eres					
• To compare	the two dimensions and th	ree d	limensions				
• To find the o	listance between the Lines	and	the Planes				
• To find the a	ngle between the Lines, th	e Pla	anes, the Spheres				-
Unit: I						1	2
The plane – Equ	ation of a Plane – Intercep	t fori	m - Normal form- Tra	nsformation to	the N	Jorm	al
form- Angle bet	ween two planes - Length	of pe	erpendicular – Angle Bi	sectors of Two	o Plan	es.	-
Unit: II		. .					2
The Straight Li	ie – Equation of a Straight	Line	e- Symmetric form – T	wo Point form	1 - Ar	gle	
between the L1	nes – Problems					1	2
		1 1		1 1 D'		1	Z
A Plane and a	Line- Coplanar Lines- An	igle I	between the line and t	the plane- Dis	tance		
between two lin	es					1	n
Shortost distance	a hatwaan two linas Tha	Spha	ra Equation of the on	hara Drohlam	0		Z
Unit: V	e between two mies - The	Spile	re – Equation of the sp	nere- riobiem	.5	1	2
Concrol Form of	a Sphara Diamatar Form	Tat	ngant Lina and Tangan	t Plana Angla	of In	torso	2 otion
of Two Spheres.	Section of a Sphere – Sim	i- I ai inle r	ngent Line and Tangen	t Flane- Aligie	01 111	leise	cuon
of two spheres	Section of a sphere – Shi	ipic j	r r	Fotal Lecture	Нош	•s 6	0
Books for Stud	7•				11001	3 0	0
Dr. Arumugam.	, • S and A. Thangapandi Isaa	ac. A	nalytical Geometry of	f three Dimen	sions	and	
Vector Calculu	s. New Gamma Publicatio	ons. F	Reprint 2017. Palavamk	ottai.			
Unit I	Chapter 2 : Full		1				
Unit II	Chapter 3 : Section 3	3.1					
Unit III	Chapter 3 : Section	3.2					
Unit IV	Chapter 3 : Section 2	3.2 &	chapter 4: Section 4	.1			
Unit V	Chapter 4 : Section4	1.2,4.	3				
Books for Refr	ences:						
1. Manicka Va	sagam Pillai and Natara	jan,	Analytical Geometry	of three Di	mens	ions	and
Vector Calo	ulus, Viswanathan. S, Pri	nters	and Publishers Pvt. Lt	d., Reprint 20	01, C	henna	ai.
2. Duraipandia	n.P, Laxmidurai pandia	n a	nd Muhilan.D, Ana	lytical Geom	netry	of	two
Dimensions	Emerald Publishers, Repi	rint, 1	1985, Chennai.	2012			
5. Analytical Ge	cometry: 2D and 3D, ,P.R.Vit	ttal- F	rearson Publications - Jar	nuary 2013			
vved Kesources	hainkant acm/antiala/T	hnoc	Dimongional Anal-4	al Cometer	615	2/	
1. <u>nup://www</u>	.pramkart.com/article/11	uree	-Dimensional-Analyti	cal-Geometry	_043.	<u>)/</u>	

2. <u>ht</u>	2. https://www.youtube.com/watch?v=a2mt2L0e06Y					
COUI	RSE OUTCOMES	K Level				
On th	e successful completion of the course, the students will be able to					
CO1.	Compute the angle between two planes, equation of the plane and its normal	K3				
COI.	forms	KJ				
CO2:	Solve the problems in straight lines	K3				
CO3:	Illustrate the angle between the planes and lines	K4				
CO4:	Calculate the distance between points, lines and planes.	K3				
CO5.	Identify sphere in general form, intersection of two spheres and its related	V2				
005:	problems	КЭ				

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	COURSE NAME	Hrs	Pedagogy
Ι	The plane – Equation of a Plane – Intercept form - Normal form- Transformation to the Normal form- Angle between two planes - Length of perpendicular – Angle Bisectors of Two Planes.	12	Chalk & Talk
II	The straight line – Equation of a Straight Line- Symmetric form – Two Point form – Angle between the Lines – Problems	12	Chalk & Talk
III	A Plane and a Line- Coplanar Lines- Angle between the line and the plane- Distance between two lines	12	Chalk & Talk
IV	Shortest distance between two lines - The Sphere – Equation of the sphere- Problems	12	Chalk & Talk
V	General Form of a Sphere- Diameter Form- Tangent Line and Tangent Plane- Angle of Intersection of Two Spheres- Section of a Sphere – Simple problems.	12	Chalk & Talk

Course Designed by: Dr.A.Hamari Choudhi and Mrs.S.Ragavi

	Learning Outcome Based Education & Assessment (LOBE)											
Articulation Mapping – K Levels with Course Outcomes (COs)												
				Sectio	on A	Section	B B	Section	Section			
Inte	C	06	K Level	MC	Qs	Short Ans	swers	Section C	Section D			
rnal		03	K Level	No. of.	К-	No. of.	K -	Either or	Open			
				Questions	Level	Questions	Level	Choice	Choice			
CI	CO	01	Upto K2	2	K1&K2	1	K1	2	1			
AI	CO2		Upto K3	2	K1&K2	2	K2	2	1			
CI	CO3		Upto K4	2	K1&K2	1	K2	2	1			
AII	CO)4	Upto K4	2	K1&K2	2	K2	2	1			
		No. of Questions to be asked		4		3		4	2			
Quest n Patter	tio	N te	o. of Questions o be answered	4		3		2	1			
CIA & I	I I	N	Aarks for each question	1		2		5	10			
		Т	otal Marks for each section	4		6		10	10			

	Distribution of Marks with K Level 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	8	20					
	K2	2	4			6	12	20					
СІА	K3			10	10	20	40	40					
	K4			10	10	20	40	40					
-	Marks	4	6	20	20	50	100	100					
	K1	2	2			4	8	20					
	K2	2	4			6	12	20					
CIA	K3			10	10	10	40	40					
II	K4			10	10	20	40	40					
	Marks	4	6	20	20	50	100	100					

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes											
(COs)												
	COs	K	MCO	Qs	Short An	swers	Section C	Section D				
S.No		K -	No. of	K –	No. of	K –	(Either / or	(Open				
		Level	Questions	Level	Question	Level	Choice)	Choice)				
1	CO1	Upto K2	2	K1&K2	1	K1	2(K1 & K1)	1(K2)				
2	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. o	of Questi	ions to be	10		5		10	5				
	Aske	d	10		3		10	5				
No. o	of Questi	ions to be	10		5		5	3				
	answei	red	10		3		5	5				
Mark	s for eac	h question	1		2		5	10				
Tota	al Marks	for each	10		10		25	30				
	sectio	on	10		10		23	50				
	(Figure	es in parentl	hesis denotes,	questions	should be as	ked with	n the given K l	evel)				

		Dis	stribution of	Marks with	ı K Leve	1			
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	1/		
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.									

Section	A (Mu	ultiple 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	
Section	B (Sho	ort Answei	rs)
Answei	r All Q	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)
Answe	r All Q	uestions	$(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	COL	K3	
16) b	COI	K3	
1/)a	CO2	K3 K2	
1/) b	CO_2	K3	
18) a	CO_3	K4	
18) D	CO3	K4 K2	
19) a	CO4	K3 K2	
19) b	C04	K3 K2	
20) a	C05	K3 K2	
20) D		N 3	
NB: HI	gner le	vel of peri	ormance of the students is to be assessed by attempting higher
Section	\mathbf{N} ieve	on Choice	
Answe	n Any '	Three que) stions (3x10-30 morks)
		K Lovol	Ouestions
21	C01	K Level K3	Questions
21	CO^{1}	K3	
22	CO_2	K4	
23	CO4	K3	
<u></u> 47	COT	13	
25	COS	K3	

Summative Examinations - Question Paper – Format



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

Course Name	ALLIED PHYSICS – II: Electricity, Electronics , Optics and Mo	dern	Phys	sics						
Course Code	21UPHA21	L	Р	С						
Category	Allied	4	-	3						
Nature of cours	e: EMPLOYABILITY 🖌 SKILL ORIENTED 🖌 ENTREPRI	ENEU	JRSH	ΗP						
Course Objecti	ves:									
The learners wil	l be able:									
1. To understand	the laws of electricity									
2. To recollect d	ifferent types of diodes and transistors									
3. To apply deci	mal and binary number system		_							
4. To understand the various types of lenses, prism, aberrations, interference and diffraction										
5. 10 understand	5. To understand and apply the basic concepts of laser									
Conceitors Eur	aricuy		12							
Capacitors – Exp	ression for C of a parallel plate capacitor – Energy of a charged capacitor	- 110F -	- LOS	S OI						
laws to Wheater	ig of charges between two capacitors- Kirchoff's laws – Application (וא 10 Dmi								
Potontiomotor	Calibration of ammeter and voltmeter (low, range only)	- FII	ncipi	2 01						
Init: II Fla	canoration of animeter and volumeter (low Tange only)		12	,						
Transistor Wo	rking of n-n-n transistor. Characteristics(CE mode only). Comm	on -	Em	ittor						
transistor amplif	ier - Frequency response - Hartley oscillator - Modulation - Types of	Mod	nn. Inlati	on -						
OPAMP and its	α characteristics – OPAMP as adder and subtractor- Logic circu	ite _	Rool	lean						
algebra – De Mo	organ's theorem – OR, AND, NOR, NOT, NAND gates	115	DUU	Can						
Unit: III Geo	metrical Optics		12							
Deviation produ	ced by thin lens – Focal length of two thin lenses in and out of contac	t - R	efrac	tion						
through a thin p	rism – Dispersion – Dispersive power – Combination of thin prisms	to pro	oduce	: (a)						
Deviation witho	ut dispersion and (b) Dispersion without deviation – Direct vision s	pectro	oscor	be –						
Chromatic aberr	ation in lenses – Spherical aberration in lenses – Theory of primary a	and se	econd	lary						
rainbows.				•						
Unit: IV Phy	sical Optics		12							
Interference in t	hin films – air wedge – Newton's rings (reflected beam only) – Det	ermi	natio	n of						
wavelength – I	Diffraction – Theory of plane transmission grating (normal incid	ence	only	') —						
Experiment to d	etermine wavelengths - Double refraction - Nicol prism - Construction	on, ac	ction	and						
uses – Quarter	wave plate (QWP) - Half wave plate (HWP) - Optical activity -	Biot'	s law	/s –						
Specific rotatory	power - Laurent's Half shade polarimeter - Determination of spec	ecific	rota	tory						
power										
Unit: V Las	ers		12	1						
Introduction of I	asers-Spontaneous and stimulated emission-Population Inversion-Ei	nstein	's A	and						
B coefficients-o	lerivation. Types of lasers-Nd:YAG,CO2 ,Semiconductor lasers-I	ndust	rial	and						
Medical Applica	tions.									
Total Lecture Hours 60 Hrs										
Books for Study	Books for Study:									
1. R. Murugesan, Electricity and Electronics , Madurai, First Edition, July 2016.										
Academic Co	ouncil Meeting Held On 29.04.2021	Pa	ige 34	- 4						

	Unit – I : 1.5,1.6, 1.9-1.14, 1.18,1.19,2.1,2.3-2.7									
	Unit – II : 4.1,4.2,4.4,4.5.4.6,4.10-4.12,4.14-4.18,4.24,4.25, 5.1-5.7,5.9-14,5.16									
	2. R.Murugeshan, Optics Spectroscopy and Modern Physics, Madurai, First Edition,									
	July 2016.									
	Unit – IIII : 1.1-1.3,1.5-1.11,1.13,1.17,1.23,1.24									
	Unit – IV : 2.1,2.2,2.4-2.6,2.9,2.10,3.1,3.2,3.4,3.5-3.10									
	3. P.Mani, A Text book of Engineering Physics, 12 th edition, , Dhanam Publica	tions,								
(Chennai									
	Unit – V : 7.1 – 7.45									
Books	for References:									
1. Kał	caniand Bhandari Sultan, Optics and Spectroscopy, Chand and Sons, New									
Delhi,	2004.									
2.Brij	laland Subramanyam., A Text book of Optics, S.Chandand Co, New Delhi, 2004.									
3. B.K	Sharma, Spectroscopy, GOEL Publishing House, Meerut, 2006.									
4. Nar	ayanamoorthyandNagarathinam, Electricity and Magnetism, National Publishin	ng Co,								
Web R	lesources:									
1. <u>ht</u>	tps://www.youtube.com/watch?v=ML7HcZo6IaE									
2. htt	tps://www.khanacademy.org/science/physics/light-waves/introduction-to-ligh	<u>t-</u>								
3. wa	wes/v/polarization-of-light-linear-and-circular	_								
Course	e Outcomes	K Level								
After s	successful completion of the course, the student is expected to									
	Remember principle of capacitors, Kirchhoff's laws, forward and reverse bias,									
CO1:	frequency response, modulation, focal length, dispersive power, cordinal	K2								
	points, double refraction, Biot's law, Principals of Laser.									
	Understand energy of a capacitor, principle of potentiometer, diode									
CO2:	characteristics, working of npn transistor, logic circuits, basics of types of	K3								
	laser.									
001	Apply Kirchhoff's laws, Boolean algebra, Refraction through a prism,	173								
CO3 :	Einstein's coefficients	К3								
	Calibration of ammeter and voltmeter, OP AMP as an adder and subtractor,									
CO4:	Calibration of ammeter and voltmeter, OP AMP as an adder and subtractor, logic gates, deviation without dispersion ,dispersion without deviation, Q.W.P,	K4								
CO4:	Calibration of ammeter and voltmeter, OP AMP as an adder and subtractor, logic gates, deviation without dispersion ,dispersion without deviation, Q.W.P, H.W.P, Applications of lacer.	K4								
CO4:	Calibration of ammeter and voltmeter, OP AMP as an adder and subtractor, logic gates, deviation without dispersion ,dispersion without deviation, Q.W.P, H.W.P, Applications of lacer. Examine parallel plate capacitor, Cary Foster bridge, transistor characteristics	K4								
CO4: CO5:	Calibration of ammeter and voltmeter, OP AMP as an adder and subtractor, logic gates, deviation without dispersion ,dispersion without deviation, Q.W.P, H.W.P, Applications of lacer. Examine parallel plate capacitor, Cary Foster bridge, transistor characteristics CE mode, frequency of Hartley oscillator, Specific rotatory power,	K4 K4								

CO & PO Mapping:

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

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

Unit	Electricity, Electronics , Optics and Modern Physics	Hrs	Pedagogy
I	Electricity Capacitors –Expression for C of a parallel plate capacitor – Energy of a charged capacitor – Loss of energy on sharing of charges between two capacitors- Kirchoff's laws – Application of Kirchhoff's laws to Wheatstone's network – Carey Foster Bridge – Measurement of resistance – Principle of Potentiometer – Calibration of ammeter and voltmeter(low range only)	13	Lecture method, PPT, Demonstration
п	Electronics Transistor – Working of n-p-n transistor– Characteristics(CE mode only) –Common - Emitter transistor amplifier – Frequency response - Hartley oscillator –Modulation – Types of Modulation - OPAMP and its characteristics – OPAMP as adder and subtractor– Logic circuits – Boolean algebra – De Morgan's theorem – OR, AND, NOR, NOT, NAND gates	12	Lecture method, PPT, Demonstration
III	Geometrical Optics Deviation produced by thin lens – Focal length of two thin lenses in and out of contact – Refraction through a thin prism – Dispersion – Dispersive power – Combination of thin prisms to produce (a) Deviation without dispersion and (b) Dispersion without deviation – Direct vision spectroscope – Chromatic aberration in lenses – Spherical aberration in lenses – Theory of primary and secondary rainbows.	11	Lecture method, PPT, Model
IV	Physical Optics Interference in thin films – air wedge – Newton's rings (reflected beam only) – Determination of wavelength – Diffraction – Theory of plane transmission grating (normal incidence only) – Experiment to determine wavelengths - Double refraction – Nicol prism – Construction, action and uses – Quarter wave plate (QWP) – Half wave plate (HWP) – Optical activity – Biot's laws – Specific rotatory power – Laurente' Half shade polarimeter – Determination of specific rotatory power	12	Lecture method, PPT
V	Lasers Introduction of Lasers-Spontaneous and stimulated emission- Population Inversion-Einstein's A and B coefficients-derivation. Types of lasers-Nd:YAG,CO ₂ ,Semiconductor lasers-Industrial and Medical Applications.	12	Lecture method, PPT

LESSON PLAN – Allied Physics - II

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha

	Learning Outcome Based Education & Assessment (LOBE)												
	Articulation Mapping – K Levels with Course Outcomes (COs)												
		K		Section A		Section	Section B			Section D (Open Choice)			
Inte	COs	-	Unit	MCO	Qs	Short Ans	swers	No.		No.	,		
rnai		vel		No. of. Questions	K - Level	No. of. Questions	K - Level	of. Ques tions	K - Level	of. Ques tions	K - Level		
CI	CO1	K1	Ι	2	K1&K2	1	K1	2	K2	1	K2		
AI	to CO5	to K4	Π	2	K1&K2	2	K2	2	K3	1	K3		
CI	CO1	K1	III	2	K1&K2	1	K2	2	K3	1	K3		
AII	to CO5	to K4	IV	2	K1&K2	2	K2	2	K4	1	K4		
		No. of Questions to be asked		4		3		4		2			
Question		No. of Questions to be answered		4		3		2		1			
CIA I	ern & II	Marl ea que	ks for 1ch stion	1		2			5	1	0		
		To Marl ea sec	otal ks for ich tion	4		6		1	0	10			

	Distribution of Marks with K Level CIA I & CIA II												
	K (Multipl Level Choice Question		Section BSection C(Short(Either /AnswerOrQuestions)Choice)		Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %					
	K1	2	2			4	8	60					
CIA	K2	2	4	10	10	26	52	00					
	K3			10	10	20	40	40					
	K4												
1	Marks	4	6	20	10	40	100	100					
	K1	2	2			4	8	20					
	K2	2	4			6	12	20					
CIA	K3			10	10	20	40	40					
II	K4			10	10	20	40	40					
	Marks	4	6	20	20	50	100	100					

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

<u>UNIT-V</u> will be allotted for individual Assignment in <u>CO5 - K4</u> level which carries five marks as part of CIA component.

Sı	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)												
S.No.	COs	К-	Unit	MO	Qs	Short Answers		Section C (Either / or Choice)		Section D (Open Choice)			
		Level		No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level	No.of Ques tions	K – Level		
1	CO1 - CO5	K1 to K4	Ι	2	K1 & K2	1	K1	2	K2 & K2	1	K2		
2	CO1 - CO5	K1 to K4	Π	2	K1 & K2	1	K1	2	K3 & K3	1	K3		
3	CO1 - CO5	K1 to K4	III	2	K1 & K2	1	K2	2	K3 & K3	1	K3		
4	CO1 - CO5	K1 to K4	IV	2	K1 &K2	1	K2	2	K4 & K4	1	K4		
5	CO1 - CO5	K1 to K4	V	2	K1 & K2	1	K2	2	K4 & K4	1	K4		
No. of	Questio	ns to be	Asked	10		5		1	0		5		
No. of Questions to be answered			be	10		5		5		3			
Marl	ks for ea	ach ques	tion	1		2		4	5	10			
Total N	Aarks fo	or each s	ection	10		10		2	5		30		

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	12	47			
K2	5	6	10	10	31	34.66	47			
K3			20	20	40	27	27			
K4			20	20	40	26.66	26			
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 lev	of K levels.									

Section	A (Mul	tiple Choic	e Questions)
Answer	All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	All Qu	estions	(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 (Eith	er/Or Type	
Answer	All Qu	estions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	<u>K 2</u>	
16) b	CO1	K 2	
17) a	CO2	<u>K 3</u>	
17) b	CO2	<u>K 3</u>	
18) a	CO3	<u>K 3</u>	
18) b	CO3	K 3	
19) a	CO4	<u>K 4</u>	
19) b	CO4	<u>K 4</u>	
20) a	CO5	<u>K 4</u>	
20) b	.05	<u>K4</u>	
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels			
Section	D (Ope	n Choice)	
Answer		Iree questic	Oregitaria (3x10=30 marks)
Q.N0		K Level	Questions
21		K2 K2	
22	CO_2	KJ V2	
23	CO3	KJ V4	
24	CO4	K4 K4	
23	005	K 4	

Summative Examinations - Question Paper – Format



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

Course Name	ALLIED PHYSICS PRACTICAL - I								
Course Code	21UPHAP1				L	Р	С		
Category	Allied				-	2	1		
Nature of cours	e: EMPLOYABILITY 🗸 SKILL ORIENTE	D 🗸	E	NTREPR	ENE	URSH	IP		
Course Objecti	ves:	I							
The learners will	l be able:								
1. To gain know	eledge about the experiments based on Optics, El	lectricit	ty an	d Electro	nics				
2. To demonstra	te modulus of elasticity								
3. To understand	d the bending of beam, forward and reverse bias	ing, fre	quen	cy respon	nce				
4. To understand	d current conduction in electrical circuits.								
5. To learn abou	t transistor amplifier, oscillator and Operational	amplif	ier						
LIS	T OF EXPERIMENTS (Any Fourteen Experim	ments)							
1. Uniform bend	ling - (Pin & Mi	crosco	pe)						
2. Torsion Pend	ulum - Determina	ation of	Rigi	idity mod	ulus a	nd M.	[
3. Thermal cond	luctivity of Bad conductor - Lee's disc	;							
4. Sonometer	- Verificatio	on of la	WS						
5. Calibration of	f low range Voltmeter - Potentiom	eter							
6. Carey Foster	Bridge - Resistance	e & resi	stivi	ty of a wi	ire.				
7. Spectrometer	- Refractive	index	of a l	Prism					
8Mirror Galva	nometer - Voltage ar	nd curre	ent so	ensitivene	ess				
9.LCR – Series	resonance - Determinat	tion of	L &	Q factor					
10.Air wedge	- Thickness	of a wi	re						
11.Grating N by	- Spectromet	er							
12.Single stage	transistor amplifier - CE mode		•						
13.Hartley Oscil	Lator - Determination	ion of I	requ	ency					
14.Logic gates -	- NAND and NOR - Using Disc	D	ompo	onents.	• • •				
15.Zener diode	- Forward &	Revers	e Cr	aracterisi	iics				
16.0P AMP	- Adder and S	Subtrac Total	tor Drea	ation IIa		20 1	[m a		
Books for Stud	V •	Tota	Pra	cucal Ho	burs	30 H	Irs		
1 Srinivasan	y. M N Balasubramanian S Ranganathan R	ΔΤ	evt	Book	of	Pract	ical		
Physics. 2017 I	Edition Sultan Chand & Sons		слі	DUUK	U .	I I aci	icai		
Books for Refe	rences:								
2. Ouseph.C.	Practical Physics and Electronics.2013.S.Vi	swana	than	.P.Ltd					
3. Practical Ph	vsics and Electronics, C.C.Ouseph, U.J.Rao, V.V.	Vijaven	dran	, S.Viswa	anath	an			
Publishers(2	2007)	5.5		, ,					
Web Resources	:								
1. https://nptel.	ac.in/course.html/physics/experimental physi	cs I, II	and	III					
2. https://nptel.	2. https://nptel.ac.in/courses/115/105/115105110/								
3. <u>https://www.</u>	youtube.com/playlist?list=PLuiPz6iU5SQ8-r2	Zn_Lg	LofF	<u> X7n8z4t</u>	t HY	K			
Academic C	ouncil Meeting Held On 29 04 2021				Γ	οπο Λ	0		

Course	e Outcomes	K Level			
On successful completion of the course, the learners should be able to					
	Understand and evaluate the Young's modulus and Rigidity modulus of the				
CO1:	given material, the ways to calibrate a low range voltmeter using	K4			
	potentiometer				
CO2:	Acquire the knowledge of the characteristics of an operational amplifier	K3			
CO3:	Apply the basic principles of optics to determine the thickness of a wire	K4			
<u>co</u> 4.	Analyze the electrical parameters like resistance and resistivity using Carrey	V.A			
CO4:	Foster bridge and characteristics of Zener diode				
CO5:	Construct Amplifier and Oscillator	K4			

CO & PO Mapping:

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

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

LESSON PLAN

Semester	Allied Physics Practical - I	Hrs	Pedagogy
	1. Carey Foster Bridge - Resistance & resistivity of a wire.		
	2. Spectrometer - Refractive indexof a Prism		
	3. Mirror Galvanometer - Voltage and current sensitiveness		
тт	4. Air wedge - Thickness of a wire	20	Demonstruction
11	5. Grating N by λ Normal incidence - Spectrometer	30	Demonstration
	6. Single stage transistor amplifier - CE mode		
	7. Hartley oscillator - Determination of frequency		
	8. OP AMP - Adder and Subtractor		

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha



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

Course Name	MS OFFICE – LAB										
Course Code	21UMTSP1					L	Р	С			
Category	Skill					-	2	2			
Nature of courses	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPREN	EUR	SHIP	✓			
Course Objectiv	/es:										
• To improve the employability skill											
• To present n	nathematical concepts i	n ser	ninar / conference								
To document	t project works										
• To prepare v	various type of charts for	r the	given data								
• To familiari	ze the office automation	n too	ls								
List of P	rograms										
1. D fc 2. D bc 3. C m 4. C 5. C by 6. C 7. C 8. Pr	esign a document with a nt style, different font s esign an invitation with order and shading. reate a main document a erge tools. reate a daily attendance period etc. reate students mark list y using string function a reate a yearly budget of reate a slide show using resent the college details	at lea izes, two and d shee for th a co blan s or a	ast two pages using M header and footer, wi column break, use wo latabase of addresses a et of a class room for a pree subjects and to lis ogical function. mpany and create diff ak presentation with at any publishing work u	S wo th pa ord to and to a we st the feren a leas sing	ord with differences age number. The insert picture merge them us ek with headin e result and ran at types of char st 20 slides. Auto content	ent , desi ing M ig, day ik it for t wizar	gn ail- y, he da d.	ıta.			
9. Ci	reate a Seminar present	ation	using insert picture a	nd s	ound.						
Total Lecture I	Iours										
Books for Stud	y:										
C.Nellai Kannar	n, MS Office , Nels Pub	licati	ons, 3 rd edition, Tirun	elve	li, 2004.						
Books for Refr	ences:			_							
1. Sanjay Saxe	na, A First course in	Com	puters, Vikas Publis	hing	House Pvt Lt	d Edi	tion,	New			
Delhi, 2003.		~				D "					
2. Vikas Gupta	2. Vikas Gupta, Comdex Computer Course Kit, Dream Tech Press Edition, New Delhi, 2003.										
J. WEBSITE:	3. WEBSITE : https://www.free-computer-tutorials.net/word-2007.html										
vveb Kesources	which a com/match/	7	7010.a								
https://www.yo	https://www.youtube.com/watch/yCVy5Kw0l8s										
COUDSE OUT	<u>uodai.org/en/subjects/</u> COME		<u>e/</u>				K T	ovol			
On the success	UNIE ful completion of the c	01110	so the students will b	ار ما	ala ta		K L	evel			
On the success	iui compietion of the o	ours	se, me sindenis will t	le al							

CO1:	Demonstrate the understanding of various packages of MS Office.	K2
CO2:	Prepare documents using Ms-Word	K4
CO3:	Use mail merge tool to merge the database.	K3
CO4:	Create professional presentation using Micorsoft Power Point	K4
CO5:	Manipulate the data using MS-excel	K3

CO & PO Mappings:

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

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

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





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

Course Name	MECHA	NICS								
Course Code	21UMT	C31			L	Р	С			
Category	Core				5	-	5			
Nature of cours	se: 🖌 E	MPLOYABILITY	SKILL ORIENTED	ENTREPI	RENU	RSH	IIP			
COURSE OBJ	ECTIVES	:								
• To understand the principles of statics.										
• To	apply law	vs of statics.								
• Te	o learn abo	ut the motion of a parti	cle in an angle							
• Te	o compare	about the static and dy	namic properties of a pa	rticle.						
• T	o calculate	the loss of energy duri	ng impact of two bodies	5.		1	~			
Unit: I	a maint 1	Desultant and someone	nto Douollolo onom lor	. of foresa	Tuian	1	5 			
forces acting at	a point – I sular Trian	Resultant and compone	ents – Parallelogram lav	v of forces-	theor	gie la	IW OI			
Init• II	Julai Illaii	igie of Porces – Conver	se of trialigie law of for	CES-Laini S	theor		5			
Resolution of a	force- Co	omponents of a force .	. Theorems of Resolved	d narts – R	esulta	int of	J f anv			
number of copla	nar forces	- Conditions of equilib	rium.		Courte		any			
Unit: III	101005					1	5			
Projectiles: Def	initions- T	wo fundamental Princi	ples- Characteristics of	the motion	of a p	rojec	tile -			
Path of the proje	ctile is a p	arabola	r		r	j				
Unit: IV	•					1	5			
Range on an ine	lined plan	e- Greatest distance- 7	Time of Flight-Motion of	on the surfa	ice of	a sm	nooth			
inclined plane.										
Unit: V						1	5			
Direct Impact	of two sm	ooth spheres- Loss of	kinetic energy due to	direct impa	ct and	d Ob	lique			
impact- Dissipa	ion of ene	rgy due to impact								
			Tot	tal Lecture	Hou	·s 7	5			
Books for Stud	y:			т · 1	C		.1			
I ext Boo	K I: M. K.	. Venkataraman, Static	s, Agasthiyar Publicatio	ons, Tricny,	Seve	nteen	th			
Edition, J	$\mathbf{L} 2 \cdot \mathbf{M} \mathbf{K}$	Vankataraman Dunar	ning Agesthiyor Dublie	otions Trial		ahtaa	nth			
Edition	K 2. IVI. K. anurary 20	. Venkalaraman, Dyna n)17	incs , Agasunyai Fublica	ations, The	ily, El	ginee	iiui			
Lation, J		/1/.								
Unit I : (Text Book	1) Chapter 2: Section 2	2.1 to 2.9							
Unit II :	(Text Bool	k 1) Chapter 2: 2.11 to	2.16							
Unit III:	Text Book	(2) Chapter 6: Section	6.1 to 6.6							
Unit IV :	(Text Boo	k 2) Chapter 6: Section	6.12 to 6.16							
Unit V:	Text Book	(2) Chapter 8 : Section	8.5 to 8.9							
Books for Refe	rences:									
1. Duraipandian	.P, Laxmi	Duraipandian and Mutl	hamizh Jayaprakash, M e	echanics, C	Chand	and				
Company Pvt L	d, New]	Delhi- 110055, 2014.		• • • • •						
2. Khanna M.L,	Statics, Ja	u Prakash Nath and co,	Meerut, Fifteenth Editi	on, 2011.						

2 51 1	2. St. Longy. The elements of Stating and Dynamics. Aribert Dublications, 2016						
5. SL.I	Loney, The elements of Statics and Dynamics, Affiliant Publications, 2010.						
Web R	Web Resources						
1. <u>ht</u>	1. https://www.researchgate.net/publication/322738790_Engineering_Mechanics						
_ <u>_</u> S	tatics_Lecture_Notes_Handwritten						
2. <u>ht</u>	tps://www.freebookcentre.net/physics-books-download/Lecture-Notes-on-the-						
Dy	vnamics-of-Particles-and-Rigid-Bodies.html						
3. <u>ht</u>	tps://people.maths.bris.ac.uk/~maxmr/Mechanics1/intro.pdf						
COUI	RSE OUTCOMES	K Level					
On th	e successful completion of the course, the students will be able to						
CO1:	Apply the basic laws of forces and friction	K3					
CO2:	Explain various theorems on forces acting on a body	K4					
CO3:	List the characteristics of the projectiles	K 4					
CO4:	Analyse the motion on the surface of an inclined plane.	K 4					
CO5 :	Solve the direct and oblique impact	K 3					

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Forces acting at a point – Resultant and components – Parallelogram law of forces-Triangle law of forces-Perpendicular Triangle of Forces – Converse of triangle law of forces-Lami's theorem.	15	Chalk & Talk
II	Resolution of a force- Components of a force - Theorems of Resolved parts – Resultant of any number of coplanar forces – Conditions of equilibrium.	15	Chalk & Talk
III	Projectiles: Definitions, Two fundamental Principles, Characteristics of the motion of a projectile, To prove that the path of the projectile is a parabola	15	Chalk & Talk
IV	Range on an inclined plane, Greatest distance, Time of Flight, Motion on the surface of a smooth inclined plane.	15	Chalk & Talk
V	Direct Impact of two smooth spheres, Loss of kinetic energy due to direct impact and Oblique impact, Dissipation of energy due to impact	15	Chalk & Talk

Course Designed by: Dr. P. Chitradevi, Assistant Professor & Dr. S. Andal, Assistant Professor

	Learning Outcome Based Education & Assessment (LOBE)										
	Formative Examination - Blue Print										
		Articulation	Mapping –	K Levels w	ith Course C	Jutcome	s (COS)				
	Cos		Section A		Section B		Section C	Section D			
Inte		K I ovol	MC	^c Qs	Short An	swers	Fither or	Open			
rnal		IX LEVEI	No. of		No. of.	К-	Choice	Choice			
			Questions	K - Level	Questions	Level	Choice	Choice			
CI	CO1	Upto K3	2	K1& K2	1	K1	2	1			
AI	CO2	Upto K4	2	K1& K2	2	K2	2	1			
CI	CO3	Upto K4	2	K1 & K2	1	K2	2	1			
AII	CO4	Upto K4	2	K1 & K2	2	K2	2	1			
		No. of	4		3						
		Questions to					4	2			
		be asked									
		No. of									
Que	stion	Questions to	4		3		2	1			
Pat	tern	be answered									
CIA	I & II	Marks for	1		2		5	10			
		each question	L		2		2	10			
		Total Marks									
		for each	4		6		10	10			
		section									

		Dist	ribution of 1	Marks with	K Level C	IA 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	8	20
	K2	2	4			6	12	20
СТА	K3			10	10	20	40	40
I	K4			10	10	20	40	40
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
S.No	COs	K - Level	MC No. of Questions	Qs K – Level	Short Ar No. of Questio n	K – Level	Section C (Either / or Choice)	Section D (Open Choice)			
1	CO1	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)			
2	CO2	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)			
3	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)			
4	CO4	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)			
5	CO5	Upto K3	2	K1 & K2	1	K2	2(K2&K2)	1(K3)			
No.	of Questi Aske	ons to be d	10		5		10	5			
No.	of Questi answer	ons to be red	10		5		5	3			
Mark	ks for eacl	n question	1		2		5	10			
Total Marks for each section		10		10		25	30				
	(Figures	in parenthe	esis denotes,	questions sł	nould be as	ked witl	h the given 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					
K2	5	6	20		31	25.8	33				
K3			30	20	50	41.7	42				
K4				30	30	25	25				
Marks	10	10	50	50	120	100	100				
NB: Hig	gher level of p	erformance o	of the students	s is to be asse	essed by a	attempting	higher level				

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

Section	Section A (Multiple Choice Questions)								
Answei	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							
Section	B (Sho	ort Answei	rs)						
Answei	r All Q	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	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	K3							
18) b	CO3	K3							
19) a	CO4	K3							
19) b	CO4	K3							
20) a	CO5	K2							
20) b	CO5	K2							
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher						
level of	K leve	ls							
Section	D (Op	en Choice							
Answe	r Any '	Three ques	stions (3x10=30 marks)						
Q.No	CO	K Level	Questions						
21	CO1	K3							
22	CO2	K4							
23	CO3	K4							
24	CO4	K4							
25	CO5	K3							

Summative Examinations - Question Paper – Format



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

Course Name	TRIGONOMETRY A	١NI	VECTOR CALCUL	US						
Course Code	21UMTC32				L	Р	С			
Category	Core				4	-	4			
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRENURS	SHIP					
COURSE OBJE	CTIVES:									
 To famil 	iarize the trigonometrica	al fu	inction							
• To devel	lop the capability of find	ing	standard expansions of	Trigonometric functi	on.					
■ To intro	duce the various types of	t hy	perbolic functions and	its inverse.						
 To learn To introduction 	the basic concepts in ve	ctor	differentiation.							
I I O INITO	auce the line and surface		egrais.			12				
Unit: 1 12 Expression for Trigonometrical functions $\sin n\theta$, $\cos n\theta$ to $n\theta$, $\sin^n\theta$, $\cos^n\theta$ and Expression of $\sin^n\theta$										
A cos A tan A ir	nowers of A	18 -		sin 6, cos 6 and Expre	28810	II OI	8111			
Unit: II										
Hyperbolic fund	ctions and Inverse hyper	holi	c functions – Problems			12				
Unit: III	etions and inverse hyper	0011	e functions i foolems	•		12				
Vector Differentiation- Vector Algebra- Differentiation of vectors- Gradient – Equation of Tangent										
plane and Norm	plane and Normal line- Equation of Tangent line and Normal plane									
Unit: IV	1		1			12				
Vector Differen	ntiation – Divergence – O	Curl	- Theorems and Proble	ems						
Unit: V						12				
Vector Integration	ion – Line integrals- Sur	face	e Integrals- Problems							
				Total Lecture Ho	urs	60				
Books for Stud	y:									
1. Dr. S. Arun House Tiru	nugam and Prof. A. T pelveli 2012	han	gapandi Isaac, Trigon	ometry, New Gamm	na P	ublis	hing			
2 Dr Arumuc	ram S and A Thangan	andi	Isaac Analytical Ca	amotry of three Din	ong	ione	and			
Vector Cale	culus , New Gamma Pul	olica	ations, Reprint 2017, Pa	layamkottai.		10115	anu			
Unit	I – Chapter 1.1 to 1.3(E	look	(1)							
Unit	II – Chapter 2.1, 2.2 (E	Book	x 1)							
Unit	III – Chapter 5.1 to 5.3	(Bo	ook 2)							
Unit	IV – Chapter 5.4 (Book	(2)								
Unit	V – Chapter 7.1 ,7.2 (B	ook	(2)							
Books for Refe	rences:		,							
1. S. Narayana Publishers)	n and T.K. Manicavacha Pyt_Ltd (1997)	agar	n Pillai, S. Viswanatha	n, Trigonometry (Pri	nters	s &				
2. S.L.Lonev.	Plane Trigonometry-Pa	art-	I&II (6 th Edition). Ariha	nt Publications. 2016						
3. Manicka V	asagam Pillai and Nata	araja	an, Analytical Geome	try of three Dim	iensi	ons	and			
Vector Cale	culus, Viswanathan. S, I	Prin	ters and Publishers Pvt	. Ltd., Reprint 2001,	Cher	nnai.				
Web Resources	· · · · · · · · · · · · · · · · · · ·			• *						

1.	https://mate.unipv.it/moiola/ReaDG/VC2016/VectorCalculus_LectureNotes_2016	.pdf
2.	https://nptel.ac.in/courses/111/107/111107108/	
3.	https://www.whitman.edu/mathematics/calculus_online/chapter16.html	
COURSE	EOUTCOME	K Level
On the su	accessful completion of the course, the students will be able to	
CO1.	Simplify expressions for trigonometrical functions using trigonometric	V/
001.	identities.	N4
CO2:	Solve problem based on hyperbolic functions	K3
CO3.	Develop the solution related to Gradient, equation of tangent plane/ line,	V2
0.05:	normal plane/ line	N.J
CO4:	Explain Divergence, Curl and vector differentiation problems	K4
CO5:	Simplify line and surface integrals	K4

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Expression for Trigonometrical functions - $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, $\sin^n\theta$, $\cos^n\theta$ and Expression of $\sin \theta$, $\cos \theta$, $\tan \theta$ in powers of θ	12	Chalk & Talk
II	Hyperbolic functions and Inverse hyperbolic functions – Problems.	12	Chalk & Talk
III	Vector Differentiation- Vector Algebra- Differentiation of vectors- Gradient – Equation of Tangent plane and Normal line- Equation of Tangent line and Normal plane	12	Chalk & Talk, PPT
IV	Vector Differentiation – Divergence – Curl – Theorems and Problems	12	Chalk & Talk
V	Vector Integration – Line integrals- Surface Integrals- Problems	12	Chalk & Talk, PPT

Course Designed by: Dr. S. Andal, Assistant Professor &Mrs. S. Ragavi, Assistant Professor

	Learning Outcome Based Education & Assessment (LOBE)										
Articulation Mapping – K Levels with Course Outcomes (COs)											
_			Sectio	on A	Section B		Section C	Section D			
Inte	Cos	K Level	MC	Qs	Short Ans	swers	Either or	Onen			
rnal	005	ix Lever	No. of.	К-	No. of.	К-	Choice	Choice			
			Questions Level Questions Level	Choice	Choice						
CI	CO1	Upto K4	2	K1&K2	1	K1	2	1			
AI	CO2	Upto K3	2	K1&K2	2	K2	2	1			
CI	CO3	Upto K3	2	K1&K2	1	K2	2	1			
AII	CO4	Upto K4	2	K1&K2	2	K2	2	1			
		No. of Questions to be asked	4		3		4	2			
Question Pattern		No. of Questions to be answered	4		3		2	1			
CIA I	1 & [Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

	Distribution of Marks with K Level 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	8	20				
	K2	2	4			6	12	20				
СТА	K3			10	10	20	40	40				
I	K4			10	10	20	40	40				
-	Marks	4	6	20	20	50	100	100				
	K1	2	2			4	8	20				
	K2	2	4			6	12	20				
CIA	K3			10	10	20	40	40				
II	K4			10	10	20	40	40				
	Marks	4	6	20	20	50	100	100				

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course							
	Outcomes (COs)							
		Os K - Level	MCQs		Short An	swers	Section C	Section D
S.No	COs		No. of	K –	No. of	K –	(Either /	(Open
			Questions	Level	Question	Level	or Choice)	Choice)
1	CO1	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)
2	CO2	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)
3	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
4	CO4	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
5	CO5	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
No.	of Questi Aske	ons to be d	10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figures	in parenthe	esis denotes,	questions s	hould be as	ked wit	h the given 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			
K2	5	6	20		31	25.8	33		
K3			30	20	50	41.7	42		
K4				30	30	25	25		
Marks	10	10	50	50	120	100	100		
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section	Section A (Multiple Choice Questions)						
Answer	All Qu	estions	(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					
Section	B (Sho	rt Answers)					
Answer	All Qu	estions	(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 (Eith	er/Or Type	2)				
Answer	All Qu	estions	(5 x 5 = 25 marks)				
Q.No	CO	K Level	Questions				
16) a	CO1	K3					
16) b	CO1	K3					
17) a	CO2	K2					
17) b	CO2	K2					
18) a	CO3	K2					
18) b	CO3	K2					
19) a	CO4	K3					
19) b	CO4	K3					
20) a	CO5	K3					
20) b	CO5	K3					
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K				
levels							
Section D (Open Choice)							
Answer	Any TI	nree questic	ons (3x10=30 marks)				
Q.No		K Level	Questions				
21	<u>COI</u>	K4					
22	<u>CO2</u>	K3					
23	<u>CO3</u>	K3					
24	<u>CO4</u>	K4					
25	CO5	К4					

Summative Examinations - Question Paper – Format



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

Course Name	OPERATIONS RESEAR	OPERATIONS RESEARCH					
Course Code	21UMTA31				L	Р	С
Category	ALLIED				5	-	5
Nature of cours	e: EMPLOYABILITY	✓	SKILL ORIENTED	ENTREP	REN	URS	HIP
COURSE OBJ	ECTIVES:	·					
• To	illustrate linear problem, spe	ecial f	forms and game theory.				
• Te	evaluate game theory and lin	near p	problems.				
• Te	o compare different types of	meth	ods in solving linear prol	blem			
• To solve linear programming problem.							
• Te	o design real life problem int	to a li	near problem.				
Unit: I						1	5
Linear Programming Problem - Mathematical formulation of the problem – Solution by Graphical Method, The Simplex method and Method of penalty (Big M Method only).							
Unit: II						1	5
Duality – Dual Simplex Method- Problems.							_
Unit: III 1:							3
Transportation p method for both	roblem – Mathematical form balanced and unbalanced Tl	m – I P- Th	nitial solutions by all me le Assignment Problem.	ethods – M	IODI		
Unit: IV						1	5
Game theory – Solution of gar method.	Two Person Zero Sum Ga ne by using formula, Grap	me – hical	- saddle point – Game v method, Method of D	with saddl ominance	e poin and 1	nt – LPP	
Unit: V						1	5
Sequencing – R	eplacement Problem						
			Tota	l Lecture	Hour	s 7	5
Books for Study: Kanti Swarup , P.K. Gupta and Man Mohan, Operations Research Sultan Chand and Sons Publications, New Delhi, Reprint 2006. Unit I - Chapter 2 Section 2.2 Chapter 3 Section 3.1 to 3.5 Chapter 4 Section 4.1 to 4.4 Unit II - Chapter 5: Section 5.1 to 5.4 and 5.7							
Unit	III - Chapter 10: Section 10.	1 to 1	0.5, 10.8 to 10.11 and 10).14			

Chapter11: Section 11.1 to 11.4						
Unit IV - Chapter17: Section 17.1 to 17.7						
Unit V - Chapter 12: Section 12.1 to 12.5						
Chapter 18: Section 18.1 & 18.2						
Books for References:						
1.Dr.S.Arumugam and ISAAC, Topics in Operations Research -Linear Programming,N	ew					
Gamma Publishing House, Palayamkottai, June 2012.						
2.P.R.Vital and V.Malini, Operations Research , Margham Publications, Chennai, 2002.						
3.Hamdy A.Taha – Operations Research, An Introduction, 8th Edition, Prentice-Hall Ind	ia ,2006.					
Web Resources						
1.https://mrcet.com/downloads/digital_notes/ME/IV%20year/Operations%20Research.pdf						
2. <u>http://lipas.uwasa.fi/~tsottine/lecture_notes/or.pdf</u>						
3. https://mrcet.com/downloads/digital_notes/ME/IV%20year/Operations%20Resear	<u>ch.pdf</u>					
COURSE OUTCOME	K Level					
On the successful completion of the course, the students will be able to						
CO1: Solve linear programming problems by various methods	K3					
Analyze different environments that needs decision using duality concepts to	V A					
find solution.	K 4					
CO3: Develop the solution to Transportation and Assignment Problem	K3					
CO4: Explain the game theory problems	K4					
CO5: Solve replacement and sequencing problem	K3					

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Linear Programming Problem - Mathematical formulation of the problem – Solution by Graphical Method, The Simplex method and Method of penalty (Big M Method only).	15	Chalk & Talk
II	Duality – Dual simplex method- Problems.	15	Chalk & Talk
III	Transportation problem – Mathematical form – Initial solutions by all methods – MODI method for both balanced and unbalanced TP- The assignment problem.	15	Chalk & Talk
IV	Game theory – Two person zero sum game – saddle point – Game with saddle point – Solution of game by using formula, graphical method, method of dominance and LPP method.	15	Chalk & Talk
V	Sequencing – Replacement Problem	15	Chalk & Talk

Course Designed by:

Dr. A. Arivuchelvam, Assistant Professor & Dr, P. Chitradevi, Assistant Professor

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print							
	Articulation Mapping – K Levels with Course Outcomes (COs)							
			Sectio	on A	Section	n B	Section C	Section D
Inte	Cos	K I ovol	MC	Qs	Short Ans	swers	Section C Fither or	Onen
rnal	0.05	IX LEVEL	No. of.	К-	No. of.	К-	Choice	Choice
			Questions	Level	Questions	Level		
CI	CO1	Upto K3	2	K1&K2	1	K1	2	1
AI	CO2	Upto K4	2	K1&K2	2	K2	2	1
CI	CO3	Upto K3	2	K1&K2	1	K2	2	1
AII	CO4	Upto K4	2	K1&K2	2	K2	2	1
		No. of						
		Questions to	4		3		4	2
		be asked						
		No. of						
Que	stion	Questions to	4		3		2	1
Pat	tern	be answered						
CIA I & II		Marks for	1		2		5	10
		each question			2		5	10
		Total Marks						
		for each	4		6		10	10
		section						

r								
		Dist	ribution of 1	Marks with	K Level C	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	5	20
	K2	2	4			6	12	20
СТА	K3			10	10	20	40	40
	K4			10	10	20	40	40
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course							
		V	MC	Qs	Short An	swers	Section C	Section D
S.No	S.No COs	K - Lovol	No. of	K –	No. of	K –	(Either /	(Open
	Level	Questions	Level	Question	Level	or Choice)	Choice)	
1	CO1	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)
2	CO2	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)
3	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
4	CO4	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Questi	ons to be	10		5		10	5
	Aske	d	10		5		10	5
No.	of Questi	ons to be	10		5		5	3
	answered		10		5		5	5
Marks for each question		1		2		5	10	
Total Marks for each		10		10		25	30	
section		10		10		23		
	(Figures in parenthesis denotes, questions should be asked with the given K level)							

	Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (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	42		
K2	5	6	30		41	34.1	42		
K3			20	30	50	41.7	42		
K4				20	20	16.7	16		
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 lev	els.								

Section	Section A (Multiple Choice Questions)						
Answer	All Qu	estions	(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					
Section	B (Sho	rt Answers)					
Answer	All Qu	estions	(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 (Eith	er/Or Type	e)				
Answer	All Qu	estions	(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	K2					
18) b	CO3	K2					
19) a	CO4	K3					
19) b	CO4	K3					
20) a	CO5	K2					
20) b	CO5	K2					
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K				
levels							
Section D (Open Choice)							
Answer Any Three questions (3x10=30							
Q.No	CO	K Level	Questions				
21	CO1	K3					
22	CO2	K4					
23	CO3	K3					
24	CO4	K4					
25	CO5	K3					

Summative Examinations - Question Paper – Format


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

Course Name	TF	RANSFORM TECHNI	QUI	ES					
Course Code	e Code 21UMTS31 I							Р	С
Category	Sk	ill					2	-	2
Nature of cours	se:	EMPLOYABILITY	SK	ILL ORIENTED	>	ENTREPF	RENU	RSH	IIP
COURSE OBJ	EC	ΓIVES:							
 To Learn Laplace transforms and Z-transforms To Understand properties of Laplace transforms 									
• To find i	inve	rse Laplace Transforms	and	d inverse Z-transform	ns.				
• To Exam	nine	the Laplace transforms	in pe	eriodic function					
• To Ident	1fy 1	the properties of Z-tran	storn	ns				6	
Unit: I								0)
Laplace Transf existence of the	orm Lap	s –Definitions -Piecev lace transform- Laplace	wise e tran	continuity – Suffices	cient nctic	t conditions	s for	the	
Unit: II								6	
Some general T	heoi	ems on Laplace Transf	orms	– Problems – Evalua	ation	of integrals	s.		
Unit: III		1				0		6	
The Inverse Lar	olace	e Transforms – Example	es–Re	esults- Method of Pa	rtial	fractions			
Unit: IV		P						6	
Z Transforms –	Int	roduction – Proprieties	– Z T	Transforms of some b	oasic	functions -	Prob	lems	•
Unit: V								6	
Inverse Z Trans	forn	ns –Use of Z – Transfor	ms to	o solve finite Differen	nce l	Equations –	probl	lems.	
					Tot	tal Lecture	Hou	s 3	0
Books for Stud 1. S.Nara Appli	y: iyan icat	an and T.K.Manicka Va ions, S.Viswanathan Pu	asaga Iblica	um Pillay, Differenti ttions , Chennai, 200	al e q 6.	quations an	d its		
2. T.Veer	rara	an, Engineering Math	emat	t ics , Tata McGraw H	Iill P	ublishing C	lompa	ny	
Limite	d, N	lew Delhi, 2000							
		Unit I (Book 1)	-	Chapter 9: Section	11 tc) 3			
		Unit II (Book 1)	-	Chapter 9: Section	14 ai	nd 5			
		Unit III (Book 1)	-	Chapter 9: Section	16 tc	$)^{\prime\prime}$			
		Unit IV (BOOK 2) Unit V (Book 2)	-	Chapter 5 sections	5 5.1	to 5.3			
Doolyg for Dofn	0.00.0		-	Chapter 5 sections	5 5.4	and 5.5			
1 Dr M		28: Daisinghania Advance	d Di	fforantial Equation	6 S	Chand and			
Comp	anv	PVT I TD New Delhi	Renr	int 2012	5, 5.				
2 Georg	nny De v	ankovsky. Differentia	and	Integral Calculus (Volu	me II). MI	R		
Publis	hers	, Moscow, 1974.							
3. BS.Grewal, Higher Engineering Mathematics 43 rd Edition, Khanna									

Publications, 2020.

Web R	lesources	
1.	<u>https://nptel.ac.in/courses/111/105/111105035/</u>	
2.	https://nptel.ac.in/courses/111/105/111105123/	
3.	http://sertoz.bilkent.edu.tr/courses/math206/2004/transformations.pdf	
COUI	RSE OUTCOME	K Level
On th	e successful completion of the course, the students will be able to	
CO1.	Demonstrate the understanding of Laplace transforms definitions and periodic	K2
COI.	functions	N 2
CO2.	Explain general Theorems on Laplace Transforms and problems involving	K)
CO2.	integrals	N 2
CO3:	Show that the inverse Laplace transforms	K2
CO4:	List the definitions, examples of Z Transforms and its Proprieties	K2
CO5:	Summarize the inverse Z Transforms	K1

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Laplace Transforms –Definitions -Piecewise continuity – Sufficient conditions for the existence of the Laplace transform- Laplace transform of periodic functions	6	Chalk & Talk , PPT
II	Some general Theorems on Laplace Transforms – Problems – Evaluation of integrals.	6	Chalk & Talk , PPT
III	The Inverse Laplace Transforms – Examples–Results- Method of Partial fractions	6	Chalk & Talk , PPT
IV	Z Transforms – Introduction – Proprieties – Z Transforms of some basic functions – Problems.	6	Chalk & Talk
V	Inverse Z Transforms –Use of Z – Transforms to solve finite Difference Equations – problems.	6	Chalk & Talk

Course Designed by:

Dr. M. Saravanan, Assistant Professor &Mrs. R. Sumathi, Assistant Professor



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

Course Name	MATHEMATICS FOR C	COMPETITIVE EXAMINA	TION – I				
Course Code	21UMTN31			L	Р	С	
Category	Non – Major Elective			2	-	2	
Nature of cours	se: EMPLOYABILITY	SKILL ORIENTED	ENTREPR	ENU	RSH	IP	
COURSE OBJECTIVES:							
• To improve the ability to face the competitive examinations. • To solve numbers, percentage, ratio. • To identify the exact method to problems. • To apply the concepts in Competitive Examinations. • To understand about numbers divisibility. Unit: I 6 Number system – Decimals - Fractions. Unit: II 6 Operation on numbers – Divisibility – Arithmetic Progression – Geometric Progression. Unit: III 6 HCF Factorization method – Division method –Factorization method of finding LCM – Common Division method – Comparison of fractions. Unit: IV							
Unit: V	citage- Results on population	on – Results on Depreciation.	•		6		
Comparison of	ratios - Compounded ratio -	Variation.					
		Tot	al Lecture	Hour	s 3	0	
Books for Stud To Books for Refe	y: ext Material will be supplied rences:	by the Department.					
 Aggarwal. R.S, Quantitative Aptitude for Competitive Examinations, S.Chand and Company Ltd, Reprint 2011, New Delhi. Abhigit Guha, Quantitative Aptitude, fourth edition, Tata MC Graw Hill Publication, 2011, New Delhi. Mohan Rao. U, Quantitative Aptitude, Scitech Publications, Reprint, 2013, Chennai. 							
Web Resources	5						
1. <u>https://www.</u>	nahendraguru.com/p/quantit	tative-aptitude-video-lectures.	<u>html</u>				
2. <u>https://www</u> .	wiziq.com/tutorials/quantitat	tive-aptitude					
3. <u>https://byjus</u>	.com/govt-exams/quantitative	<u>e-</u>					
aptitude/#:~:text=Quantitative%20aptitude%20is%20an%20inseparable,skills%20by%20solving%							
20these%20qu	estions						
Academic C	ouncil Meeting Held On 17	7.05.2022		P	age (63	

COUI	RSE OUTCOME	K Level			
On the successful completion of the course, the students will be able to					
CO1:	Recall the concepts of numbers and decimals	K1			
CO2:	Demonstrate the understanding of divisibility and their properties	K2			
CO3:	Classify the factors in finding LCM and HCF	K2			
CO4:	Explain the percentage related problems	K2			
CO5:	Illustrate the problems on ratios	K2			

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Number system – Decimals - Fractions.	6	Chalk & Talk
II	Operation on numbers – Divisibility – Arithmetic Progression – Geometric Progression.	6	Chalk & Talk
III	HCF Factorization method – Division method –Factorization method of finding LCM – Common Division method – Comparison of fractions.	6	Chalk & Talk
IV	Concept of percentage- Results on population – Results on Depreciation.	6	Chalk & Talk
V	Comparison of ratios - Compounded ratio - Variation.	6	Chalk & Talk

Course Designed by:

Dr. P. Chitradevi, Assistant Professor & Mrs. S. Ragavi, Assistant Professor





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF MATHEMATICS

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

Course Name	MODERN ALGEBRA						
Course Code	21UMTC41			L	P	С	
Category	Core			5	-	5	
Nature of cour	se: EMPLOYABILITY	SKILL ORIENTED	ENTREPR	RENU	RSH	IP	
COURSE OBJ	ECTIVES:						
 To understand the basic algebraic structures To familiarize the various type of groups. To write the proofs in a clear and logical manner effectively. To analyze the relationships between various algebraic structures To solve the problems by using various theorems 							
Demonstation on	Cualog and transmositi	one Even normeutati	ma Tha	-	1	3	
Permutation groups – Cycles and transpositions – Even permutations – Theorems on Permutations - Subgroups – Theorems on subgroups-Cyclic groups- Generators–Number of generators of Cyclic groups– Theorems- Problems							
Unit: II					1	5	
Order of an el Lagrange's The	ement–Cosets– Theorems on c orem–Euler's, Fermat's Theore	osets, Lagrange's theor ms.	em, proble	ms u	sing		
Unit: III					1	5	
Normal subgro	ups – Theorems on Normal su	ubgroups – Quotient gr	oup- Isom	orphis	sms-		
Cayley's Theor	em – Automorphism- Problems a	and theorems.					
Unit: IV					1	5	
Homomorphism	s – Types of homomorphis	sms – Theorems on	Homomorp	ohism	s –		
Fundamental th	corem of Homomorphism -Rings	s – Problems			1	~	
Unit: V			- E'-14- 7	7 1	1	3	
Elementary pro	berties – Isomorphism - Types of	rings – Integral domains	s, Fields – Z	Lero d	1V1SO	rs	
- Theorems on	ntegral domains and Fields, Cha	racteristic of a ring.		TT		5	
Doolse for Stud		10	lai Lecture	Houi	S /	3	
 Dr. S. Arumugam and Isaac ,Modern Algebra, Scitech Publication, Chennai, Reprint, June 2019. Unit I - Section 3.4 to 3.6 Unit II - Section 3.7 to 3.8 Unit III - Section 3.9 to 3.10 Unit IV - Section 3.11, 4.1 Unit V - Section 4.2 to 4.5 Books for References: M.L Santiago, Modern Algebra, Tata MC Graw Hill Publication, New Delhi,1988. K.Sivasubramaniam, A.S.Kumaraswamy and K.Sitaraman, Modern Algebra, S.Chand and Company Ltd, New Delhi,1979. 							
3. Basi	e ModernAlgebra with Applic	ations, Adhikari, Mahim	naRanjan,				
Academic C	ouncil Meeting Held On 17.05.	2022		Р	age (56	

	Adhikari, Avishek, Springer, 2014.	
Web F	Resources	
1. <u>h</u>	<u> </u>	
2. <u>h</u>	<u> https://nptel.ac.in/courses/111/106/111106113/</u>	
3. h	<u> ttps://thebookee.net/mo/modern-algebra-pdf-by-arumugam</u>	
COU	RSE OUTCOME	K Level
On the	successful completion of the course, the students will be able to	
CO1:	Explain the basic concepts of algebraic structures	K4
CO2:	Construct the mathematical proofs for the theorems related to groups.	K4
CO3:	Examine the properties of various groups	K3
CO4:	Analyze the Lagrange's, Euler's, Fermat's and Cayley's Theorems in solving the problems.	K4
CO5:	Apply the characteristics of various algebraic structures.	K3

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Permutation groups – Cycles and transpositions – Even permutations – Theorems on Permutations - Subgroups – Theorems on subgroups- Cyclic groups- Generators – Number of generators of Cyclic groups – Theorems- Problems	18	Chalk & Talk
II	Order of an element –Cosets – Theorems on cosets, Lagrange's theorem, problems using Lagrange's Theorem – Euler's, Fermat's Theorems.	18	Chalk & Talk
III	Normal subgroups – Theorems on Normal subgroups – Quotient group- Isomorphisms- Cayley's Theorem – Automorphism- Problems and theorems.	18	Chalk & Talk
IV	Homomorphisms – Types of homomorphisms – Theorems on Homomorphisms – Fundamental theorem of Homomorphism -Rings – Problems	18	Chalk & Talk
V	Elementary properties – Isomorphism - Types of rings – Integral domains, Fields – Zero divisors – Theorems on Integral domains and Fields, Characteristic of a ring.	18	Chalk & Talk

Course Designed by:

	Learning Outcome Based Education & Assessment (LOBE)											
	Formative Examination - Blue Print											
Articulation Mapping – K Levels with Course Outcomes (COs)												
				Sectio	n A	Section	n B	Section C	Section D			
Inte	C	26	K I ovol	MCO	Qs	Short Ans	swers	Fither or	Open			
rnal		55	K Level	No. of.	К -	No. of.	K -	Choice	Choice			
				Questions	Level	Questions	Level	Choice	Choice			
CI	CC)1	Upto K4	2	K1&K2	1	K1	2	1			
AI	CO2		Upto K4	2	K1&K2	2	К2	2	1			
CI	CO3		Upto K3	2	K1&K2	1	K2	2	1			
AII	CO4		Upto K4	2	K1&K2	2	K2	2	1			
		No. of Questions to be asked		4		3		4	2			
Ques n Patte	tio ern	No	b. of Questions to be answered	4		3		2	1			
CIA I II	[&		Marks for each question	1		2		5	10			
		r	Fotal Marks for each section	4		6		10	10			

Dr. P.	Chitradevi,	Assistant	Professor	&	Dr. A.	Arivuchely	vam	, Assistant	Professor
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		Dist	ribution of]	Marks with	K Level C	IA 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	8	20
	K2	2	4			6	12	20
СІА	K3			10	10	20	40	40
	K4			10	10	20	40	40
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			10	10	20	40	40
II	K4			10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

5	Summative Examination – Blue Print Articulation Mapping – K Level with Course										
	Outcomes (COs)										
		V	MC	Qs	Short An	swers	Section C	Section			
S.No	COs		No. of	K –	No. of	K –	(Either / or	D (Open			
		Level	Questions	Level	Question	Level	Choice)	Choice)			
1	CO1	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)			
2	CO2	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)			
3	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)			
4	CO4	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)			
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)			
No.	of Questi Aske	ons to be d	10		5		10	5			
No.	of Questi answer	ons to be red	10		5		5	3			
Marks for each question			1		2		5	10			
Total Marks for each section			10		10		25	30			
	(Figures	in parenthe	esis denotes, (questions s	hould be as	ked with	the given K le	evel)			

	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	22						
K2	5	6	20		31	25.8							
K3			30	20	50	41.7	42						
K4				30	30	25	25						
Marks	10	10	50	50	120	100	100						
NB: Hig	gher level of p	erformance o	of the students	s is to be asso	essed by a	attempting	higher level						

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

Section	Section A (Multiple Choice Questions)								
Answer	All Qu	estions	(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							
Section	B (Shor	rt Answers)							
Answer	All Qu	estions	(5x2=10 marks)						
Q.No	СО	K Level	Questions						
11	CO1	K1							
12	CO2	K1							
13	CO3	K2							
14	CO4	K2							
15	CO5	K2							
Section	C (Eith	er/Or Type)						
Answer	All Qu	estions	(5 x 5 = 25 marks)						
Q.No	CO	K Level	Questions						
16) a	CO1	K3							
16) b	CO1	K3							
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	K2							
20) b	CO5	K2							
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K						
levels									
Section	D (Ope	n Choice)							
Answei	r Any T	hree questi	ons (3x10=30 marks)						
Q.No	CO	K Level	Questions						
21	CO1	K4							
22	CO2	K4							
23	CO3	K3							
24	CO4	K4							
25	CO5	K3							

Summative Examinations - Question Paper – Format



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

Course Name	SEQUENCES AND SERIES									
Course Code	21UMTC42			L	Р	С				
Category	Core			4	-	4				
Nature of Cour	rse: EMPLOYABILITY	SKILL ORIENTED	ENTREP	REN	JRSI	HIP				
COURSE OBJ	ECTIVES:	· · ·								
• To • To	learn about sequences through ex discuss the convergence of seque	amples.								
• To	introduce infinite series and alter	native series.								
• To familiarize the application of series in Trigonometry.										
• To	understand how the elementary f	unctions can be defined b	by power se	eries.						
Unit: I					1	2				
Sequences – Bo Monotonic Sequ	ounded Sequences – Bounded ab uences – Monotonic Increasing S	ove Sequences– Bounded equences – Monotonic d	d below Sec ecreasing S	quenc equer	es-					
Unit: II				equei	1	2				
Convergent Seq	uences – limit of the sequence –	Theorems – Divergent a	nd Oscillati	ng Se	quen	ces				
– Diverging seq	uences - Finitely Oscillating Seq	uences –Infinitely Oscill	ating Seque	ences	_					
Algebra of limit	s – Theorems.									
Unit: III 12										
Subsequences –	Limit points – Cauchy sequence	s – Theorems – The Upp	er and Low	ver lin	nits o	f				
a sequence – Th	eorems and Problems.									
Unit: IV					1	2				
Infinite series –	Comparison test – Theorems (St	atement only) and Proble	ems.		1	2				
Unit: V	D' Alembert's ratio test Pach	o'a Tast Da Margan an	d Dortrand'	a toat		Z				
- Gauss's Test	-D Alemoent's fatio test -Raad	's Condensation test – The	u Dertrallu peorems (St	s iesi	ent or	nlv)				
and Problems	Cauchy s Root test and Cauchy	s condensation test – 11		atent	in oi	lly)				
		Tot	al Lecture	Нош	s 6	i0				
Books for Stud	v:	100	<u>ui 19000010</u>	11041	0 0	0				
Arumug	am.S and Issac, Sequences and S	Series, New Gamma Pub	lishing Hou	ise, 20	017,					
Palayam	kottai.	, ,	e							
Unit I	Chapter 3: Section 3.1 to	0 3.3								
Unit I	I Chapter 3 Section 3.4 to	3.6.								
Unit I	II Chapter 3 Section 3.9 to	3.12.								
Unit I	V Chapter 4: Section 4.1 to	o 4.2								
Unit V	Chapter 4: Section 4.3 &	& 4.4.								
Books for Refe	rence:									
1. A	rumugam .S and Thangapandi Is	sac, Classical Algebra, I	New Gamm	a						
Pu	Publications, Edition 2003, Palayamkottai.									
2. C	handra Sekara Rao. K and K.S.N	arayanan, Real Analysis	, Volume –	·I,						
2 L	iswanathan. S Pvt.Ltd, 2008, Che	ennal.)16							
3. Ja	in. wi.L, Sequence & Series, Jeev	anson's Publications, 20	110.							

Web 1	Web Resources							
1. ht	tps://nptel.ac.in/courses/111/101/111101134/							
2. ht	http://www.jjernigan.com/172/ConvergenceDivergenceNotes.pdf							
3. ht	tps://www3.cs.stonybrook.edu/~cse547/ch2slides.pdf							
COU	COURSE OUTCOME K Level							
On th	e successful completion of the course, the students will be able to							
CO1:	Explain the concepts of sequences	K4						
CO2:	Examine the convergence of the sequences	K4						
CO3:	Identify the limit points of the sequence	K3						
CO4:	Classify the various forms of series	K4						
CO5 :	Apply most appropriate test to check the convergence of series	K3						

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Sequences – Bounded Sequences – Bounded above Sequences– Bounded below Sequences- Monotonic Sequences – Monotonic Increasing Sequences – Monotonic decreasing Sequences.	12	Chalk & Talk
п	Convergent Sequences – limit of the sequence – Theorems – Divergent and Oscillating Sequences – Sequences diverging to ∞ - Sequences diverging to -∞ - Finitely Oscillating Sequences –Infinitely Oscillating Sequences – Algebra of limits – Theorems.	12	Chalk & Talk
III	Subsequences – Limit points – Cauchy sequences – Theorems – The Upper and Lower limits of a sequence – Theorems and Problems.	12	Chalk & Talk
IV	Infinite series – Comparison test – Theorems (Statement only) and Problems.	12	Chalk & Talk
V	Kummer's Test –D' Alembert's ratio test –Raabe's Test – De Morgan and Bertrand's test- Gauss's Test – Cauchy's Root test and Cauchy's Condensation test – Theorems (Statement only) and Problems.	12	Chalk & Talk

Course Designed by: Dr. A. Hamarichoudhi, Associate Professor &Mrs. S. Ragavi, Assistant Professor

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Inte rnal	Co	s	K Level	Section A MCQs No. of. K - Questions Level		Section B Short Answers No. of. K - Ouestions Level		Section C Either or Choice	Section D Open Choice		
CI	CO	1	Upto K4	2	K1&K2	1	K1	2	1		
AI	CO2		Upto K4	2	K1&K2	2	K2	2	1		
CI	CO3		Upto K3	2	K1&K2	1	K2	2	1		
AII	CO	4	Upto K4	2	K1&K2	2	K2	2	1		
0.000	(No. of Questions to be asked	4		3		4	2		
Ques n Patte CIA II		Ç	No. of Questions to be answered	4		3		2	1		
		N	Aarks for each question	1		2		5	10		
		Т	otal Marks for each section	4		6		10	10		

	Distribution of Marks with K Level 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	8	20			
	K2	2	4			6	12	20			
СТА	K3			10	10	20	40	40			
	K4			10	10	20	40	40			
-	Marks	4	6	20	20	50	100	100			
	K1	2	2			4	8	20			
	K2	2	4			6	12	20			
CIA	K3			10	10	20	40	40			
II	K4			10	10	20	40	40			
	Marks	4	6	20	20	50	100	100			

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course							
	Outcomes (COs)							
		V	MC	Qs	Short An	swers	Section C	Section D
S.No	lo COs	K -	No. of	K –	No. of	K –	(Either /	(Open
	Level	Questions	Level	Question	Level	or Choice)	Choice)	
1	CO1	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)
2	CO2	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)
3	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
4	CO4	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Questi Aske	ons to be d	10		5		10	5
No. of Questions to be answered		ons to be red	10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section		10		10		25	30	
	(Figures	in parenthe	esis denotes,	questions s	hould be as	ked with	the given K l	evel)

	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	22		
K2	5	6	20		31	25.8			
K3			30	20	50	41.7	42		
K4				30	30	25	25		
Marks	10	10	50	50	120	100	100		
NB: Hig of K lev	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section A (Multiple Choice Questions)						
Answer	· All Qu	estions	(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				
Section	B (Shor	rt Answers)				
Answer	All Qu	estions	(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 (Eith	er/Or Type	2)			
Answer	All Qu	estions	(5 x 5 = 25 marks)			
Q.No	CO	K Level	Questions			
16) a	CO1	K3				
16) b	CO1	K3				
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	K2				
20) b	CO5	K2				
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K			
levels						
Section	D (Ope	n Choice)				
Answei	r Any T	hree questi	ons (3x10=30 marks)			
Q.No	CO	K Level	Questions			
21	CO1	K4				
22	CO2	K4				
23	CO3	K3				
24	CO4	K4				
25	CO5	K3				

Summative Examinations - Question Paper – Format



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

Course Name	PROGRAMMING IN C++	PROGRAMMING IN C++						
Course Code	21UMTA41			L	Р	С		
Category	Allied			3	-	3		
Nature of cour	se: EMPLOYABILITY	SKILL ORIENTED	ENTREP	REN	URS	HIP		
COURSE OBJ	ECTIVES:							
•]	 To understand basic concepts in C++ programming with OOP. To develop shills in advanced concepts like Control structures functions. 							
•]	to develop skills in advanced co	ncepts like Control structur	res, function	ons.				
•]	To improve the capability on us	ng arrays and classes.						
•]	to develop the concepts of Con	structors and operators.						
•]	o study about inheritance.							
Unit: I	- f Olis - t Onis - t Dress - service			<u></u>	9			
Basic Concepts	of Object Oriented Programmi	ng – Benefits of OOP – Str	ucture of	C++ I trma	brogr	am –		
dete turas	ords – Identifiers and Constants	· Basic data type – User del	ined data	type -	De	rived		
Unit. II					0)		
Control structu	es-The Main Functions – Fun	ction prototyping – Call by	v Referen		Petui	m hv		
Reference – Inli	ne functions - Default argumen	$t_{\rm S} = Function overloading$	y Kereren		ixetui	II Uy		
Unit. III	ine functions Default argumen	to i unetion overiouding.			9)		
Specifying a Cl	ass – Defining member function	ns – Static data members –	Static me	mber	func	tions		
– Array of Obie	cts –Friendly functions	ins Sture duta memoris	Static Inc	mou	rune	tions		
Unit: IV					9)		
Constructors –	Parameterized Constructors	– Destructors- Defining	Operator	over	oadi	ng –		
Overloading un	ary operators – Overloading bir	ary operators – Rules for o	verloading	g oper	ator.	0		
Unit: V		J I	C		9)		
Inheritance – D	Defining Derived classes – Sin	gle Inheritance – Multileve	el Inherita	nce –	Mu	ltiple		
inheritance- Hie	erarchical Inheritance – Hybrid	Inheritance.				1		
		Tota	l Lecture	Hou	s 4	5		
Books for Stud	y:							
E. Balagurusam	y, Object Oriented Programm	ning with C++, Tata McGra	aw Hill, N	lew D	elhi,			
Fifth Edition, 20	011.							
Unit I - (Chapter 1: Sections : 1.5, 1.6							
(Chapter 2: Section : 2.6							
(Chapter 3: Sections : 3.2 – 3.6, 3	3.8						
Unit II - (Chapter 3: Sections : 3.24							
(Chapter 4: Sections : $4.2 - 4.7$,	4.10						
Unit III -	Chapter 5: Sections : $5.3 - 5.4$,	5.11 – 5.13, 5.15						
Unit IV - (Chapter 6: Sections : 6.2 , 6.3, 6	.11						
(Chapter 7: Sections : 7.2- 7.4 , 7	.7						
Unit V -	Chapter 8: Sections : $8.1 - 8.3$,	8.5 - 8.8						
Books for Refe	rences:	-			000			
1. Bjarne Stroustrup, The C++ Programming Language , Addison-Wesley, New York, 1999.								

-						
2. Rob	ert Lafore, Object-Oriented Programming in Microsoft C++, Galgotia Publica	tions, New				
Delhi,	2000					
3. D. R	avichandran, Programming with C++ , Tata McGraw Hill Education (India) Priv	vate				
Limite	d, New Delhi, Sixth Reprint, 2005.					
Web F	Resources					
1. htt	tps://nptel.ac.in/courses/106/105/106105151/					
2. htt	tps://www.classcentral.com/course/swayam-programming-in-c-6704					
3. htt	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-096-introduction-to-c-					
jaı	january-iap-2011/lecture-notes/					
COU	COURSE OUTCOME K Level					
On th	e successful completion of the course, the students will be able to					
CO1:	Explain object-oriented features in C++.	K4				
COA	Point out the programs in C++ using control structure, function prototyping,	TZ A				
CO2:	inline functions and function overloading.	K 4				
CO3:	Make use of classes and member functions.	K3				
CO4:	Differentiate overload functions and operators in C++.	K4				
CO5:	Construct C++ using inheritances.					

CO & PO Mappings:

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

*3 – Advanced Application; 2 – Intermediate Development; 1 – Introductory Level <u>LESSON PLAN</u>

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Basic Concepts of Object Oriented Programming – Benefits of OOP – Structure of C++ program – Tokens- Keywords – Identifiers and Constants- Basic data type – User defined data type - Derived data type	9	Chalk & Talk
II	Control structures-The Main Functions – Function prototyping – Call by References – Return by References – Inline functions– Default arguments – Function overloading.	9	Chalk & Talk, PPT
III	Specifying a Class – Defining member functions – Static data members – Static member functions – Array of Objects –Friendly functions	9	Chalk & Talk
IV	Constructors – Parameterized Constructors – Destructors- Defining Operator overloading – Overloading unary operators – Overloading binary operators – Rules for overloading operator.	9	Chalk & Talk
V	Inheritance – Defining Derived class –Single Inheritance – Multilevel Inheritance – Multiple inheritance- Hierarchical Inheritance – Hybrid Inheritance.	9	Chalk & Talk, PPT

Course Designed by: Dr. S. Andal, Assistant Professor &Mrs. S. Ragavi, Assistant Professor

	Learning Outcome Based Education & Assessment (LOBE)							
		Articulati	on Mapping -	- K Levels w	vith Course C) outcome	s (COs)	
			Sectio	on A	Section	B	Section C	Section D
Inte	Cos	K Level	MC	Qs	Short Ans	swers	Either or	Onen
rnal	005	K Levei	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO1	Upto K4	2	K1&K2	1	K1	2	1
AI	CO2	Upto K4	2	K1&K2	2	K2	2	1
CI	CO3	Upto K3	2	K1&K2	1	K2	2	1
AII	CO4	Upto K4	2	K1&K2	2	K2	2	1
		No. of Questions to be asked	4		3		4	2
Que	stion	No. of Questions to be answered	4		3		2	1
CIA I &	I & II	Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

	Distribution of Marks with K Level 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	8	20	
	K2	2	4			6	12	20	
СТА	K3			10	10	20	40	40	
	K4			10	10	20	40	40	
-	Marks	4	6	20	20	50	100	100	
	K1	2	2			4	8	20	
	K2	2	4			6	12	20	
CIA	K3			10	10	20	40	40	
II	K4			10	10	20	40	40	
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course							
		V	MC	Qs	Short An	swers	Section C	Section D
S.No	COs	K -	No. of	K –	No. of	K –	(Either /	(Open
	Level	Questions	Level	Question	Level	or Choice)	Choice)	
1	CO1	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)
2	CO2	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)
3	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
4	CO4	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Questi Aske	ons to be d	10		5		10	5
No. of Questions to be answered		ons to be red	10		5		5	3
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figures	in parenthe	esis denotes,	questions s	hould be as	ked witl	h the given 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	22		
K2	5	6	20		31	25.8			
K3			30	20	50	41.7	42		
K4				30	30	25	25		
Marks	10	10	50	50	120	100	100		
ND. III	han land of m	and a mark a mark a s	f the student	a ia ta ha aga	and here	ttom time	high on land		

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

Section	Section A (Multiple Choice Questions)						
Answer	All Qu	estions	(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					
Section	B (Sho	rt Answers)					
Answer	All Qu	estions	(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 (Eith	er/Or Type	2)				
Answer	All Qu	estions	(5 x 5 = 25 marks)				
Q.No	CO	K Level	Questions				
16) a	CO1	K3					
16) b	CO1	K3					
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	K2					
20) b	CO5	K2					
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K				
levels							
Section	D (Ope	n Choice)					
Answer	Any Tl	nree questic	ons (3x10=30 marks)				
Q.No	CO	K Level	Questions				
21	CO1	K4					
22	CO2	K4					
23	<u>CO3</u>	K3					
24	CO4	K4					
25	CO5	K3					

Summative Examinations - Question Paper – Format



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

Course Name	me PROGRAMMING IN C++ LAB						
Course Code	21UMTAP1					Р	С
Category	Practical				-	2	1
Nature of cours	se: EMPLOYA	BILITY	SKILL ORIENTED	ENTREPH	RENU	IRSH	IIP
COURSE OBJ	ECTIVES:						
To learn	the fundamental J	programming	g concepts and methodolog	ies which a	re ess	entia	l to
building	good C++ progra	ms.	• • • •				
To pract To code	document test	amming lang	guage via laboratory experi-	ences.	rooro	m 110	ina
• To code	nocument, test, a		in a well-structured, fobust	computer p	nogra	III us	ing
To write	roughla modulas	guage.	of functions)				
• To write	and call function	s (conections	or functions).	values			
List of Program	c and can function	is that use pa	tranieter passing and return	values			
1 Write a $C_{\pm\pm}$	ns m C++ program for In-lin	e function					
2 Write a $C++$	program for Funct	ion overload	ling				
3 Write a $C++$	program for Funct	tions using D)efault arguments				
4 Write a $C++$	program using Sta	tic member t	functions				
5 Write a $C++$	program for Const	tructors					
6 Write a $C++$	program for Unary	v Operator ov	verloading				
7. Write a $C++$	program using Bir	ary Operato	r overloading				
8. Write a $C++$	program in Friend	function	r of enrouening.				
9. Write a $C++$	program using Sir	gle inheritar	ice				
10. Write a $C++$	program using re	cursive func	tion.				
	<u> </u>			Total	Hou	rs 3	80
Books for Stud	y:						
1. E. Balag	urusamy, Object (Oriented Pro	gramming with C++, Tata	McGraw Hi	ill, Ne	w D	elhi,
Fifth Ed	ition, 2011.						
Books for Refe	rences:						
1. LesHanCock	, Morris Kringer,	C Primer, N	AcGraw Hill , 1997.				
2. Robert Lafor	e, Object-Orient	ed Program	ming in Microsoft C++, C	Galgotia Puł	olicati	ons,	New
Delhi, 2000.							
3. Bjarne Strou	strup, The C++ P	rogramming	g Language, Addison-Wes	sley, New Y	ork, 1	1999.	
Web Resources	5						
1. <u>https://npte</u>	.ac.in/courses/106	<u>/104/1061041</u>	<u>28/</u>				
2. <u>https://nptel.ac.in/courses/106/105/106105171/</u>							
3. <u>https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-096-introduction-to-c-</u>							
january-iap-2011/lecture-notes/							
COURSE OUTCOME K Level							
CO1. Illuster	the empression of	une course,	, the students will be able	ιο	<u> </u>	T2	~)
CO1: Illustrat	e uie appropriate i	use of data ty	pes.	ing and		K	<u>.</u> 2
CO2: Demons	strate the understa	nung of algo	oriums in the problem-solv	ing process	5.	<u> </u>	<u>~</u> 2
UUS: Develop	programs using (conditional, 1	nerative, and functions.			K	13

CO4:	Explain control structures for a given programming task.	K2
CO5:	Apply fundamental syntax rules for identifiers, declarations, expressions and functions.	K3

CO & PO Mappings:

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

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

Course Designed by:

Dr. S. Andal, Assistant Professor &Mrs. S. Ragavi, Assistant Professor



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

Course Name	FOURIER SERIES AND	FOURIER TRANSFORM				
Course Code	21UMTS41			L	Р	С
Category	Skill			2	-	2
Nature of cour	se: EMPLOYABILITY	SKILL ORIENTED	ENTREPF	RENU	RSH	IP
COURSE OBJ	ECTIVES:					
• To have	a sound knowledge of Fouri	er series and transform.				
To solve	Fourier series, Fourier Tran	sform and inverse Fourier Tr	ansform.			
• To expan	nd periodic function as a ser	ies of sines and cosines.				
• To apply	Fourier Transform and its p	properties for solving Partial I	Differential	equat	ions.	
• To study	finite Fourier transform and	l its properties.		-		
Unit: I		• •			6	
Periodic functio	ns – Trigonometric series –	Fourier series and Fourier coe	efficient the	orem	- fin	ite
discontinuity - H	Even and odd functions.					
Unit: II					6	
Half range Four	ier cosine series and Fourier	sine series - Change of inter	val – Chan	ge of	peric	od
Complex form of	of Fourier series - Parseval's	Identity.		-	-	
Unit: III					6	
Infinite Fourier	Transform – Fourier Sine	Fransform – Fourier Cosine t	ransform –	Rela	tions	ship
between Fourie	er Transform and Laplace	e Transform – Properties	of Fourier	r trai	nsfor	m –
Convolution the	orem.	-				
Unit: IV					6	
Simple results r	elated to Fourier Transform	- integral equation - Cosine a	and sine Tra	nsfor	m	
Unit: V					6	
Finite Fourier S	ine Transform – Finite Fouri	er Cosine Transform – Fourie	er Integral t	heore	m –	
Parsevel's Ident	ity.					
		Tot	al Lecture	Hou	s 3	0
Books for Stud	y:					
J.K.Goyal,	K.P. Gupta, Laplace and F	' ourier Transform, Pragati P	rakashan E	ducat	ional	
Publisher,	Meerut, 2019 Ed.,					
Unit 1: Chapter	3, Section 1 to 6					
Unit 2: Chapter	3, Section 7 to 11					
Unit 3: Chapter	2, Section 2.1 to 2.5					
Unit 4: Chapter	2, Section 2.6 to 2.8					
Unit 5: Chapter	Unit 5: Chapter 2, Part II full.					
Books for Refr	ences:					
1. Dr.S. Arumug	gam and Issac, Sequence & S	Series and Fourier Series, Nev	w Gamma F	Publis	hing	
House, Palayamkottai, 2006.						
2. P.R. Vittal,	Differential Equations, Fou	arier and Laplace Transform	ns, Probabi	lity –	- Yea	ar of
Publication 200), Margham Publications, 24	I, Rameshwaram Road, T.Nag	gar, Chenna	ui — 60)0 01	7
3. Grewal, B.S.,	"Higher Engineering Mathe	ematics" (35th Edition), Khan	na Publishe	ers,De	elhi,2	000.
Web Resources	1					

1.	https://nptel.ac.in/courses/111/105/111105035/	
2.	https://www.youtube.com/playlist?list=PLs7oDAL8_ouJ5w8wCPtKnK2I09N	MIKC6kP
3.	https://math.mit.edu/~gs/cse/websections/cse41.pdf	
COU	RSE OUTCOME	K Level
On the	he successful completion of the course, the students will be able to	
CO1:	Demonstrate the understanding of Fourier Series and Fourier transforms.	K1
CO2 :	Analyze Half range Fourier cosine series and Fourier sine series	K2
CO3:	Examine the convergence of Fourier series.	K1
CO4:	Use the Fourier transform in periodic function	K2
CO5:	List the properties of Fourier transforms.	K1

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Periodic functions – Trigonometric series – Fourier series and Fourier coefficient theorem – finite discontinuity - Even and odd functions.	6	Chalk & Talk
II	Half range Fourier cosine series and Fourier sine series – Change of interval – Change of period Complex form of Fourier series - Parseval's Identity.	6	Chalk & Talk
III	Infinite Fourier Transform – Fourier Sine Transform – Fourier Cosine transform – Relations ship between Fourier Transform and Laplace Transform – Properties of Fourier transform – Convolution theorem.	6	Chalk & Talk
IV	Simple results related to Fourier Transform – integral equation – Cosine and sine Transform	6	Chalk & Talk
V	Finite Fourier Sine Transform – Finite Fourier Cosine Transform – Fourier Integral theorem – Parsevel's Identity.	6	Chalk & Talk

Course Designed by:

Dr. V. Ramachandran, Assistant Professor & Dr. M. Saravanan, Assistant Professor



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

Course Name	MATHEMATICS FOR COMPETITIVE EXAMINATIONS – II					
Course Code	21UMTN41			L	Р	С
Category	Non-Major Elective			2	-	2
Nature of cour	se: EMPLOYABILITY S	SKILL ORIENTED	ENTREPR	ENU	RSH	IP
COURSE OBJ	ECTIVES:					
• T	o improve the ability to face the cor	mpetitive examinations	8			
• T	b identify the exact method to proble	lems				
• T	o apply the concepts in Competitive	e Examinations.				
• T	o familiarize the concepts of Profit	& Loss, Interest on mo	oney, Rules	of all	igati	on.
• T	o identify verbal and non – verbal p	problems				
Unit: I					6	
Cost Price- Sell	ng price – Profit or Gain – Loss – I	Profit and Loss Percen	tage.			
Unit: II					6	
Alligation – Me	an price - Rule of alligation.					
Unit: III					6	
Principal – Inter	est – Simple Interest – Compound	Interest.				
Unit: IV					6	
Non Verbal Rea	soning – Completion of Figures	Completion of Series.				
Unit: V					6	
Calendar – Leap	Year – Non Leap Year – Number	of Days between Date	S			
		Tot	al Lecture I	Hour	s 3	0
Books for Stud	y:					
	ext Material will be supplied by the	e Department.				
Books for Refr	ences:	de feu Commetitive E		~		
1. A	ggarwai. R.S. Quantitative Aptitud	ae for Competitive E	xamination	s,		
2 A	bhigitGuba Quantitative Antitud	e fourth edition Tata]	MCGraw			
2. A H	ill Publication 2011 New Delhi		VICOIAW			
3 B	S Sijwali Indu Sijwali Non -Verb	al Reasoning, Arihant	Publication	s		
(I	ndia) LTD., New Delhi.					
Web Resource						
1.https://www.	khanacademy.org/math/in-in-clas	ss-7th-math-				
cbse/x939d838	80cf9307:comparing-quantities/x	x939d838e80cf9307:p	rofit-or-loss	s-as-a	<u>a-</u>	
percentage/v/fi	nding-profit-percent-comparing-	quantities-class-7-ind	lia-math-kh	an-a	<u>cade</u>	<u>my</u>
2. https://www	toppr.com/guides/maths/compair	ring-quantities/profit-	-and-loss/			
3. http://accioneduca.org/admin/archivos/clases/material/interest-rates_1564084248.pdf						
COURSE OUTCOME K Level						evel
On the success	ful completion of the course, the	students will be able	to			
CO1: Explain	the concepts the profit and loss				<u> </u>	2
CO2: Recall t	ne rules of alligation	1 1 1 1 1 1			<u> </u>	1
CO3: Demon	trate the understanding of the comp	pound and simple inter	rest		Ŕ	.2

CO4:	Classify the non-verbal reasoning problems	K2
CO5:	Illustrate the concepts related to calendar	K2

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
т	Cost Price- Selling price – Profit or Gain – Loss – Profit and Loss	6	Chalk &
-	Percentage.	U	Talk
TT	Alligation Maan price Pule of alligation	6	Chalk &
11	Angation – Mean price - Kule of angation.	U	Talk
TTT	Dringing Interest Simple Interest Compound Interest	6	Chalk &
111	Principal – interest – Simple interest – Compound interest.		Talk
IV	Non Verbal Bassoning Completion of Figures Completion of Series		Chalk &
1 V	Non verbai Reasoning – Completion of Figures – Completion of Series.	U	Talk
V	Calendar – Leap Year – Non Leap Year – Number of Days between		Chalk &
	Dates	U	Talk

Course Designed by:

Dr. P. Chitradevi, Assistant Professor &Mrs. S. Ragavi, Assistant Professor







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

Course Name	LINEAR ALGEBRA					
Course Code	21UMTC51			L	Р	С
Category	Core			6	_	<u>~</u> Л
NATURE OF				U	-	4
COURSE:	EMPLOYABILITY	SKILL ORIENTED	✓ ENTREPRE	NURS	SHIP	
COURSE OBJ	ECTIVES:					
• To exhi	oit vector space, inner produ	ict space, span of a set an	d understand the fu	ındam	ental	
theorem	of homomorphism.					
• To have	a sound knowledge of matr	rices and its properties.				
• To anal	ze orthogonality, rank and	nullity.				
• To illus	rate Eigen values and Eiger	n vectors				
• To famil	arize the concepts of Bilinear	forms				
Unit: I					18	
Vector Spaces	- Definition and examples	– Subspaces – Linear Tra	ansformation – Fu	ındam	ental th	neorem
of Homomorph	sm.	-				
Unit: II					18	
Span of a set –	Linear independence – Bas	sis and Dimension – Ran	k and Nullity – Ma	atrix o	f Linea	r
Transformation	5.					
Unit: III					18	
Inner Product S	paces – Orthogonality – Or	hogonal complement-Pro	blems and Theorem	ns.		
Unit: IV					18	
Theory of Mat	ices –Algebra of Matrices	-Types -Inverse-Elemen	ntary Transformation	on- Ra	ank of	a
Matrix- Simul	aneous Linear equations –	Characteristic equation a	and Cayley Hamilt	ton th	eorem ·	_
Eigen values ar	d Eigen Vectors.					
Unit: V					18	
Bilinear forms	- Matrix of a Bilinear form	– Quadratic forms – Redu	ction to Quadratic	forms	5.	
			Total Lecture H	ours	90	
Books for Stud	y:					
Dr.S.Arum	gam and Issac A.T. Moder	n algebra . Scitech Public	cations. Chennai, R	eprint	July 20	014
Unit	- Chapter 5: Section	5.0 to5.3		• • • • • • • • • • • • • • • • • • • •	• • • · · j = ·	
Unit	I - Chapter 5: Section	5.4 to5.8				
Unit	III - Chapter 6: Section	6.0 to6.3				
Unit	IV - Chapter 7: Section	7.0 to7.8				
Unit	V - Chapter 8: Section	8.0 to 8.2				
Books for Refe	rences:					
Academ	c Council Meeting Held C	on 20.04.2023		I	Page 88	_

- 1. Leadership Project Committee, University of Bombay, **Books for Study of Algebra**, Tata McGraw Hill Publication, New Delhi,1985.
- V.Krishnamurthy, V.P.Mainra & J.L.Arora, An Introduction to Linear Algebra, Affiliated East West press Pvt Ltd, New Delhi,1990.

3. Manicavasagam Pillai .T.K and others – Modern algebra, S. Viswanathan Publishers, Chennai 1993.

Web Resources

- 1. https://nptel.ac.in/courses/111/105/111105035/
- 2. https://nptel.ac.in/courses/111/106/111106135/
- 3. https://webspace.maths.qmul.ac.uk/p.j.cameron/notes/linalg.pdf

COUI	RSE OUTCOME	K Level
On the	successful completion of the course, the students will be able to	
CO1:	Demonstrate the understanding of the basic concepts of vector space, subspace and linear transformation.	K2
CO2:	Identify spanning set, linear independent set and basis to predict the dimension of a vector space.	K3
CO3:	Explain Inner Product Space, orthogonality and its complement	K4
CO4:	Compute Eigen values, Eigen vectors and inverse, higher powers of a given matrix using Cayley Hamilton Theorem	K4
CO5:	Change quadratic form to diagonal form.	K3

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Vector Spaces – Definition and examples – Subspaces – Linear Transformation – Fundamental theorem of Homomorphism.	18	Chalk & Talk
II	Span of a set – Linear independence – Basis and Dimension – Rank and Nullity – Matrix and Linear Transformations.	18	Chalk & Talk
III	Inner Product Spaces – Orthogonality – Orthogonal complement-Problems and Theorems.	18	Chalk & Talk
IV	Theory of Matrices –Algebra of Matrices –Types –Inverse-Elementary Transformation- Rank of a Matrix– Simultaneous Linear equations – Characteristic equation and Cayley Hamilton theorem – Eigen values and Eigen Vectors.	18	Chalk & Talk
V	Bilinear forms – Matrix of a Bilinear form – Quadratic forms – Reduction to Quadratic forms.	18	Chalk & Talk

Course Designed by : Dr.V. Ramachandran & Dr.P.Chitra devi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print							
		Articulatio	on Mapping –	K Levels w	ith Course Ou	utcomes (COs)	
			Sectio	on A	Section	n B	Section	Section
Inte	Cos	K I ovol	MC	Qs	Short An	swers	Section C	Section D
rnal	CUS	K Level	No. of.	K -	No. of.	К-	Either or	Open
			Questions	Level	Questions	Level	Choice	Choice
CI	CO1	Upto K2	2	K1&K2	1	K1	2 (K2 &K2)	1 (K2)
AI	CO2	Upto K3	2	K1&K2	2	K2	2 (K3 &K3)	1 (K3)
CI	CO3	Upto K4	2	K1&K2	1	K2	2 (K3 &K3)	1 (K4)
AII	CO4	Upto K4	2	K1&K2	2	K2	2 (K3 &K3)	1 (K4)
		No. of Questions to be asked	4		3		4	2
Que Pat	estion tern	No. of Questions to be answered	4		3		2	1
CIA	1 & 11	Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

	Distribution of Marks with K Level 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	8	60	
	K2	2	4	10	10	26	52	00	
CIA	K3			10	10	20	40	40	
I	K4								
	Marks	4	6	20	20	50	100	100	
	K1	2	2			4	8	40	
	K2	2	4	10		16	32	40	
CIA	K3			10		10	20	20	
II	K4				20	20	40	40	
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MO	Qs	Short Answers		Section C	Section D	
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open	
			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	1	K1	2(K3&K3)	1(K3)	
3	CO3	Upto K4	2	K1&K2 1 K2 2(K3&K3)	2 K1&K2 1 K2 2(K3&K3)	K1&K2 1 K2 2(K3&K3)	K2 2(K3&K3) 1(K4	2 2(K3&K3) 1(K4	1(K4)
4	CO4	Upto K4	2	K1&K2	1	K2	2(K4&K4)	1(K4)	
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)	
No.	of Questi	ons to be	10		5		10	5	
	Aske	d	10		5		10	5	
No.	of Questi	ons to be	10		5		5	2	
answered		10		5		5	3		
Mar	ks for eac	h question	1		2		5	10	
Total Marks for each section		10		10		25	30		
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)	

	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	10		19	15.9	41 7		
K2	5	6	10	10	31	25.8	41.7		
K3			20	20	40	33.3	33.3		
K4			10	20	30	25	25		
Marks	10	10	50	50	120	100	100		
NB: Hig levels.	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section	A (Mul	tiple Choic	e Questions)
Answer	All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	All Qu	estions	(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 (Eith	er/Or Type	
Answer	All Qu	estions	(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	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels			
Section	D (Ope	n Choice)	
Answer	Any T	hree questic	ons (3x10=30 marks)
Q.No	CO	K Level	Questions
21	COl	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K3	

Summative Examinations - Question Paper – Format



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

Course Name	REAL ANALYSIS								
Course Code	21UMTC52 L P						С		
Category	Core				6 - 4				
NATURE OF COURSE:	EMPLOYABILITY		SKILL ORIENTED	SKILL ORIENTED Image: Constraint of the second se					
COURSE OBJ	COURSE OBJECTIVES:								
 To define th To introduc To recogniz To determin To identify 	 To define the least upper bounds and the triangle inequality. To introduce the various types of sequences. To recognize convergent, conditionally and absolutely convergent series. To determine the different types of metric space. 								
Unit: I							18		
Limit of a functi	ion on the real line- Met	ric s	paces – Limits in metri	c spa	ices.				
Unit: II							18		
Functions contir	nuous at a point on the re	eal li	ine – Reformulation – I	Funct	ions continu	ious on	a metri	c	
space.							10		
Unit: III	ad anta Diagontinuous f		ions on D ¹				18		
Upit: IV	ed sets- Discontinuous I	unci	IONS ON K.				10		
Connected sets-	Bounded sets and totall	v ho	unded sets- Complete i	netri	c snaces		10		
Unit: V	Dounded sets and total	y 00	unded sets- Complete I	neur	e spaces.		18		
Compact metric	spaces – Continuous	func	ctions on Compact me	etric s	spaces- Cor	tinuitv	of the		
inverse function	- Uniform Continuity.		······		·r ····				
				Tot	tal Lecture	Hours	90		
Books for Stud Richard R New Delhi,1970	y: Goldberg, Methods of), Reprint 2019.	f Re	al Analysis , Oxford an	d IBI	H Publishing	g Pvt. L	td,		
	Unit I - Chapt	er 4:	Sections 4.1-4.3						
	Unit II - Chapt	er 5:	Sections 5.1-5.3						
	Unit III - Chapt	er 5:	sections $5.4-5.6$						
	Unit IV - Chapt	er 6	Sections $6.2-6.4$						
Books for Pofo	Unit V - Chapt	er o:	Sections 0.3–0.8						
 Dr.S.Arumugam, Mr. A.Thangapandi Isaac, Dr.A.Somasundaram, Modern Analysis, Yes Dee Publishing PvtLtd. Tom M.Apostol, Mathematical Analysis, II Edition, Narosa Publishing House, New Delhi(Unit I), 1997. 									
3. M	K Singal, Asha Rani Si	ngal	, A First Course In R	eal A	nalysis, R (Chand 8	z CO,20	020.	
vveb Kesources	$\frac{1}{2} \log \frac{1}{2} \log \frac{1}$	1/11	1101134/						
2. https://npt	el ac in/courses/111/10	5/11 ⁻	<u>1101134/</u> 1105069/						
<u><u> </u></u>									

3. ht	tps://s2pnd-matematika.fkip.unpatti.ac.id/wp-content/uploads/2019/03/Real-Ana l-Royden.pdf	alysis-4th-
COU	RSE OUTCOME	K Level
On the	successful completion of the course, the students will be able to	
CO1:	explain the basic concepts of countable , uncountable sets and metric space.	K4
CO2:	analyse the completeness of the metric space.	K4
CO3:	examine whether a function on a metric space is continuous, discontinuous, or uniformly continuous.	K4
CO4:	construct the logical arguments evolving the theory behind connected sets.	K3
CO5:	construct mathematical proofs of basic results in compact metric space	K3

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Limit of a function on the real line- Metric spaces – Limits in metric spaces.	18	Chalk & Talk
II	Functions continuous at a point on the real line – Reformulation – Functions continuous on a metric space.	18	Chalk & Talk
III	Open sets- Closed sets- Discontinuous functions on R ¹ .	18	Chalk & Talk
IV	Connected sets- Bounded sets and totally bounded sets- Complete metric spaces.	18	Chalk & Talk
V	Compact metric spaces – Continuous functions on Compact metric spaces- Continuity of the inverse function- Uniform Continuity.	18	Chalk & Talk

Course Designed by: Mrs.S.Ragavi & Mrs.R.Sumathi

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print											
Articulation Mapping – K Levels with Course Outcomes (COs)											
Inte rnal	Cos	K Level	Section A		Section B		Section Section C	Section			
			MCQs		Short Answers			Section D			
			No. of.	К-	No. of.	К-	Either or Choice	Open			
			Questions	Level	Questions	Level		Choice			
CI	CO1	Upto K4	2	K1&K2	1	K1	2 (K3 &K3)	1 (K4)			
AI	CO2	Upto K4	2	K1&K2	2	K2	2 (K3 &K3)	1 (K4)			
CI	CO3	Upto K4	2	K1&K2	1	K2	2 (K3 &K3)	1 (K4)			
AII	CO4	Upto K3	2	K1&K2	2	K2	2 (K3 &K3)	1 (K3)			
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	2			
		No. of Questions to be answered	4		3		2	1			
		Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

Distribution of Marks with K Level 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	8	20				
CIA I	K2	2	4			6	12	20				
	K3			20		20	40	40				
	K4				20	20	40	40				
	Marks	4	6	20	20	50	100	100				
CIA II	K1	2	2			4	8	20				
	K2	2	4			6	12					
	K3			20	10	30	60	60				
	K4				10	10	20	20				
	Marks	4	6	20	20	50	100	100				

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.
Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MO	Qs	Short An	Short Answers		Section D
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Upto K4	2	K1&K2	1	K1	2(K2&K2)	1(K4)
2	CO2	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)
3	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
4	CO4	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Questi	ons to be	10		5		10	5
	Aske	d	10		5		10	5
No.	of Questi	ons to be	10		5		5	3
answered		10		5		5	3	
Marks for each question			1		2		5	10
Total Marks for each section		10		10		25	30	
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)

		Dis	stribution of	Marks with	n K Leve	1			
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	22.2		
K2	5	6	20		31	25.8	55.5		
K3			30	20	50	41.7	41.7		
K4				30	30	25	25		
Marks	10	10	50	50	120	100	100		
NB: Hig levels.	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section A (Multiple Choice Questions)						
Answer	All Qu	estions	(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				
Section	B (Sho	rt Answers)				
Answer	All Qu	estions	(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 (Eith	er/Or Type	e)			
Answer	All Qu	estions	(5 x 5 = 25 marks)			
Q.No	CO	K Level	Questions			
16) a	CO1	K2				
16) b	COl	<u>K2</u>				
17) a	CO2	<u>K3</u>				
17) b	CO2	K3				
18) a	CO3	<u>K3</u>				
18) b	CO3	<u>K3</u>				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	CO5	K3				
20) b	CO5	K3				
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K			
levels						
Section	D (Ope	n Choice)				
Answer	Any T	hree questic	ons (3x10=30 marks)			
Q.No	CO	K Level	Questions			
21	COl	K4				
22	CO2	K4				
23	CO3	K4				
24	CO4	K3				
25	CO5	K3				

Summative Examinations - Question Paper – Format



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

Course Name	DIFFERENTIAL EQUATIONS								
Course Code	21UMTC53				L	Р	С		
Category	Core				6	-	4		
NATURE OF COURSE:	EMPLOYABILITY	~	SKILL ORIENTED	ENTREPRI	ENUR:	SHIP			
COURSE OB	COURSE OBJECTIVES:								
• To unders	tand the first order and se	cond	order differential equation	ons					
• To apply suitable method for solving linear differential equations									
• To solve s	imultaneous linear differe	ential	equations						
• To form the	ne partial differential equa	tion							
• To apply a	appropriate methods for so	olvin	g partial differential equa	ations					
Unit: I	18								
Exact differential equations of first order but of higher degree – Equations solvable for y – Equations solvable for x – Clairaut's form – Equation that do not contain x,y explicitly, Equation homogeneous in x and y .									
Unit: II	18								
Linear Equation	ns with constant coefficie neous equations.	ents a	nd variable coefficients	- Equations reduc	ible to	the			
Unit: III						18			
Simultaneous I the normal for	Linear differential equation m – Change of independer	ons – nt va	Linear Equations of the riables – Variation of particular terms of the second s	second order – Re rameters.	eductio	on to			
Unit: IV			-			18			
Partial differences of the second sec	ntial equation of the first of functions - Derivation of p	order oartia	– Formation of PDEs – l differential equation –	Elimination of ar Lagrange method	bitrary l of sol	ving li	near		
Unit: V						18			
Standard form	s – Equations reducible to	the s	standard forms – Charpit	's method.					
Total Lecture Hours 90									
Books for Stu	dy:								
T.K.Manickav S.Viswanathar	asagam Pillai and S.Naray Publication, Chennai,201	yanar 14.	n, Differential equations	s and its Applica	tions,				
	UnitI - Cha	oter 1	: Section 6.1, 6.3 and						

			Volume VI – Science Syllabus / 20	023 - 2024			
			Chapter 4: Section 1, 2, 3& 4				
	Unit II	-	Chapter 5: Section 4, 5 &6				
	Unit III	-	Chapter 6: Section 5, 6and				
			Chapter 8: Section 1, 2, 3, &4				
	Unit IV	-	Chapter 12: Section 1, 2, 3&4				
	UnitV	-	Chapter 12: Section 5,6				
Books f	for References:						
1. Dr. 1	M.D. Raisinghania,	Adva	nced Differential Equations, S.Chand and Company P	vt. Ltd,			
New	Delhi, Reprint,201	2					
Dr S	Arumugam and Is	sac T	Nifferential equations and its Annlications New Gamp	19			
. DI.5	Dr.S. Arumugam and issac, Differential equations and its Applications, New Gamma						
Publ	lications, Palayamk	ottai,2	011.				
3. Kano Delh	dasamy. P. and K. T ni.	Гhilag	avathi, Mathematics for B.Sc., Vol III – 2004 – S.Chand	and Co., New			
Web R	esources						
1. htt	ps://www.digimat.	in/np	tel/courses/video/111108081/L02.html				
2 htt	net//www.whitmor	a odu	mathematics/calculus_online/section17.01.html				
2. <u>IIII</u>	<u>ps://www.wiitunai</u>	<u>1.euu/</u>	mathematics/carculus_onnne/section17.01.ntm				
3. <u>htt</u>	ps://www.math.hk	ust.eo	lu.hk/~machas/differential-equations.pdf				
COUR	RSE OUTCOME			K Level			
On the	successful completi	on of	the course, the students will be able to	·			
CO1:	Choose the approp	riate 1	nethod for solving ordinary differential equation.	K3			
CO2:	Apply suitable me	thod f	or solving linear differential equations.	K3			
CO3:	Solve the Simultar	neous	differential equations using various methods.	K3			
CO4:	Solve the partial di	ifferer	tial equation by Lagrange's method.	K3			
CO5:	Analyse various for	orms o	f partial differential equations	K4			

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Exact differential equations of first order but of higher degree – Equations solvable for y – Equations solvable for x – Clairaut's form – Equation that do not contain x,y explicitly, Equation homogeneous in x andy.	18	Chalk & Talk
II	Linear Equations with constant coefficients and variable coefficients - Equations reducible to the linear homogeneous equations.	18	Chalk & Talk
ш	Simultaneous Linear differential equations – Linear Equations of the second order – Reduction to the normal form – Change of independent variables – Variation of parameters.	18	Chalk & Talk
IV	Partial differential equation of the first order – Formation of PDEs – Elimination of arbitrary constants and functions - Derivation of partial differential equation – Lagrange method of solving linear equations	18	Chalk & Talk
v	Standard forms – Equations reducible to the standard forms – Charpit's method.	18	Chalk & Talk

Course Designed by: Dr.A.Arivu Chelvam & Dr.S.Andal

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
			Section A		Section B		Section	Section	
Inte	Cos	K Level	MC	Qs	Short Ans	swers	Section C	Section D	
rnal			No. of. Questions	K - Level	No. of. Questions	K - Level	Either or Choice	Open Choice	
CI	CO1	Upto K3	2	K1&K2	1	K1	2 (K2 & K2)	1 (K3)	
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3 & K3)	1 (K3)	
CI	CO3	Upto K3	2	K1&K2	1	K2	2(K3 & K3)	1(K3)	
AII	CO4	Upto K3	2	K1&K2	2	K2	2 (K2 & K2)	1(K3)	
		No. of Questions to be asked	4		3		4	2	
Question Pattern CIA I & II		No. of Questions to be answered	4		3		2	1	
		Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10	

	Distribution of Marks with K Level 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	8	40		
	K2	2	4	10		16	32	ν		
CIA	K3			10	20	30	60	60		
I	K4									
-	Marks	4	6	20	20	50	100	100		
	K1	2	2			4	8	40		
	K2	2	4	10		16	32	40		
CIA	K3			10	20	30	60	60		
II	K4									
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
		MO	MOQs		Short Answers		Section D	
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)
2	CO2	Upto K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
3	CO3	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
4	CO4	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
5	CO5	Upto K4	2	K1&K2	1	K2	2(K2&K2)	1(K4)
No.	of Questi	ons to be	10		5		10	5
	Aske	d	10		5		10	5
No.	of Questi	ons to be	10		5		5	2
answered		10		5		5	3	
Marks for each question			1		2		5	10
Total Marks for each section		10		10		25	30	
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)

	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	22.4			
K2	5	6	20		31	25.9	55.4			
K3			30	40	70	58.3	58.3			
K4				10	10	8.3	8.3			
Marks	10	10	50	50	120	100	100			
NB: Hig levels.	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

Section A (Multiple Choice Questions)						
Answer	All Qu	estions	(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				
Section	B (Shor	rt Answers)				
Answer	All Qu	estions	(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 (Eith	er/Or Type				
Answer	All Qu	estions	(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	K3				
19) b	CO4	K3				
20) a	CO5	<u>K3</u>				
20) b	<u>CO5</u>	<u>K3</u>				
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K			
levels						
Answer	D (Ope Anv Tł	n Unoice) hree questic	ons (3x10=30 marks)			
O.No	CO	KLevel	Ouestions			
21	CO1	K3	Zuonan			
22	CO2	K3				
23	CO3	K3				
24	CO4	K3				
25	CO5	K4				

Summative Examinations - Question Paper – Format



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

Course Name	STATISTICS – I								
Course Code	21UMTE51					L	Р	С	
Category	Elective					5	-	5	
NATURE OF COURSE:	EMPLOYABILITY	✓	SKILL ORIENTED]	ENTREPREN	URS	HIP		
COURSE OB	JECTIVES:								
• To know j	probability, random variat	oles,	sampling.						
• To apply p	• To apply problems on probability and sampling.								
• To solve p	broblems in different envir	ronm	ients that needs decision	n.					
 To learn a To find th 	bout fitting of curves a relationship between tw	0 1/9	riables						
	e relationship between tw	0 va	Hables.				15	5	
Measures of D	of Dispersion – Arithmetic Mean – Median– Quartile Deviation – Mode – Geometric								
Mean – Harmo	onic Mean – Measures of	dispe	ersion – Standard Devia	ation		onnet			
Unit: II	15								
Curve fitting –	Principle of least squares	-F	itting a Straight line – F	Fitting	a second degr	ree Pa	rabol	a –	
Type of curves	of the form $y = bx^a$, $y =$	ab ^x ,	$y = ae^{bx}$.						
Unit: III							15	5	
Correlation – C	Correlation Co efficient –	Prob	elems – Rank Correlation	on – R	egression – E	quatio	on of		
Regression line	es – Regression Coefficie	nts –	Angle between Regres	ssion l	ines.				
Unit: IV							15	5	
Theory of Attr frequencies- C Coefficient of	ibutes – Positive class fre onsistency of data – Inder Colligation.	quen pend	cies - Negative class fi ence and Association o	requer f data-	ncies – Ultima - Coefficient c	te cla of Ass	ss sociati	ion-	
Unit: V							15	5	
Index Number	s- Aggregate Method- Av	erag	e of Price relatives Met	thod- V	Weighted Inde	ex nui	nbers	-	
Laspeyre's Ind	ex numbers- Paasche's Ir	ıdex	numbers- Marshall – E	dgewo	orth's Index n	umbe	rs-		
Bowley's Inde	x numbers- Fischer's Inde	ex nı	umbers- Kelly's Index r	numbe	ers- Ideal Inde	x Nur	nbers	_	
Consumer pric	e Index numbers.								
				Т	otal Lecture	Hour	s 75	5	
Books for Stu	dy:								

Dr. S. Arumugam and Isaac, Statistics, New Gamma Publications, Palayamkottai, Reprint 2012. UnitI -Chapter 3 UnitII -Chapter 5 UnitIII -Chapter 6 UnitIV -Chapter 8 UnitV - Chapter 9 **Books for References:** 1. T. Sankara Narayanan and A. Mangaldoss, Statistics and its Application, Preist Publications, New Delhi, 1994. 2. R.S.N.Pillai and Bagavathi, Practical Statistics, S.Chand and Company Pvt Ltd, New Delhi, 1987. 3. Bhat B.R, Srivenkataramana T and Rao Madhava K.S.: Statistics: A Beginner s Text, Vol. I, New Age International (P)Ltd, 1996. Web Resources 1. https://nptel.ac.in/courses/111/105/111105041/ 2. https://nptel.ac.in/courses/103/106/103106120/ 3. https://sesricdiag.blob.core.windows.net/oicstatcom/TEXTBOOK-CORRELATION-AND-REGRESSION-ANALYSIS-EGYPT-EN.pdf **COURSE OUTCOME** K Level On the successful completion of the course, the students will be able to **K4 CO1**: Analyze statistical techniques to interpret the data. Construct the functional relationship between the variables. **K3 CO2:** K4 Compute the coefficient of correlation and the line of best fit for the bivariate data. **CO3:** K4 **CO4:** Examine the qualitative characteristics of population using theory of attributes. CO5: **K3** Compute the index numbers for the given phenomenon.

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Measures of averages – Arithmetic Mean – Median – Median – Quartile Deviation – Mode – Geometric Mean – Harmonic Mean – Measures of dispersion – Standard Deviation	15	Chalk & Talk
II	Curve fitting – Principle of least squares – Fitting a Straight line – Fitting a second degree Parabola – Type of curves of the form $y = bx^a$, $y = ab^x$, $y = ae^{bx}$.	15	Chalk & Talk
III	Correlation – Correlation Co efficient – Problems – Rank Correlation – Regression – Equation of Regression lines – Regression Coefficients – Angle between Regression lines.	15	Chalk & Talk
IV	Theory of Attributes – Positive class frequencies - Negative class frequencies – Ultimate class frequencies- Consistency of data – Independence and Association of data- Coefficient of Association- Coefficient of Colligation.	15	Chalk & Talk
V	Index Numbers- Aggregate Method- Average of Price relatives Method- Weighted Index numbers- Laspeyre's Index numbers- Paasche's Index numbers- Marshall – Edgeworth's Index numbers- Bowley's Index numbers- Fischer's Index numbers- Kelly's Index numbers- Ideal Index Numbers – Consumer price Index numbers	15	Chalk & Talk

Course Designed by: Dr.A.Hamari Choudhi & Dr.R.Bhavani

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print								
	Articulation Mapping – K Levels with Course Outcomes (COs)								
			Sectio	on A	Section	n B	Section	Section	
Inte	Cos	K I ovol	MC	Qs	Short An	swers	Section C	Section D	
rnal	CUS	K Level	No. of.	К-	No. of.	K -	Either or	Open	
			Questions	Level	Questions	Level	Choice	Choice	
CI	CO1	Upto K4	2	K1&K2	1	K1	2 (K3&K3)	1 K4	
AI	CO2	Upto K3	2	K1&K2	2	K2	2 (K2&K2)	1 K3	
CI	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1 K4	
AII	CO4	Upto K4	2	K1&K2	2	K2	2(K3&K3)	1 K4	
		No. of							
		Questions to be	4		3		4	2	
		asked							
Oue	stion	No. of							
Que Pot	torn	Questions to be	4		3		2	1	
	I & II	answered							
		Marks for each	1		2		5	10	
		question	*					ĨV	
		Total Marks for	4		6		10	10	
		each section	-		v		10	IV	

	Distribution of Marks with K Level 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	8	40		
	K2	2	4	10		16	32	40		
СТА	K3			10	10	20	40	40		
I	K4				10	10	20	20		
-	Marks	4	6	20	20	50	100	100		
	K1	2	2			4	8	40		
	K2	2	4	10		16	32	40		
CIA	K3			10		10	20	20		
II	K4				20	20	40	40		
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			МО	Qs	Short Answers		Section C	Section D
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Upto K4	2	K1&K2	1	K1	2(K2&K2)	1(K4)
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(K4)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	. of Questi	ons to be	10	10			10	5
	Aske	d	10		5		10	5
No.	. of Questi	ons to be	10		5		5	2
answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total I	Marks for	each section	10		10		25	30
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)

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	7.4	37 /		
K2	5	6	20		36	30	57.4		
K3			20	20	40	33.3	33.3		
K4			10	30	40	33.3	33.3		
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								
levels.									

Section	A (Mul	ltiple Choic	e Questions)
Answer	· All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	· All Qu	estions	(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 (Eith	ner/Or Type	e)
Answer	All Qu	estions	(5 x 5 = 25 marks)
Q. No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	<u>K3</u>	
18) b	CO3	<u>K3</u>	
19) a	<u>CO4</u>	<u>K4</u>	
19) b	<u>CO4</u>	K4	
20) a	<u>CO5</u>	<u>K2</u>	
20) b	<u>CO5</u>	K2	
NB: Hi	gher lev	vel of perfor	mance of the students is to be assessed by attempting higher level of K
levels	D (0		
Section	D (Ope	en Choice)	
Answer	Any T	nree questio	Ons (3x10=30 marks)
Q. No		K Level	Questions
21		K4 V2	
22	<u>CO2</u>	KJ V4	
23	<u>CO3</u>	K4 K4	
24	<u>CO4</u>	K4 K2	
23	005	K3	

Summative Examinations - Question Paper – Format



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

Course Name	ASTRONOMY							
Course Code	21UMTE52				L	Р	С	
Category	Elective				5	-	5	
NATURE OF COURSE:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPREN	URSH	ΗP		
COURSE OBJ	ECTIVES:							
To derive various results associated with planetary motion.								
• To list the types of calendars and discuss different time zone								
To discu	ss the various character	ristic	es of the moon					
• To know	about the effects of di	p on	Earth					
To under	stand the various syste	ms c	of coordinates					
Unit: I						1	5	
Spherical trigon	ometry – formulae only	y – c	elestial sphere – diurna	l motion – sidereal d	ay – o	differ	ent	
systems of coord	linates – equinoxes, so	lstice	es, apparent annual mo	tion of the sun – $ecli$	ptic –	latiti	ıde	
of a place – hour	r angle of a star at risin	g – c	arcumpolar star.					
Unit: II 15								
Earth – dip – det	finition and effects – tw	vilig	ht – duration					
Unit: III 15								
Refraction – tar	igent and Cassini's form	nula	– effects of refraction	on right ascension, d	leclin	ation,	,	
small vertical an	d horizontal arcs and o	n dij	0					
Unit: IV						1	5	
Moon – Introduc	ction – phases of moon	- S1	dereal and synodic mor	hth-lunar day and lur	har tin	ne –tł	ne	
Unit: V						1	5	
Eclipses – solar	and lunar – occurrence	s – c	onditions for the occur	rences – ecliptic lim	its – r	naxir	num	
and minimum nu	umber of eclipses in a y	/ear						
				Total Lecture	Hou	rs 7	5	
Books for Study	y:							
S.Kumaravelu a	nd Susheela Kumarave	lu, A	stronomy, Reprinted,	Sri Vishnu Arts, 200)4.			
Unit I : Chapter	2;							
Unit II : Chapter	: 3;							

Unit III : Chapter 4;

Unit IV: Chapter 12;

Unit V : Chapter 13

Books for References:

1. Robert .H. Baker, **Introduction in Astronomy**, 6th Edition, D. Van Nostrand Company

2. Denison Olmsted ,An Introduction to Astronomy,Collins & Brother, Publishers,Newyork.

3. Pankaj Jain, An Introduction to Astronomy and Astrophysics, CRC Press, Taylor &

Fransis,2015.

Web Resources

1. <u>https://www.amazon.in/Introduction-Astronomy-Cosmology-Ian-Morison/dp/0470033347</u>

- 2. https://bookriot.com/astronomy-books-for-beginners/
- 3. https://link.springer.com/book/9783662646366

COU	RSE OUTCOME	K Level
On the	e successful completion of the course, the students will be able to	
CO1:	Sketch the various systems associated with celestial sphere	K3
CO2:	Compute the duration of twilight on earth	K3
CO3:	Analyze the refraction	K4
CO4:	Explain the phases and tides of the moon	K4
CO5:	find the number of occurrences of solar and lunar eclipses in a year and prove	K3
	related results	K5

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Spherical trigonometry – formulae only – celestial sphere – diurnal motion – sidereal day – different systems of coordinates – equinoxes, solstices, apparent annual motion of the sun – ecliptic – latitude of a place – hour angle of a star at rising – circumpolar star.	15	Chalk & Talk
II	Earth – dip – definition and effects – twilight – duration	15	Chalk & Talk
III	Refraction – tangent and Cassini's formula – effects of refraction on right ascension, declination, small vertical and horizontal arcs and on dip	15	Chalk & Talk
IV	Moon – Introduction – phases of moon – sidereal and synodic month-lunar day and lunar time –the tides	15	Chalk & Talk
V	Eclipses – solar and lunar – occurrences – conditions for the occurrences – ecliptic limits – maximum and minimum number of eclipses in a year.	15	Chalk & Talk

Course Designed by: Mrs.S.Ragavi & Dr.P.Chitra devi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print										
Inte rnal	Cos	Articulation K Level	Mapping – Section MC No. of. Questions	K Levels w on A Qs K - Level	Vith Course Outcom Section B Short Answers No. of. Questions		nes (COs) Section Section C Either or Choice	Section Section D Open Choice			
CI	CO1	Upto K3	2	K1&K2	1	K1	2(K2&(K2)	1(K3)			
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&(K3)	1(K3)			
CI	CO3	Upto K4	2	K1&K2	1	K2	2(K3&(K3)	1(K4)			
AII	CO4	Upto K4	2	K1&K2	2	K2	2(K3&(K3)	1(K4)			
		No. of Questions to be asked	4		3		4	2			
Question Pattern CIA I & II		No. of Questions to be answered	4		3		2	1			
		Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

	Distribution of Marks with K Level 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	8	40				
	K2	2	4	10		16	32	ΨŪ				
CIA	K3			10	20	30	60	60				
I	K4											
-	Marks	4	6	20	20	50	100	100				
	K1	2	2			4	8					
CIA	K2	2	4			6	12	20				
	K3			20		20	40	40				
II	K4				20	20	40	40				
	Marks	4	6	20	20	50	100	100				

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	native Exa	amination – I	Blue Print Art	ticulation M	[apping – K]	Level wit	h Course Outc	comes (COs)
			MO	Qs	Short Answers		Section C	Section D
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Up to K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)
2	CO2	Up to K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
5	CO5	Up to K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Questi	ons to be	10		5		10	5
	Askee	d	10		5		10	5
No.	of Questi	ons to be	10		5		5	2
answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	he given K lev	el)

		Dis	stribution of	Marks with	n K Leve	1	
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	22.4
K2	5	6	20		31	25.9	55.4
K3			30	30	60	50	50
K4				20	20	16.6	16.6
Marks	10	10	50	50	120	100	100
NB: Hig levels.	her level of per	formance of th	ne students is t	o be assessed	by attemp	ting higher	level of K

Section	Section A (Multiple Choice Questions)								
Answer	· All Qu	estions	(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							
Section	B (Sho	rt Answers)							
Answer	· All Qu	estions	(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 (Eith	ner/Or Type	e)						
Answer	· All Qu	estions	(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	K3							
19) b	CO4	K3							
20) a	CO5	K4							
20) b	CO5	K4							
NB: Hi	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K						
levels									
Section	D (Ope	en Choice)							
Answer	Any T	hree questio	ons (3x10=30 marks)						
Q. No		K Level	Questions						
21		K3 K2							
22	<u>CO2</u>	K3 174							
23	<u>CO3</u>	K4							
24	<u>CO4</u>	K4							
25	005	K3							

Summative Examinations - Question Paper – Format



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

Course Name	OPTIMIZATION TECHNIQUES								
Course Code	21UMTE53	_			L	Р	С		
Category	Elective				5	-	5		
NATURE OF COURSE:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPREN	JRSH	IIP			
COURSE OBJ	ECTIVES:		·	·					
• To solve ga	ames								
• To give the	policy of equipment re	place	ement						
• To learn va	rious queue models								
• To determi	ne EOQ of inventory pr	roble	ms						
• To calculate critical path and PERT									
Unit: I	*					1	5		
Markov Process	s- Introduction- State Tr	ransi	tion Matrix – Transition	n Diagram – Constru	ction	of a	State		
– Transition Ma	atrix- n step Transition l	Proba	abilities	0					
Unit: II	-					1	5		
Decision Analy	sis – Introduction – Dec	cisio	n making problems – D	ecision making proc	ess- I	Decis	ion		
making environment- Decision under uncertainty- Decisions under risk.									
Unit: III						1	5		
The inventory decisions - costs associated with inventories - factors affecting inventory control -									
economic order quantity (EOQ) - deterministic inventory problems with no shortages - deterministic									
inventory problem with shortages.									
Unit: IV						1	5		
Queueing system	m – elements of queuein	ng sy	stem – operating chara	cteristics of queuein	g syst	em –	-		
probability dist	ribution in queueing sys	stems	s – classification of que	ueing models – defin	nition	of			
transient and ste	eady states – Poisson qu	ieuei	ng system.						
Unit: V						1	5		
Network and ba	sic components - logic	al se	quencing – rules of net	work construction –	critica	al pat	h		
analysis – proba	ability consideration in	PER	Г.						
				Total Lecture	Hou	s 7	5		
Books for Stud	ly:								
Mohan, M., Sw	arup, K., and Gupta, P.	K. (2	003). Operations Rese	earch, New Delhi: S	ultan	Char	nd &		
Sons. Print.									
Unit I: Chapter:	15 (15.1 – 15.6)								
Unit II: Chapter	16 (16.1 – 16.6)								
Unit III: Chapt	er19(19.1-19.7),								
Unit IV: Chapte	20(20.1 - 20.8).								
Unit V: Chapter	r 21(21.1-21.6).								
BOOKS for Refe	erences:	L 1	a in On ang ti D	wah Nave Dalla's C	140.5		1		
1. Gupta, P.K.,	wionan, Wi. (2003). Pro	onen	is in Operations Resea	arch, new Deini: Su	man C	_nano	1		
2 Homdy A T	(1087) Anorations D	0000-	ch Now Vork Maam	llan Dublishing Com	nont	Drin	+		
2. Hamuy, A.I.	(1707), Operations K	cseal	UI, INTW I UIK. IVIACIIII	nan ruonsinng Coll	ipally.	Г 110	ıı		

3 P R	ma Murthy Operations Research New Age International Limited Publishers 200)7					
Web D	and Martiny, Operations Research, 1000 Fige International Eninted, 1 abisiters,200						
wed R	cesources						
1. <u>http</u>	s://youtu.be/2nYCpIoJi9E						
2. http	s://www.bbau.ac.in/dept/UIET/EME-601%20Operation%20Research.pdf						
3. <u>http</u>	3. https://easyengineering.net/operations-research-p-ramamurthy/						
COUI	COURSE OUTCOME K Level						
On th	e successful completion of the course, the students will be able to						
CO1:	identify the optimal strategies for the players in a two person zero sum game	K2					
CO2:	justify the replacement of an equipment that deteriorates gradually	K3					
CO3:	compare the various queueing situations	K4					
CO4:	solve the inventory problems with and without the shortages	K3					
CO5:	determine the minimum time for completion of projects	K3					

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Two-person zero sum games – basic terms – maximin-minimax principle – games without saddle point – mixed strategies – graphic solution of 2 x n and m x 2 games – dominance property – general solution of m x n rectangular games.	15	Chalk & Talk
II	Replacement of equipment / asset that deteriorates gradually – replacement policy when value of money does not change with time – replacement policy when value of money changes with time.	15	Chalk & Talk
ш	Queueing system – elements of queueing system – operating characteristics of queueing system – probability distribution in queueing systems – classification of queueing models – definition of transient and steady states – Poisson queueing system – Models: (M/M/1): (infinity/FIFO) – (M/M/1):(N/FIFO) – (M/M/C): (infinity/FIFO).	15	Chalk & Talk
IV	The inventory decisions – costs associated with inventories – factors affecting inventory control – economic order quantity (EOQ) – deterministic inventory problems with no shortages – deterministic inventory problem with shortages	15	Chalk & Talk
V	Network and basic components – logical sequencing – rules of network construction – critical path analysis – probability consideration in PERT. Experiential Learning: Problems involving PERT/CPM	15	Chalk & Talk

Course Designed by: Dr. M. Saravanan & Mrs. S. Ragavi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print										
Articulation Mapping – K Levels with Course Outcomes (COs)											
			Section A		Section B		Section	Section			
Inte	Cos		MC	Qs	Short Ans	wers	Section C	Section D			
rnal		K Level	No. of	K - No. of. Level Questions	No. of	K -	Either or	Onen			
			Ouestions		Lev	Choice	Choice				
			Questions		Questions	el					
CI	CO1	Up to K2	2	K1&K2	1	K1	2(K2&(K2)	1(K2)			
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3&(K3)	1(K3)			
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3&(K3)	1(K4)			
AII	CO4	Up to K3	2	K1&K2	2	K2	2(K3&(K3)	1(K3)			
		No. of									
		Questions to be	4		3		4	2			
		asked									
		No. of									
Que	stion	Questions to be	4		3		2	1			
Pat	tern	answered									
CIA	I & II	Marks for each	1		2		5	10			
		question	1				5	10			
		Total Marks									
		for each	4		6		10	10			
		section									

		Dist	ribution of	Marks wit	h K Level	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	8	60
	K2	2	4	10	10	26	52	00
СІА	K3			10	10	20	40	40
I	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	20
	K2	2	4			6	12	20
CIA	K3			20	10	30	60	60
II	K4				10	10	20	20
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	native Exa	amination – I	Blue Print Art	ticulation M	apping – K	Level wit	h Course Outc	comes (COs)
			МО	MOQs		Short Answers		Section D
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	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 K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Questi	ons to be	10		5		10	5
	Aske	d	10		5		10	5
No.	of Questi	ons to be	10		5		5	2
answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)

	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	117				
K2	5	6	20	10	41	34.2	41./				
K3			30	30	60	50	50				
K4				10	10	8.3	8.3				
Marks	10	10	50	50	120	100	100				
NB: Hig	her level of per	formance of th	ne students is t	o be assessed	by attemp	ting higher	level of K				
levels.											

Section	A (Mul	tiple Choic	e Questions)
Answer	· All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	· All Qu	estions	(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 (Eith	er/Or Type	2)
Answer	· All Qu	estions	(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	K3	
19) b	CO4	K3	
20) a	CO5	K2	
20) b	CO5	K2	
NB: Hi	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels	D (0		
Section	D (Ope	en Choice)	
Answer	Any T	hree questio	Ons (3x10=30 marks)
Q. No		K Level	Questions
21		K2 K2	
22	<u>CO2</u>	K3 17.4	
23	<u>CO3</u>	K4	
24	<u>CO4</u>	K3	
25	005	K3	

Summative Examinations - Question Paper – Format



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

Course Name	NUMERICAL METH	HOD	S						
Course Code	21UMTE54				L	Р	С		
Category	Elective				5	-	5		
NATURE OF COURSE:	EMPLOYABILITY		SKILL ORIENTED	ENTREPR	ENUR	SHIP			
COURSE OBJ	ECTIVES:		·						
• To develop the skills in solving algebraic, transcendental, difference equations.									
• To solve di	• To solve differential equations numerically.								
• To solve in	tegral equations numerica	ally.							
• To lay four	dation of computational	math	ematics for post gradua	te courses.					
• To learn the	eory and applications of r	nume	erical methods in a large	e number.					
Unit: I	15								
Numerical solu	tions of Algebraic and '	Trans	scendental equations -	Iteration metho	od – No	ewton			
method of false	positions - Solutions of	f Sim	ultaneous linear equati	ons- Gauss metl	nod - C	auss'			
Jordan method -	- Iteration method –Gaus	ss Jac	obi method.						
Unit: II						15			
Finite differences - Forward difference and backward differences - Finite differences - operators -									
relations – prop	erties – Finding missing t	terms	s – Inverse operators.						
Unit: III						15			
Interpolation an	d Newton's forward and	back	cward formulae – divid	ed differences a	nd prop	erties			
– Newton's div	ided differences formula	a – C	Gauss formula Sterling	formula - Bess	el form	ula –			
Laplace Everest	t's formula - Lagrange fo	ormu	la – Simple problems	 inverse interp 	olation	using			
Lagrange formu	lation.								
Unit: IV						15			
Numerical diffe	erentiation – Finding the	first	and second derivative	s – Maximum a	nd Min	imum			
values of a func	tion for a given data.								
Unit: V						15			
Numerical Integ	gration - Newton's Cote'	's for	mula – Trapezoidal Ru	le – Simpson's d	one thir	d rule			
– Simpson's thr	ee eighth rule – Weddle's	s rule	2.						
				Total Lectur	re Hou	rs 75			
Books for Stud	y:					1			
Dr. S. Arumuga	Dr. S. Arumugam, Thangapandi Issac and A.Somasundaram, Numerical Analysis, New Gamma								
Publications, Pa	Publications, Palayamkottai, Edition2006.								
U	nit I - Chapter 1: Section	n 1.0	, 1.2, 1.5 &						

Chapter 2: Section 2.0, 2.1, 2.4, 2.6 Unit II - Chapter 3: Section 3.1, 3.2 Unit III - Chapter 4: Section 4.0 to 4.6 Unit IV - Chapter 5: Section 5.1, 5.2 & 5.4 Unit V - Chapter 6: Section 6.0 to 6.6

Books for References:

- 1. Prasun KrNayak, **Numerical Analysis** (Theory and Application) ,Second Edition, Asian Books Private Limited, New Delhi,2012.
- 2. S.S Sastry, **Introductory Methods of Numerical Analysis**, ThirdEdition, Prentice Hall of India Pvt Ltd, New Delhi,1998.
- Kandasamy, P. K. Thilagavathy, and K. Gunavathy "Numerical Methods", S.Chand& Company Ltd., Edn. 2006.

Web Resources

- 1. https://nptel.ac.in/courses/122/102/122102009/
- 2. <u>https://nptel.ac.in/courses/111/107/111107105/</u>
- 3. https://www.mathcity.org/_media/msc/notes/numerical-analysis-m-usman-

<u>hamid.pdf</u>

COUI	RSE OUTCOME	K Level					
On th	On the successful completion of the course, the students will be able to						
CO1:	Solve transcendental equation by using various methods.	K3					
CO2:	Apply difference operators for equal and unequal intervals	K3					
CO3:	Construct the linear interpolation equations.	K4					
CO4:	Apply numerical differentiation for finding maximum and minimum of a function	K3					
CO5:	Analyse various rules in numerical integration	K4					

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Numerical solutions of Algebraic and Transcendental equations – Iteration method – Newton method of false positions – Solutions of Simultaneous linear equations- Gauss method – Gauss' Jordan method – Iteration method –Gauss Jacobi method.	15	Chalk & Talk
II	Finite differences – Forward difference and backward differences – Finite differences - operators – relations – properties – Finding missing terms – Inverse operators.	15	Chalk & Talk
Ш	Interpolation and Newton's forward and backward formulae – divided differences and properties – Newton's divided differences formula – Gauss formula Sterling formula - Bessel formula – Laplace Everest's formula - Lagrange formula – Simple problems – inverse interpolation using Lagrange formulation.	15	Chalk & Talk
IV	Numerical differentiation – Finding the first and second derivatives – Maximum and Minimum values of a function for a given data.	15	Chalk & Talk
V	Numerical Iteration – Newton's Cote's formula – Trapezoidal Rule – Simpson's one third rule – Simpson's three eighth rule – Weddle's rule .	15	Chalk & Talk

Course Designed by: Dr. M.Saravanan & Mrs. S. Ragavi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print									
	Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section A		Section B		Section	Section		
Inte rnal	Cos	K Level	MC	Qs	Short Answers		Section C	Section D		
	005	IX Level	No. of.	К-	No. of. K -	К -	Either or	Open		
			Questions	Level	Questions	Level	Choice	Choice		
CI	CO1	Up to K3	2	K1&K2	1	K1	2(K3&K3)	1 (K3)		
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K2&K2)	1(K3)		
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
AII	CO4	Up to K3	2	K1&K2	2	K2	2(K2&K2)	1 (K3)		
		No. of Questions to be asked	4		3		4	2		
Question Pattern		No. of Questions to be answered	4		3		2	1		
	1 & 11	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

	Distribution of Marks with K Level 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	8	40			
	K2	2	4	10		16	32	40			
CIA	K3			10	20	30	60	60			
I	K4										
-	Marks	4	6	20	20	50	100	100			
	K1	2	2			4	8	40			
CIA II	K2	2	4	10		16	32	40			
	K3			10	10	20	40	40			
	K4				10	10	20	20			
	Marks	4	6	20	20	50	100	100			

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MOQs		Short Answers		Section C	Section D
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Up to K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)
2	CO2	Up to K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
4	CO4	Up to K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
No.	of Questi	ons to be	10	10			10	5
	Aske	d	10		5		10	5
No.	of Questi	ons to be	10		5		5	2
	answer	red	10		5		5	3
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)

	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	22.4				
K2	5	6	20		31	25.9	55.4				
K3			30	30	60	50	50				
K4				20	20	16.6	16.6				
Marks	10	10	50	50	120	100	100				
NB: Hig levels.	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.										

Section	A (Mul	tiple Choic	e Questions)
Answer	· All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	All Qu	estions	(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 (Eith	er/Or Type	
Answer	· All Qu	estions	(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	K2	
19) b	CO4	K2	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels			
Section	D (Ope	en Choice)	
Answer	Any T	hree questio	ons (3x10=30 marks)
Q. No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
25	CO5	K4	

Summative Examinations - Question Paper – Format



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

Course Name	MATHEMATICAL	MATHEMATICAL MODELING							
Course Code	21UMTE55				L	Р	С		
Category	Elective				5	-	5		
NATURE OF COURSE:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPREN	URS	HIP			
COURSE OBJ	ECTIVES:								
• .To understand basic definitions from mathematical modeling through ordinary differential equations of first order									
• To understa	nd simple models throu	igh o	difference equations						
• To know sir	nple models through di	ffer	ence equations						
• To apply pro	oblems in Economics,	Fina	ance, Genetics, etc.,						
• To learn mo	dels in Graphs								
TT •4 T						1	_		
Unit: I First Order Diffe	rential Equations in M	otho	matical Modeling: Thro	ugh Ordinary Diffe	rontia		5		
of First Order- I	inear Growth and Dec	aute	Indical Modeling. The Indels Non-Linear Gro	ugh Ordinary Diffe	dels	I Lqu	ations		
Compartment M	odels	ay 10	iodels – Noli-Linear Oro	will and Decay Mo	1015-				
	Unit. II								
Geo metrical Problems: Mathematical Modeling through Systems of Ordinary Differential Equations of									
First Order: D	ynamic problems – C	Geor	netrical problems- Pop	oulation Dynamics	– E	piden	nics –		
Compartment M	odels.								
Unit: III	· · · · · · · · · · · · · · · · · · ·	.1				1	5		
Applications: M	athematical Modeling	thre	bugh Systems of Ordin	ary Differential Ec	juatio	ns of			
First Order in Ec	conomics – Medicine, A	Arm	s Race, Battles and Inter	national Trade– Dy	namic	cs.	-		
Unit: IV Mothematical M	adaling through Diffor	ono	Equations: Simple Mo	dala Pasia Theor	u of I	1 incor	5		
Difference Equ	ations with Constan	t C	oefficients Economic	a = basic finance		lation			
Dynamics and G	enetics	ιc	bernelents- Leononne	s and i manee-	ropu	ation	L		
	eneres.								
Unit: V	· 1 1'						5		
Mathematical M	odeling: Mathematical	Mo	deling through Graphs:	Solutions that can t	be mo	deled			
through Graphs	-Mathematical Modeli	ng 11	n Terms of Directed Gra	pns, Signed Graphs	, wei	gnted			
Digraphs and Ur	i oriented Graphs.			Total Lasture	Harr		5		
Books for Study	57•			Total Lecture	Hou		5		
	,. 	99 -		J D11 / 1000					
Kapur, J.N., "M	athematical Modelling	g´, \	whey Eastern Limited, I	new Deini, 1988.					
Unit 1: Chap 2, S	Sec2.1–2.4								

Unit 2: Chap 2, Sec2.5–2.6 Chap3, Sec3.1 – 3.3

Unit 3: Chap 3, Sec3.4–3.6

Unit 4: Chap 5, Sec5.1–5.5

Unit 5: Chap 7, Sec7.1–7.5

Books for References:

1. Kapur J.N., Mathematical Models in biology and Medicine—, EWP, New Delhi, 1985.

2. Michael Alder, An Introduction to Mathematical Modeling, Heaven for Books.com, 2001

3. Frank R. Giordano, Maurice D. Weir and William P. Fox, A First Course in Mathematical Modeling, Thomson Learning, London and New York, 2003.

Web Resources

1. https://www.pdfdrive.com/mathematical-modeling-handbook-e6506152.html 2. https://repository.ung.ac.id/get/kms/16993/referensi-mata-kuliah-an-introduction-tomathematical-modelling.pdf 3. https://www.math.colostate.edu/~gerhard/MATH331/331book.pdf **COURSE OUTCOME K** Level On the successful completion of the course, the students will be able to **CO1:** Explain various Growth & Decay and Compartment models **K2 CO2:** Solve geometric problems **K3** Apply mathematical modeling through ordinary differential equations of first order **CO3: K3** to applications **CO4:** Choose models for various fields like economics, Genetics, etc., **K3** CO5: Analyse models through Graphs K4

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	First Order Differential Equations in Mathematical Modeling: Through Ordinary Differential Equations of First Order- Linear Growth and Decay Models –Non-Linear Growth and Decay Models–Compartment Models	15	Chalk & Talk
II	Geometrical Problems: Mathematical Modeling through Systems of Ordinary Differential Equations of First Order: Dynamic problems – Geometrical problems- Population Dynamics – Epidemics – Compartment Models	15	Chalk & Talk
ш	Mathematical Modeling through Systems of Ordinary Differential Equations of First Order in Economics – Medicine, Arms Race, Battles and International Trade– Dynamics.	15	Chalk & Talk
IV	Mathematical Modeling through Difference Equations: Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients– Economics and Finance– Population Dynamics and Genetics.	15	Chalk & Talk
V	Mathematical Modeling: Mathematical Modeling through Graphs: Solutions that can be modeled through Graphs –Mathematical Modeling in Terms of Directed Graphs, Signed Graphs, Weighted Digraphs and Unoriented Graphs	15	Chalk & Talk

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

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print								
Articulation Mapping – K Levels with Course Outcomes (COs)								
Inte rnal	Cos	K Level	Section A		Section B		Section	Section
			MCQs		Short Answers		Section C	Section D
			No. of.	К-	No. of.	K -	Either or	Open
			Questions	Level	Questions	Level	Choice	Choice
CI	CO1	Up to K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)
CI	CO3	Up to K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
AII	CO4	Up to K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)
Question Pattern		No. of	4					
		Questions to be			3		4	2
		asked						
		No. of						
		Questions to be	4		3		2	1
		answered						
UIA	IXII	Marks for each	1		2		5	10
		question			4		3	10
		Total Marks for	1		6		10	10
		each section	-		U		10	10

Distribution of Marks with K Level 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	8	60
СІА	K2	2	4	10	10	26	52	UU
	K3			10	10	20	40	40
I	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	40
	K2	2	4	10		16	32	40
CIA	K3			10	20	30	60	60
II	K4							
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.
Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MOQs		Short Answers		Section C	Section D
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Up to K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
2	CO2	Up to K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
3	CO3	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
4	CO4	Up to K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
No.	of Questi	ons to be	10		5		10	Section D (Open Choice) 1(K2) 1(K3) 1(K3) 1(K3) 1(K4) 5 3 10 30 el)
	Aske	d	10		5		10	
No.	of Questi	ons to be	10		5		5	2
answered		10		5		5	3	
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figu	res in parent	hesis denotes.	questions s	hould be ask	ed with t	he given K lev	el)

	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	11 7	
K2	5	6	20	10	41	34.2	41./	
K3			30	30	60	50	50	
K4				10	10	8.3	8.3	
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.	_				_			

Section	Section A (Multiple Choice Questions)						
Answer	· All Qu	estions	(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					
Section	B (Sho	rt Answers)					
Answer	· All Qu	estions	(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 (Eith	er/Or Type	2)				
Answer	· All Qu	estions	(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	K2					
19) b	CO4	K2					
20) a	CO5	K3					
20) b	CO5	K3					
NB: Hi	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K				
levels							
Section	D (Ope	en Choice)					
Answer	Any T	hree questio	ons (3x10=30 marks)				
Q. No	<u>CO</u>	K Level	Questions				
21		K2					
22	<u>CO2</u>	K3					
23	<u>CO3</u>	K3					
24	<u>CO4</u>	K3					
25	CO5	K4					

Summative Examinations - Question Paper – Format



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

Course Name	COMBINATORICS							
Course Code	21UMTE56					L	Р	С
Category	Elective					5	-	5
NATURE OF COURSE:	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPREN	URS	HIP	
COURSE OBJECTIVES:								
• To demonstrate effectively the addition and multiplication principles								
• To us	• To use generating functions							
• To me	odel recurrence relations	s usi	ng different techniques	for re	al time counting	g proł	olems	
• To kn	now various special coun	ting	numbers					
• To de	sign a new counting prin	ncip	le called inclusion and e	exclus	sion principle			
Unit: I	0 01				1 1		15	5
Two basic pr	rinciples – Simple arr	ange	ement and selections	with	or without re	epetiti	on –	
Distributions -	- Binomial coefficients.							
Unit: II		0.01					15	5
Generating fur	ictions - Calculating coe		ents of generating funct	tions -	– Exponential g	enera	ting	
Tunction – Sun	function – Summation method – Partitions.							
Unit: III							15	5
Recurrence relations – Divide and conquer relations – Dearrrangement – Solution of linear								
recurrence relation.								
Unit: IV							15	5
Fibonacci num	ber - Stirling number of	firs	t and second kind – Cat	alan 1	number– Ménag	ge nun	nber.	
Unit: V							15	5
Inclusion and I	Exclusion principle – Pig	geor	hole principle – Ramse	ey the	orem			
Decles for Str	J				Total Lecture	Hou	rs 75	,
1 Tucker A W	uy: V Annlied Combinato	rics	Wiley 2011					
2. Schaum's or	utline series. Combinato	oric	, whey, 2011. s. Tata McGraw-Hill Pu	blish	ing Company L	td 200	05. Ur	nit
Unit1: Chapter	: 5		-,		8F5 -			
Unit 2: Chapte	r 6							
Unit 3: Chapte	r 7(sec 7.1 - 7.3).							
Unit 4: Chapte	er 8(sec 8.1, 8.2 and App	pend	lix A4).					
Unit5: Chapter 1(sec 1.112, 1.114, 1.132, 1.134, 1.146, 1.147, 1.148, 1.149, 1.150),								
Chapter 2 (s	ec 2.73), Chapter 3 (sec	3.64	4)					
Rooks for Deferences								
1. Cohen D., C	Combinatorics, Wiley, 1	978						
2. Hall M., Combinatorial Mathematics, McGraw Hill, 1968.								
			- 20.04.2022			n	10/	
Academi	c Council Meeting Hel	a Oi	n 20.04.2023			Pa	ge 13:	•

3. Liu C.L., Introduction to Combinatorial Mathematics, McGraw-Hill, Newyork, 1994.

Web F	Resources						
1. http	s://users.math.msu.edu/users/bsagan/Books/Aoc/final.pdf						
2. <u>http</u>	s://www.whitman.edu/mathematics/cgt_online/cgt.pdf						
3. <u>http</u>	s://newsite.kashanu.ac.ir/Files/IntroductoryCombinatorics.pdf						
COU	COURSE OUTCOME K Level						
On th	On the successful completion of the course, the students will be able to						
CO1:	Use addition and multiplication principles for counting	K2					
CO2:	Solve problems by partition	K3					
CO3:	Find solutions of real time counting problems	K3					
CO4.	outline special counting numbers such as Fibonacci number, Stirling numbers,	K4					
C04:	catalan number and Menage number						
CO5:	Solve problems by Inclusion and Exclusion principle	K 3					

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
т	Two basic principles - Simple arrangement and selections with or without	15	Chalk &
1	repetition – Distributions – Binomial coefficients	15	Talk
т	Generating functions - Calculating coefficients of generating functions -	15	Chalk &
11	Exponential generating function – Summation method – Partitions	15	Talk
тт	Recurrence relations - Divide and conquer relations - Dearrrangement -	15	Chalk &
111	Solution of linear recurrence relation	12	Talk
137	Fibonacci number - Stirling number of first and second kind - Catalan	15	Chalk &
11	number– Ménage number.	13	Talk
X 7	Inclusion and Exclusion principle — Pigeon hole principle — Pemsey theorem	15	Chalk &
V	nerusion and Exclusion principle – rigeon note principle – Kansey meorem	15	Talk

Course Designed by: Dr.A.Hamari Choudhi & Mrs.R.Sumathi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print							
		Articulatio	on Mapping –	K Levels w	ith Course O	utcomes (COs)	
			Section A		Section B		Section	Section
Inte	Cos	K Level	MC	Qs	Short An	swers	Section C	Section D
rnal	CUS	K Level	No. of.	К-	No. of.	K -	Either or	Open
			Questions	Level	Questions	Level	Choice	Choice
CI	CO1	Up to K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)
CI	CO3	Up to K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)
		No. of						
		Questions to be	4		3		4	2
		asked						
0.0	ation	No. of						
Que	stion	Questions to be	4		3		2	1
		answered						
		Marks for each	1		2		5	10
		question	1		4		3	10
		Total Marks for	1		6		10	10
		each section	-		U		10	10

	Distribution of Marks with K Level 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	8	60	
	K2	2	4	10	10	26	52	00	
CIA	K3			10	10	20	40	40	
I	K4								
-	Marks	4	6	20	20	50	100	100	
	K1	2	2			4	8	40	
	K2	2	4	10		16	32	40	
CIA	K3			10	10	20	40	40	
II	K4				10	10	20	20	
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MO	Qs	Short An	swers	Section C	Section D
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Up to K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
2	CO2	Up to K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
3	CO3	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
5	CO5	Up to K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Questi	ons to be	10		5		10	Section D (Open Choice) 1(K2) 1(K3) 3 30 evel)
	Aske	d	10		5		10	
No.	of Questi	ons to be	10		5		5	2
answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)

	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	417		
K2	5	6	20	10	41	34.2	41./		
K3			30	30	60	50	50		
K4				10	10	8.3	8.3		
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.									

Section	Section A (Multiple Choice Questions)						
Answer	· All Qu	estions	(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					
Section	B (Sho	rt Answers)					
Answer	· All Qu	estions	(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 (Eith	ner/Or Type	e)				
Answer	All Qu	estions	(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	<u>K3</u>					
18) b	CO3	<u>K3</u>					
19) a	<u>CO4</u>	<u>K3</u>					
19) b	<u>CO4</u>	K3					
20) a	<u>CO5</u>	<u>K2</u>					
20) b	<u>CO5</u>	K2					
NB: Hi	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K				
levels	D (0						
Section	D (Ope	en Choice)					
Answer	Any T	nree questio	Ons (3x10=30 marks)				
Q. No		K Level	Questions				
21		K2 K2					
22	<u>CO2</u>	KJ K2					
23	<u>CO3</u>	K3 V4					
24	<u>CO4</u>	K4 K2					
23	05	K3					

Summative Examinations - Question Paper – Format



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

Course Name	R LANGUAG	R LANGUAGE - LAB								
Course C	de 21UMTSP2					L	Р	С		
Category	Skill					-	2	2		
NATURE COURSE:	OF EMPLOYBILIT	TY 🗸	SKILL ORIENTED	✓	ENTREPREN	URSI	HIP			
COURSE	OBJECTIVES:									
 To Install and use R for simple programming To Exercise the fundamentals of statistical analysis in R environment To analyse data for the purpose of exploration using Descriptive and Inferential Statistics To visualize data in R To develop program in R 										
List of Pro 1. V 2. V 3. V 4. V 5. V 6. V 7. V 8. V 9. V 10. 11. 12. Books for	 List of Programs: Write a program to find list of even numbers from 1 to n using R-Loops. Write a program to find mean and standard deviation. Write a program to find factorial of a given number. Write a program to find the sum of the first 100 natural numbers. Write a program to add and multiply two matrices. Write a program to create a function to print squares of numbers in sequence. Write a program to implement different String Manipulation functions in R. Write a program to implement different data structures in R (Vectors, Lists, Data Frames) Write a program to read a csv file and analyze the data in the file in R. Create a data set and do statistical analysis on the data using R. 									
1. Norman	Matloff, The Art of l	R Program	ming, UC Davis 2009							
Books for	References:	5011.								
Paul Murr	ell, R Graphics, Chap	man & Ha	ll/CRC, 2006							
Web Reso	urces	() (10						
$1. \frac{\text{ht}}{2}$	<u>ps://cran.r-project.o</u> ps://onlinecourses.n	<u>rg/doc/ma</u> ntel ac in/	<u>inuals/r-release/K-inti</u> 10c19 ma33/preview	<u>ro.par</u>						
$\frac{2}{3}$ ht	ps://onlinecourses.n	ptel.ac.in/	noc21 ma75/preview							
COURS	OUTCOME						K	Level		
On the su	ccessful completion	of the cou	rse, the students will l	be abl	e to			20101		
CO1:	CO1: Use R software for simple programming K3							K3		
CO2: Manipulate data in efficient way using appropriate techniques								K3		
CO3: Develop programs using add-on packages								K3		
CO4:	nalyze data sets usin	g R – prog	ramming capabilities					K4		
CO5:	se R Graphics to visi	ualize the r	esult obtained from sta	tistical	operations			K3		

CO & PO Mapping:

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

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

Course Designed by: Mrs. R. Sumathi & Dr. R. Bhavani







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

	F								
Course Name	COMPLEX ANALYS	SIS							
Course Code	21UMTC61					L	Р	С	
Category	Core					6	-	4	
NATURE OF COURSE:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPREN	IURS	HIP		
COURSE OB	JECTIVES:								
•	Γο illustrate the Cauchy-	Riem	ann Equations and vari	ous fi	unctions				
• [Γo relate different types	of trar	nsformations						
• To apply Cauchy's Integral formula in Maximum modulus theorem.									
• To introduce the Taylor's, Laurent's series and singularities									
• To evaluate the definite integrals using residue theorem									
Unit: I		U					1	8	
Continuous functions – Differentiability – Cauchy-Riemann Fountions – Alternative forms of									
Couchy Diamonn aquations – Differentiability – Cauchy-Klemann Equations – Alternative forms of									
mathod	ini equations – Analyt	ic iu	inctions – marmonic	luncti		nomp	3011		
Unit: II Elementary tra	nsformations: translatior	n. rota	tions, magnification, in	versi	on – Bilinear T	ransf	1 orma	8 tion –	
Cross ratio – F	ixed points –Some Spec	ial Bil	inear Transformation.			Tunion	or ma		
Unit: III							1	8	
Cauchy's Theo	orem– Cauchy's Integral	formı	ıla -Maximum modulu	s theo	orem –Higher d	erivat	ives.		
Unit: IV	···						1	8	
Taylor's series	– Maclaurin's series – I	auren	ıt's series – Zeros – Sir	ngular	rities – types of				
singularities –	Meromorphic function.								
Unit: V							1	8	
Residues – Cau	uchy's residue theorem –	Eval	uation of definite integ	rals o	f standard type	s – Jo	rdan	S	
lemma (withou	it proof).								
					Total Lecture	Hou	rs 9	0	
Books for Stu	dy:								
S. Arumugam,	A. Thangapandi Isaac a	nd A.	Somasundaram, Comp	olex A	Analysis, Scited	h			
publications, 2	019.								

Unit – I: Chapter 2: Section 2.4 to section 2.8

Unit - II: Chapter 3: Section 3.0 to section 3.5

Unit – III: Chapter 6: Section 6.2 to 6.4

Unit IV: Chapter 7

Unit – V: Chapter 8

Books for References:

- 1. S.Ponnusamy, **Foundations of Complex Analysis**, Narosa Publishing House, New Delhi. 2000.
- 2. L.V Ahlfors, Complex Analysis, McGraw Hill Co., New York, 1988.
- 3. Churchill.R.V.and J.W. Brown "**Complex variables and Applications**" Fourth Edition McGraw Hill International Editions.

Web Resources

- 1. <u>https://nptel.ac.in/courses/111/105/111105035/</u>
- 2. https://nptel.ac.in/courses/111/103/111103070/
- 3. <u>https://www.iitg.ac.in/physics/fac/charu/courses/ph503/book.pdf</u>

COUI	RSE OUTCOME	K Level
On the	successful completion of the course, the students will be able to	
CO1:	Discuss the basic concepts of analytic function with Cauchy Riemann Equations and their properties	K2
CO2:	Apply the bilinear Transformation as composition of elementary transformation.	K3
CO3:	Use Cauchy's Integral formula and its consequences in theoretical proofs	K3
CO4:	Explain the basic properties of singularities poles, convergence of power series.	K4
CO5:	Evaluate definite integrals of standard types in complex integration	K4

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Continuous functions – Differentiability – Cauchy-Riemann Equations – Alternative forms of Cauchy-Riemann equations – Analytic functions – Harmonic functions –Milne-Thompson method.	18	Chalk & Talk
II	Elementary transformations: translation, rotations, magnification, inversion – Bilinear Transformation – cross ratio – Fixed points. –Some Special Bilinear Transformation.	18	Chalk & Talk
III	Cauchy's Integral formula – Maximum modulus theorem –Higher derivatives.	18	Chalk & Talk
IV	Taylor's series – Maclaurin's series – Laurent's series – Zeros – Singularities – types of singularities – meromorphic function.	18	Chalk & Talk
V	Residues – Cauchy's residue theorem – Evaluation of definite integrals of standard types – Jordan's lemma (without proof).	18	Chalk & Talk

Course Designed by: Dr. R. Bhavani & Dr. A. Arivu Chelvam

		Lear	ning Outcom	e Based Edu	ication & Ass	essment (LOBE)	
			Formative	Examination	on - Blue Prin	t		
		Articulatio	on Mapping –	K Levels w	ith Course O	utcomes (COs)	
			Sectio	Section A		Section B		Section
Inte	Cos	K Level	MC	Qs	Short An	swers	Section C	Section D
rnal	0.05	IX LEVEI	No. of.	K –	No. of.	K -	Either or	Open
			Questions	Level	Questions	Level	Choice	Choice
CI	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)
CI	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
AII	CO4	Upto K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)
		No. of						
		Questions to be	4		3		4	2
		asked						
Oue	stion	No. of						
Pat	tern	Questions to be	4		3		2	1
	I & II	answered						
	1 0 11	Marks for each	1		2		5	10
		question	*		-			Ĩ
		Total Marks for	4		6		10	10
		each section	•		Ŭ		ĨV	10

		Dist	tribution of	Marks wit	h K Level	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	8	60
	K2	2	4	10	10	26	52	00
CIA	K3			10	10	20	40	40
I	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	40
	K2	2	4	10		16	32	40
CIA	K3			10	10	20	40	40
II	K4				10	10	20	20
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			MO	Qs	Short An	Short Answers		Section D		
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open		
			Questions	Level	Question	Level	Choice)	Choice)		
1	CO1	Up to K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)		
2	CO2	Up to K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)		
3	CO3	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)		
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	1(K4)		
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
No.	of Questi	ons to be	10		5		10	5		
	Askee	d	10		5		10	5		
No.	of Questi	ons to be	10		5		5	2		
	answer	red	10		5		5	3		
Marks for each question		1		2		5	10			
Total Marks for each section		10		10		25	30			
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	he given K lev	el)		

		D	istribution 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	22.2			
K2	5	6	10	10	31	25.8	55.5			
K3			30	20	50	41.7	41.7			
K4			10	20	30	25	25			
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	els.				-					

Section	A (Mul	tiple Choic	e Questions)
Answer	· All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	· All Qu	estions	(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 (Eith	er/Or Type	
Answer	· All Qu	estions	(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	K3	
20) b	CO5	K3	
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels			
Section	D (Ope	en Choice)	
Answer	Any T	hree questio	ons (3x10=30 marks)
Q. No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



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

Course Name	GRAPH THEORY AND ITS APPLICATIONS							
Course Code	21UMTC62					L	Р	С
Category	Core					6	-	4
NATURE OF COURSE:	EMPLOYABILITY	SKI	LL ORIENTED		ENTREPRE	NURS	HIP	
COURSE OBJ	ECTIVES:							
 To defin To form planar g To detex To appl To find 	ne basic notions in graph nulate and prove basic th graphs. rmine whether the graph y the concepts of graph chromatic polynomial of	n theory. neorems about the theory in post the graph	out trees, matchi onian or Eulerian ractical problem	ng, con 1. s.	nectivity, col	louring	g and	
Unit: I							18	
Graphs- Degrees – Sub graphs, Isomorphism, Ramsey numbers – Independent sets and								
Coverings –Ma	trices of graphs - Opera	tion on gra	phs.					
Unit: II							18	
Walks, Trials a	nd Paths – Connectedne	ss and Con	nponents – Block	ks- Con	nectivity.			
Unit: III							18	
Eulerian graphs	– Hamiltonian graphs -	- Trees - C	haracterization of	of trees	– Centre of a	tree		
Unit: IV							18	
Matching – Ma	tching in bipartite graph	s - Planar g	graph and proper	ties – C	Characterizati	ion of l	Planar	
graphs.								
Unit: V							18	
Chromatic num	ber and Chromatic inde	x – Applica	ations – Connect	or Prob	lem – Shorte	est Patł	1	
Problem.								
				Т	otal Lecture	e Hour	s 90	
Books for Stud	ly:							
Dr. S. Ar Chennai,2015. Unit Unit Unit	rumugam and S. Ramac II - Chapter 2: Sectio II - Chapter 4 III- Chapter 5, 6 tIV- Chapter 7 &8	handran, Iı n 2.1 to 2.6	witation to Gra &2.8 to2.9	iph Tho	e ory , Scitech	Public	cation,	

UnitV - Chapter9: Section 9.1 & Chapter 11: Section 11.1 & 11.2

Books for References:

- 1. Harary, Graph Theory, Narosa Publishing House, New Delhi, 2001.
- 2. S.K.Yadav, Elements of Graph Theory, Ane Books Private Ltd, New Delhi, 2010.
- Narasingh Deo Graph theory with application to engineering and computer science, Prentice – Hall of india pvt. Ltd., NewDelhi.

Web Resources

- 1. <u>https://nptel.ac.in/courses/111/106/111106102/</u>
- 2. <u>https://www.digimat.in/nptel/courses/video/106104170/L19.html</u>
- 3. <u>https://books.google.co.in/books?id=ToHHwAEACAAJ&dq=graph+theory++notes&hl=en&</u> <u>newbks=1&newbks_redir=1&sa=X&ved=2ahUKEwj85pDa0-</u>

v7AhWPAogKHVoCCm4Q6AF6BAgDEAI

COURSE OUTCOME F							
On the	On the successful completion of the course, the students will be able to						
CO1:	Explain the basic concepts in Graph theory	K4					
CO2:	Analyse the connectedness of graphs	K4					
CO3.	Construct the logical arguments to prove results involving Eulerian graphs,	V3					
005:	Hamiltonian graphs and Trees	КЭ					
CO4:	Develop proof for theorems in Mathcing and Planar graphs	K3					
CO5:	Apply the appropriate models of graph theory in real life problems	K3					

CO & PO Mapping:

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

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

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Graphs- Degrees – Sub graphs, Isomorphism, Ramsey numbers – Independent sets and Coverings –Matrices of graphs - Operation on graphs.	18	Chalk & Talk
II	Walks, Trials and Paths – Connectedness and Components – Blocks- Connectivity.	18	Chalk & Talk
III	Eulerian graphs – Hamiltonian graphs – Trees – Characterization of trees – Centre of a tree	18	Chalk & Talk
IV	Matching – Matching in bipartite graphs - Planar graph and properties – Characterization of Planar graphs.	18	Chalk & Talk
V	Chromatic number and Chromatic index – Applications – Connector Problem – Shortest Path Problem.	18	Chalk & Talk

LESSON PLAN

Course Designed by: Dr.S.Andal & Dr.P.Chitra Devi

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print											
	Articulation Mapping – K Levels with Course Outcomes (COs)											
			Sectio	on A	Section	n B	Section	Section				
Inte	Cos	K Level	MC	Qs	Short An	swers	Section C	Section D				
rnal			No. of.	К-	No. of.	К -	Either or	Open				
			Questions	Level	Questions	Level	Choice	Choice				
CI	CO1	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)				
AI	CO2	Upto K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)				
CI	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)				
AII	CO4	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)				
		No. of Questions to be asked	4		3		4	2				
Question Pattern CIA I & I	estion tern	No. of Questions to be answered	4		3		2	1				
	1 & 11	Marks for each question	1		2		5	10				
		Total Marks for each section	4		6		10	10				

	Distribution of Marks with K Level 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	8	20			
	K2	2	4			6	12	20			
CIA	K3			20		20	40	40			
I	K4				20	20	40	40			
-	Marks	4	6	20	20	50	100	100			
	K1	2	2			4	8	40			
CIA II	K2	2	4	10		16	32	40			
	K3			10	20	30	60	60			
	K4										
	Marks	4	6	20	20	50	100	100			

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MO	Qs	Short An	swers	Section C (Either / or Choice)	Section D	
S. No	COs	K - Level	No. of Questions	K – Level	No. of Question	K – Level		(Open Choice)	
1	CO1	Upto K4	2	K1&K2	1	K1	2(K3&K3)	1(K4)	
2	CO2	Upto K4	2	K1&K2	1	K1	2(K2&K2)	1(K4)	
3	CO3	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)	
4	CO4	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)	
5	CO5	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)	
No.	of Questi Aske	ons to be d	10		5		10	5	
No. of Questions to be answered		10		5		5	3		
Marks for each question		1		2		5	10		
Total Marks for each section		10		10		25	30		
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	he given K lev	el)	

	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	22.2				
K2	5	6	20		31	25.8	55.5				
K3			30	30	60	50	50				
K4				20	20	16.7	16.7				
Marks	10	10	50	50	120	100	100				
NB: Hig levels.	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.										

Section	A (Mul	tiple Choic	e Questions)
Answer	· All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	All Qu	estions	(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 (Eith	er/Or Type	
Answer	All Qu	estions	(5 x 5 = 25 marks)
Q. No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K2	
17) b	CO2	K2	
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: Hi	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels			
Section	D (Ope	en Choice)	
Answer	Any T	hree questio	ons (3x10=30 marks)
Q. No	CO	K Level	Questions
21	CO1	K4	
22	CO2	K4	
23	CO3	K3	
24	CO4	K3	
25	CO5	K3	

Summative Examinations - Question Paper – Format



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

Course Name	PR	PROJECT AND VIVA - VOCE									
Course Code	210	21UMTPR1 L P									
Category	Pro	ject	6	-	4						
Nature of course:EMPLOYABILITYSKILL ORIENTEDENTR					RENU	JRSH	IIP				

Course Objectives:

- To identify, describe the problem and scope of project
- To collect, analyse and present data into significant form using appropriate tools
- To choose, plan and implement a proper approach in problem solving
- To work with team and ethically
- To present the findings in both oral and written form

Course Description

The Project is conducted by the following Course Pattern.

Internal

- 100
60
} 40
]

COURSE OUTCOMES								
On the successful completion of the course , the students will be able to								
CO1:	Apply the skill of presentation and communication techniques	K3						
CO2:	Motive as an individual or in a team in development of projects.	K4						
CO3:	Analyze the available resources and to select most appropriate one	K4						
CO4:	Make use of the fundamentals of Mathematics to search the related literature survey	K3						
CO5:	Explain the real life problems by using Mathematics and its Application.	K4						

Course Designed by:

Dr. A. Hamari Choudhi, Head & Associate Professor & Dr. R. Bhavani Assistant Professor

CO & PO Mappings:

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

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



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

Course	STATISTICS II								
Name	5141151105-11								
Course Code	21UMTE61 L P								
Category	Elective				5	-	5		
NATURE OF COURSE:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRE	ENUR	SHIF)		
COURSE OBJ	ECTIVES:								
 Remember and understanding of statistics and data analysis Apply various types of distribution Analyze statistical techniques to interpret the data Evaluate problems on test of significance and probability functions Create sampling development and scientific attitude through Statistics 									
Unit: I						1	5		
Theory of proba	ability – Sample space –	Prob	ability function – Condi	tional probability					
Boole's inequal	lity –Baye's theorem – P	roble	ems.						
Unit: II	1								
Random variab	les – Distribution function	on – 2	Discrete and Continuous	random variables	_				
Probability den	sity function – Mathema	tical	expectation(one dimension	onal only).					
Unit: III						1	5		
Moment genera Binomial – Pois	ting function – Cumular sson –Normal	nts —	Characteristic function-	Theoretical distrib	oution	_			
Unit: IV						1	5		
Test of signification	ance of large samples.								
Unit: V						1	5		
Test of signific:	ance of small samples –	t-test	, F-test and Chi-square to	est					
				Total Lecture	Hou	rs 7	5		
Books for Study: Dr.S.Arumugam and Isaac, Statistics , New Gamma Publications, Palayamkottai, Reprint 2012.									
 UnitI - Chapter11 UnitII -Chapter12: Section 12.1 to12.4 UnitIII -Chapter12: Section 12.5- 12.6 &Chapter13 UnitIV - Chapter14 UnitV - Chapter 15,16 									

Books for References:

- T. Sankara Narayanan and A.Mangaldoss, Statistics and its Application, Preist Publications, New Delhi, 1994.
- R.S.N.Pillai and Bagavathi, Practical Statistics, S.Chand and Company Pvt Ltd, New Delhi, 1987.

3. Bhat B.R, Srivenkataramana T and Rao Madhava K.S.(1996): Statistics: A Beginners Text, Vol. I,

New Age International (P)Ltd.

Web R	esources							
1. <u>https</u>	1. <u>https://nptel.ac.in/courses/111/102/111102012/</u>							
2. <u>https</u>	://nptel.ac.in/courses/111/104/111104027/							
3. <u>http</u>	s://www.hamilton.ie/ollie/Downloads/ProbMain.pdf							
COUI	RSE OUTCOME	K Level						
On th	e successful completion of the course, the students will be able to							
CO1:	Apply the basic concepts of probability in problem solving.	K3						
CO2:	Compute mathematical expectation for discrete and continuous random variables	K3						
CO3:	Compute the MGF of Binomial, Poisson and Normal distribution	K3						
CO4 :	Analyze test of significances of large samples.	K 4						
CO5:	Analyze test of significances of small samples and chi-square distribution.	K4						

CO & PO Mapping:

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

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

LESSON	PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Theory of probability – Sample space – Probability function – Conditional probability – Boole's inequality –Baye's theorem – Problem	15	Chalk & Talk
II	Random variables – Distribution function – Discrete and Continuous random variables – Probability density function – Mathematical expectation(one dimensional only).	15	Chalk & Talk
III	Moment generating function – Cumulants – Characteristic function- Theoretical distribution – Binomial – Poisson –Normal.	15	Chalk & Talk
IV	Test of significance of large samples.	15	Chalk & Talk
V	Test of significance of small samples – t-test, F-test and Chi-square test.	15	Chalk & Talk

Course Designed by: Dr. P. Chitra devi & Dr. A. Arivu Chelvam

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print										
	Articulation Mapping – K Levels with Course Outcomes (COs)										
			Sectio	on A	Section	n B	Section	Section			
Inte	Cos	K Level	MC	Qs	Short An	swers	Section C	Section D			
rnal	005		No. of.	К –	No. of.	К-	Either or	Open			
			Questions	Level	Questions	Level	Choice	Choice			
CI	CO1	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)			
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)			
CI	CO3	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)			
AII	CO4	Upto K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)			
		No. of									
		Questions to be	4		3		4	2			
		asked									
One	estion	No. of									
Pat	tern	Questions to be	4		3		2	1			
CIA I & II	answered										
		Marks for each	1		2		5	10			
		question	-		-			±v			
		Total Marks for	4		6		10	10			
		each section	•		Ŭ		1 0	Δ.v			

	Distribution of Marks with K Level 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	8	40			
	K2	2	4	10		16	32	Ŧ			
CIA	K3			10	20	30	60	60			
I	K4										
-	Marks	4	6	20	20	50	100	100			
	K1	2	2			4	8	20			
	K2	2	4			6	12	20			
CIA	K3			20	10	30	60	60			
II	K4				10	10	20	20			
	Marks	4	6	20	20	50	100	100			

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			MO	Qs	Short Answers		Section C	Section D		
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open		
			Questions	Level	Question	Level	Choice)	Choice)		
1	CO1	Up to K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)		
2	CO2	Up to K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)		
3	CO3	Up to K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)		
4	CO4	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
No.	of Questi	ons to be	10		5		10	5		
	Askee	b	10		5		10	5		
No.	of Questi	ons to be	10		5		5	2		
answered		10		5		5	3			
Marks for each question		1		2		5	10			
Total Marks for each section		10		10		25	30			
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	he given K lev	el)		

	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						
K2	5	6	20		31	25.8	33.3					
K3			30	30	60	50	50					
K4				20	20	16.7	16.7					
Marks	10	10	50	50	120	100	100					
NB: Hig levels.	her level of per	formance of t	ne students is t	o be assessed	by attemp	ting higher	level of K					

Section	A (Mul	ltiple Choic	e Questions)
Answer	· All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	· All Qu	estions	(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 (Eith	ner/Or Type	2)
Answer	· All Qu	estions	(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	K2	
18) b	CO3	K2	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hi	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels	D (0		
Section	D (Ope	en Choice)	
Answer	Any T	hree questio	ons (3x10=30 marks)
Q. No	<u>CO</u>	K Level	Questions
21		K3 K2	
22	<u>CO2</u>	K3 1/2	
23	<u>CO3</u>	K3	
24	<u>CO4</u>	K4	
25	005	K4	

Summative Examinations - Question Paper – Format



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

Course Name	DATA STRUCTURE	DATA STRUCTURES AND ALGORITHMS							
Course Code	21UMTE62				L	Р	С		
Category	Elective	Elective 5							
NATURE OF COURSE:	DFEMPLOYABILITY ✓SKILL ORIENTEDENTREPRENURSHIP								
COURSE OI	BJECTIVES:								
 To lea To known To uno To known To lea 	rn basic concepts data ty ow about arrays derstand the different ope ow about stacks rn the structure of binary	pes eratio	ns on linked list s using different algorithm	ns					
Unit: I									
Algorithmic n complexity of	otation – control structur algorithm – sub algorith	es – ms –	complexity of algorithms variables – data types.	s – other asymptot	ic nota	tions f	or		
Unit: II						15			
arrays – spars sort – radix so Unit: III Linked lists –	e matrices – bubble sort ort representation of linked	– inso	ertion sort – selection sor	t – merging – mer	ge – hing li	15 nked l	ist		
– memory alle	ocation – garbage collect	ion –	insertion into a linked li	st– deletion from a	linke	d list –	-		
Unit: IV	lists – two - way lists					15			
Stacks – array notation – qui recursive proc	v representation of stacks ck sort – an application of cedures by stacks – queue	– lin of sta es – l	ked representation of sta cks – recursion –Towers inked representation of q	cks – arithmetic ex of Hanoi – implen ueues – dequeues	xpressi nentati – prior	on – p on of ity qu 15	olish eues		
Binary trees – representation of binary trees in memory – traversing binary trees – traversal algorithms using stacks – binary search trees – searching and inserting in binary search trees – deleting in a binary search tree – heap – heap sort – general trees									
				Total Lecture	Hour	s 75			
Books for Stu Seymour Lips	ıdy: schutz & VijayalakshmiP	ai G	A., (2008). Data Structu	res , Schaum's out	lines, l	New D	Delhi:		
Academ	ic Council Meeting Hel	d Or	n 20.04.2023		Pa	ge 163	■ }		

Tata McGraw- Hill Publishing Company Ltd. Print.

(Chapter: 2, 4 (4.1 to 4.10, 4.13 to 4.14), 5, 6, 7 (7.1 to 7.5, 7.7 to 7.9, 7.17, 7.19), 9 (9.3 to 9.7).

Books for References:

1. Wirth Niklaus, (1985). **Algorithms + Data Structures = Programs**, New Delhi: Prentice Hall Lt. Print. WEBLINK(S): IT Faculty-LIMU.(2020, July 25)

2.Alfred V. Aho, John E. Hopcroft, Jeffrey D.Ullman, **Data Structures and Algorithms**, Pearson Publication.

3. G.A.V.Pai, **Data Structures and Algorithms- Concepts, Techniques and Applications**, Mc Graw Hill Publication

Web Resources

- 1. https://youtu.be/_KzJfDt5hyE
- 2. https://www.cs.bham.ac.uk/~jxb/DSA/dsa.pdf
- 3. https://mu.ac.in/wp-content/uploads/2021/05/Data-Structure-Final-.pdf

COU	RSE OUTCOME	K Level					
On the	On the successful completion of the course, the students will be able to						
CO1:	explain notations and structures involved in algorithms	K2					
CO2:	apply suitable algorithms on arrays to produce required result	K3					
CO3:	experiment with different operations on linked list	K3					
CO4:	apply the concepts of stacks, queues and recursion to develop algorithms	K3					
CO5:	investigate the structure of binary trees using different algorithms	K3					

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Algorithmic notation – control structures – complexity of algorithms – other asymptotic notations for complexity of algorithm – sub algorithms – variables – data types.	15	Chalk & Talk
Π	Linear arrays – representation of linear arrays in memory – traversing linear arrays – inserting and deleting – linear search – binary search – multidimensional arrays – pointers – pointer arrays – sparse matrices – bubble sort – insertion sort – selection sort – merging – merge – sort – radix sort.	15	Chalk & Talk
III	Linked lists – representation of linked lists in memory – traversing a linked list – searching linked list – memory allocation – garbage collection – insertion into a linked list– deletion from a linked list – header linked lists – two - way lists.	15	Chalk & Talk
IV	Binary trees – representation of binary trees in memory – traversing binary trees – traversal algorithms using stacks – binary search trees – searching and inserting in binary search trees – deleting in a binary search tree – heap – heap sort – general trees	15	Chalk & Talk
V	Binary trees – representation of binary trees in memory – traversing binary trees – traversal algorithms using stacks – binary search trees – searching and inserting in binary search trees – deleting in a binary search tree – heap – heap sort – general trees	15	Chalk & Talk

Course Designed by: Dr. R. Bhavani & Dr. A. Hamari Choudhi

	Learning Outcome Based Education & Assessment (LOBE)								
	Formative Examination - Blue Print								
	Articulation Mapping – K Levels with Course Outcomes (COs)								
			Section A		Section B		Section	Section	
Inte	Cos	K I ovol	MCQs		Short Answers		Section C	Section D	
rnal	0.05	K Level	No. of.	K -	No. of.	K -	Either or	Open	
			Questions	Level	Questions	Level	Choice	Choice	
CI	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)	
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)	
CI	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)	
AII	CO4	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)	
		No. of							
		Questions to be	4		3		4	2	
		asked							
0	at: a :	No. of							
Que	Question	Questions to be	4		3		2	1	
CIA I & II	answered								
	Marks for each	1		2		5	10		
		question	I		2		3	10	
		Total Marks for	1		(10	10	
		each section	4		U		10	10	

	Distribution of Marks with K Level 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	8	60
	K2	2	4	10	10	26	52	00
CIA	K3			10	10	20	40	40
I	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	40
CIA	K2	2	4	10		16	32	40
	K3			10	20	30	60	60
II	K4							
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MOQs		Short Answers		Section C	Section D
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
2	CO2	Upto K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
3	CO3	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
4	CO4	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
5	CO5	Upto K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
No. of Questions to be		10		5		10	5	
	Aske	d	10				10	
No. of Questions to be		10		5		5	3	
answered				-		-	•	
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figures in parenthesis denotes, questions should be asked with the given K level)								

Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (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	<i>A</i> 1 7
K2	5	6	20	10	41	34.2	41./
K3			30	40	70	58.3	58.3
K4							
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.							

Section A (Multiple Choice Questions)						
Answer	· All Qu	estions	(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				
Section	B (Sho	rt Answers)				
Answer	· All Qu	estions	(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 (Eith	er/Or Type				
Answer	· All Qu	estions	(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	K2				
18) b	CO3	K2				
19) a	CO4	K3				
19) b	CO4	K3				
20) a	CO5	K3				
20) b	CO5	K3				
NB: Hi	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K			
levels						
Section	D (Ope	en Choice)				
Answer Any Three questions (3x10=30 mark						
Q. No	CO	K Level	Questions			
21	CO1	K2				
22	CO2	K3				
23	CO3	K3				
24	CO4	K3				
25	CO5	K3				

Summative Examinations - Question Paper – Format


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

Course Name	NUMBER THEORY							
Course Code	211IMTE63					Т	P	C
Course Coue						L	1	<u> </u>
Category	Elective				T	3	-	3
NATURE OF COURSE:	EMPLOYABILITY	√	SKILL ORIENTED		ENTREPRENU	JRSHI	Р	
COURSE OB	JECTIVES:							
• To kno • To lear • To stud • To lear • To lear • To und Unit: I Introduction, D The series of rativo numbers. In and μ , A produc Unit: II The Dirichlet formula, The Dirichlet multip $\lambda(n)$, The diviso arithmetical fur	w the basic concepts in r n arithmetic functions. by Euclid's and division a n basic properties of con erstand the fundamental ivisibility, Greatest comr eciprocals of the primes, ntroduction, The Mobius et formula for $\varphi(n)$. product of arithmetical Mangoldt function $\Lambda(n)$ plication, The inverse of or function $\Box_x(n)$ and Ge nction and Bell series ar	algoriti gruence theore non di The Eu functio functio , Mul a com neraliz	r theory. hm. res m in number theory. visor, Prime numbers, uclidean algorithm, Th on $\mu(n)$, The Euler toier ons, Dirichlet inverse tiplicative functions, pletely multiplicative ed convolutions, Form chlet multiplication, I	The fu e grea nt func s and Multip function al serio Derivat	indamental theorem test common diventation $\varphi(n)$, A relation $\varphi(n)$, A relation $\varphi(n)$, Liouville's frees, The Bell series ives of an arithmetic content of the test of test	rem of risor o ttion c versio ns an unctio es of a metica	15 f arithr f more onnect 15 n d n n d n n d	metic, than ting φ
functions, The	Selberg identity.						15	,
Chebyshev's f prime number Shapiro's theo function, Brief Unit: IV Definition and Congruences.	unctions $\psi(x)$ and $\vartheta(x)$, theorem, Inequalities rem, An asymptotic forr sketch of an elementary basic properties of co Reduced residue systems	Relation for $\pi($ nula for proof ongruent and the	ons connecting $\vartheta(x)$ and n) and pn, Shapiro's or the partial sums $\Sigma(p$ of the prime number t nces, Residue classes ne Euler-Fermat theore	and $\pi(x)$ s Taul p) $P \le x$ s and em.	 k), Some equivale berian theorem, c), The partial summers m, Selberg's asy c) <lic)<< td=""><td>lent fo App ns of mptot</td><td>orms of licatio the M tic form 15 stem,I</td><td>of the ns of obius mula.</td></lic)<<>	lent fo App ns of mptot	orms of licatio the M tic form 15 stem,I	of the ns of obius mula.
Unit: V		und ti					15	;
Polynomial congruences module p. Lagrange's theorem, Applications of Lagrange's theorem, Simultaneous linear congruences. The Chinese remainder theorem, Applications of the Chinese remainder theorem, Polynomial congruences with prime power moduli								
	_				Total Lecture	Hou	rs 75	;
Books for Stu T.M. Apostol,	dy: 1976, Introduction to An	alytic	Number Theory, Spri	nger V	/erlag			

Books for References:

1. Ivan Nivan and Herberts Zucherman, 1972, **An Introduction to Theory of Numbers**, Third Edition, Wiley Eastern Limited, New Delhi.

2. Kennath and Rosan, 1968, **Elementary Number Theory and its Applications**, Addison Wesley Publishing Company.

3.Tom M. Apostal, Introduction to Analytic Number Theory, Springer InternationalEdition,

Web F	Resources	
1.	http://www2.math.uu.se/~lal/kompendier/Talteori.pdf	
2.	https://nptel.ac.in/courses/111/101/111101137/	
3.	https://nptel.ac.in/courses/111/103/111103020/	
COU	RSE OUTCOME	K Level
On th	e successful completion of the course, the students will be able to	
CO1:	understand the concept of theory of numbers, some special functions and	K2
	congruences	
CO2:	apply the concept in Divisibility, multiplicative functions, prime number theorem, residue	К3
	classes, Lagrange's theorem and Chinese remainder theorem	110
CO3.	analyze Euclidean algorithm, Bell series, Relations connecting $\vartheta(x)$ and $\pi(x)$, linear	KA
005.	congruences and polynomial congruences	174
CO4.	Explain the Dirichelet product of arithmetic functions, Dirichlet inverses and Mobius	KA
C04:	inversion formula.	Λ4
CO5:	solve the problems in Divisibility, Some Special functions, Chebyshev's Functions,	K3
2001	Congruences and polynomial congruences	ЛJ

CO & PO Mapping:

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

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

LESSON I	<u>PLAN</u>

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Divisibility, Greatest common divisor, Prime numbers, The fundamental theorem of arithmetic, The series of reciprocals of the primes, The Euclidean algorithm, The greatest common divisor of more than two numbers. Introduction, The Mobius function $\mu(n)$, The Euler toient function $\varphi(n)$, A relation connecting φ and μ , A product formula for $\varphi(n)$.	15	Chalk & Talk
п	The Dirichlet product of arithmetical functions, Dirichlet inverses and the Mobius inversion formula, The Mangoldt function $\Lambda(n)$, Multiplicative functions, Multiplicative functions and Dirichlet multiplication, The inverse of a completely multiplicative function, Liouville's function $\lambda(n)$, The divisor function $\Box_x(n)$ and Generalized convolutions, Formal series, The Bell series of an arithmetical function and Bell series and Dirichlet multiplication, Derivatives of an arithmetical functions, The Selberg identity.	15	Chalk & Talk
III	Chebyshev's functions $\psi(x)$ and $\vartheta(x)$, Relations connecting $\vartheta(x)$ and $\pi(x)$, Some equivalent forms of the prime number theorem, Inequalities for $\pi(n)$ and p _n , Shapiro's Tauberian theorem, Applications of Shapiro's theorem, An asymptotic formula for the partial sums $\Sigma(p)_{P \le x}$, The partial sums of the Mobius function, Brief sketch of an elementary proof of the prime number theorem, Selberg's asymptotic formula.	15	Chalk & Talk
IV	Definition and basic properties of congruences, Residue classes and complete residue system, Linear Congruences, Reduced residue systems and the Euler-Fermat theorem.	15	Chalk & Talk
V	Polynomial congruences module p. Lagrange's theorem, Applications of Lagrange's theorem, Simultaneous linear congruences. The Chinese remainder theorem, Applications of the Chinese remainder theorem, Polynomial congruences with prime power moduli	15	Chalk & Talk

Course Designed by: Dr.A.Arivu Chelvam & Dr.R.Bhavani

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print							
		Articulatio	on Mapping –	K Levels w	ith Course O	utcomes (COs)	
			Sectio	on A	Section	n B	Section	Section
Inte	Cos	K Level	MC	Qs	Short An	swers	Section C	Section D
rnal	CUS	K Level	No. of.	К-	No. of.	K -	Either or	Open
			Questions	Level	Questions	Level	Choice	Choice
CI	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)
CI	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
AII	CO4	Upto K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)
		No. of						
		Questions to be	4		3		4	2
		asked						
Oue	stion	No. of						
Que Pat	torn	Questions to be	4		3		2	1
CIA I & II		answered						
		Marks for each	1		2		5	10
		question	1					10
		Total Marks for	4		6		10	10
		each section	•		v		* *	.

	Distribution of Marks with K Level 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	8	60		
	K2	2	4	10	10	26	52	00		
CIA	K3			10	10	20	40	40		
I	K4									
-	Marks	4	6	20	20	50	100	100		
	K1	2	2			4	8	20		
	K2	2	4			6	12	20		
CIA	K3			20		20	40	40		
II	K4				20	20	40	40		
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MOQs		Short An	swers	Section C	Section D	
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open	
			Questions	Level	Question	Level	Choice)	Choice)	
1	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	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(K3&K3)	1(K4)	
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)	
No.	of Questi	ons to be	10		5		10	5	
	Aske	d	10		5		10	5	
No.	of Questi	ons to be	10		5		5	2	
answered		10		5		5	3		
Mar	ks for eacl	h question	1		2		5	10	
Total I	Marks for	each section	10		10		25	30	
	(Figu	res in parent	hesis denotes.	questions s	hould be ask	ed with f	the given K lev	el)	

	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	41.6				
K2	5	6	20	10	41	34.1	41.0				
K3			30	20	50	41.7	41.7				
K4				20	20	16.7	16.7				
Marks	10	10	50	50	120	100	100				
NB: Hig levels.	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.										

Section	A (Mul	tiple Choic	e Questions)
Answer	All Qu	estions	(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	
Section	B (Sho	rt Answers)	
Answer	All Qu	estions	(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 (Eith	er/Or Type	
Answer	All Qu	estions	(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	K3	
19) b	CO4	K3	
20) a	CO5	K2	
20) b	CO5	K2	
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K
levels	D (0		
Section	D (Ope	n Choice)	
Answer	Any T	hree questio	0 (3x10=30 marks)
Q.No		K Level	Questions
21		K2 K2	
22	<u>CO2</u>	K3 K4	
23	<u>CO3</u>	K4	
24	<u>CO4</u>	K4	
25	005	K3	

Summative Examinations - Question Paper – Format



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

Course Name	DISCRETE MATHE	мат	ICS				
					Ŧ	n	
Course Code	21UNI1E04				L	ľ	U
Category	Elective				5	-	5
NATURE OF COURSE:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPREM	NURS	HIP	
COURSE OB	JECTIVES:						
 To lear To kno To app To und To kno To kno Mathematical local 	n logical connectives and w about normal forms ly rules of inference erstand about relations w about lattices and Boo pgic: Propositions – Conne	d prep blean a	oositions algebra – Conditional and Bi-con	nditional proposition	ıs – Ta	15 autolog	y and
Contradiction –	Equivalence of proposition	ns.					
Unit: II	- l'astan NT 10			Queriere di		15	
forms – Princip	nplication – Normal form pal Disjunctive normal fo	ns – L orm –	Principal Conjunctive r	ormal form	mal		
Unit: III						15	
Theory of infer	rence – Rules of inference	e - P	redicate calculus (Quan	tifiers - Excluded)			
Unit: IV						15	
Relations – Ty relations – Equ	pes of Relations – Opera ivalence classes – Partit	itions	of relations – Composit	ion of relations – p	roper	ties of	
Unit: V						15	
Lattices – Prinalgebra.	nciple of duality – Prop	pertie	s of lattices – Boolear	Algebra – Prope	rties	of Bo	olean
				Total Lecture	Hou	rs 75	
Books for Stu	dy:						
T.Veerarajan, I Hill Publishing Unit I,II – (Unit III – (Unit IV – (Unit V – C	Discrete Mathematics v company limited, New Chapter 1(Pg 1-26) Chapter 1 (Pg 27- 49) (Qu Chapter 2 (Pg 66 - 77)& hapter 2 (Pg 96 - 97,103)	vith G Delhi uantif Probl 6) & P	Graph Theory and Cor iers - Excluded) lems Problems	nbinatorics, The M	/Ic-Gr	aw	
Books for Ref	erences:						
1Keni	neth H. Rosen, Discrete M	athen	natics and its Application	ns , Tata MCGraw Hi	11		
2. J. F	P. Trembly & Manohar, D i	iscret	e Mathematical Structu	res with applicatio	ons to	Comp	uter

science, 1st Edition, McGraw Hill Education, 2017.

3.J K Sharma, Discrete Mathematics, Macmillan Publishers India Limited, 2004

Web Resources

- 1. <u>https://home.iitk.ac.in/~arlal/book/mth202.pdf</u>
- 2. <u>https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_tutorial.pdf</u>
- 3. https://archive.nptel.ac.in/courses/111/107/111107058/

COUH	RSE OUTCOME	K Level
On the	e successful completion of the course, the students will be able to	
CO1:	Discuss various connectives of logics	K2
CO2:	Prepare the PDNF and PCNF for the logic statements	K3
CO3:	Analyze the theory of inference in logical statements	K4
CO4:	Classify the relations between the set of elements.	K 4
CO5:	Explain lattice and Boolean algebra concepts	K 4

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
I	Mathematical logic: Propositions – Connectives – Conditional and Bi- conditional propositions – Tautology and Contradiction – Equivalence of propositions.	15	Chalk & Talk
Ш	Tautological implication – Normal forms – Disjunctive normal form – Conjunctive normal forms – Principal Disjunctive normal form – Principal Conjunctive normal form.	15	Chalk & Talk
ш	Theory of inference – Rules of inference – Predicate calculus (Quantifiers - Excluded)	15	Chalk & Talk
IV	Relations – Types of Relations – Operations of relations – Composition of relations – properties of relations – Equivalence classes – Partition of a set.	15	Chalk & Talk
V	Lattices – Principle of duality – Properties of lattices – Boolean Algebra – Properties of Boolean algebra.	15	Chalk & Talk

Course Designed by: Dr.M.Saravanan & Dr.V.Ramachandran

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte rnal Cos		K Level	Section MC ⁴ No. of. Questions	on A Qs K - Level	Section Short An No. of. Questions	n B swers K - Level	Section Section C Either or Choice	Section Section D Open Choice		
CI	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)		
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)		
CI	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
AII	CO4	Upto K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)		
		No. of Questions to be asked	4		3		4	2		
Question Pattern		No. of Questions to be answered	4		3		2	1		
CIA	1 & 11	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

	Distribution of Marks with K Level 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	8	60			
	K2	2	4	10	10	26	52	00			
CIA	K3			10	10	20	40	40			
I	K4										
-	Marks	4	6	20	20	50	100	100			
	K1	2	2			4	8	30			
	K2	2	4			6	12	20			
CIA	K3			20		20	40	40			
II	K4				20	20	40	40			
	Marks	4	6	20	20	50	100	100			

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MO	Qs	Short Answers		Section C	Section D	
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open	
			Questions	Level	Question	Level	Choice)	Choice)	
1	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)	
2	CO2	Upto K3	2	K1&K2	1	K1	2(K2&K2)	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(K3&K3)	1(K4)	
5	CO5	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)	
No.	of Questi	ons to be	10		5		10	5	
	Aske	d	10		5		10	5	
No.	of Questi	ons to be	10		5		5	2	
answered		red	10		5		5	3	
Marks for each question		1		2		5	10		
Total Marks for each section		10		10		25	30		
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)	

	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	11 67				
K2	5	6	20	10	41	34.17	41.07				
K3			30	10	40	33.33	33.33				
K4				30	30	25	25				
Marks	10	10	50	50	120	100	100				
NB: Hig levels.	her level of per	formance of th	ne students is t	o be assessed	by attemp	ting higher	level of K				

Section	Section A (Multiple Choice Questions)						
Answer	All Qu	estions	(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					
Section	B (Sho	rt Answers)					
Answer	All Qu	estions	(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 (Eith	er/Or Type	2)				
Answer	All Qu	estions	(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	K3					
18) b	CO3	K3					
19) a	CO4	K3					
19) b	CO4	K3					
20) a	CO5	K3					
20) b	CO5	K3					
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K				
levels							
Section	D (Ope	n Choice)					
Answer	Any T	hree questio	ons (3x10=30 marks)				
Q.No	CO	K Level	Questions				
21	CO1	K2					
22	CO2	K3					
23	CO3	K4					
24	CO4	K4					
25	CO5	K4					

Summative Examinations - Question Paper – Format



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

Course Name	FUZZY SET THEOR	Y						
Course Code	21UMTE65			L	Р	С		
Category	Elective			5	-	5		
NATURE OF COURSE:	EMPLOYABILITY	SKILL ORIENTED	ENTREPR	ENUR	SHIF	>		
COURSE OBJ	ECTIVES:							
 To understand the concepts of fuzzy sets To Learn Extension Principle for Fuzzy Sets To know about fuzzy operations To understand Fuzzy Arithmetic To know about relations on Fuzzy Unit: I 								
Crisp Sets to Fu	zzy Sets: Introduction -	- Crisp Sets: An Overview -	Fuzzy Sets: Bas	ic typ	es - 1	Fuzzy		
Sets: Basic Con	cepts.							
Unit: II					15	5		
Fuzzy Sets vers	sus Crisp Sets - Additio	nal properties of α – Cuts	- Representation	of Fu	zzy S	Sets -		
Extension Princ	iple for Fuzzy Sets.		-		-			
					15			
Operations on I	Fuzzy Sets: Types of on	erations – Fuzzy Compleme	ents - Fuzzy Inte	rsecti	$\frac{15}{000}$)		
Norms – Fuzzy	Unions' – Conforms - Co	ombinations of Operations- A	ggregation Operation	ations	JII. t-			
Unit: IV					15	5		
Fuzzy Arithme	tic: Fuzzy Numbers - 1	Linguistic Variables - Arith	metic Operation	s on	Interv	vals -		
Arithmetic Oper	cations on Fuzzy Number	s - Lattice of Fuzzy Numbers	s - Fuzzy Equation	ns.				
Unit: V					15	5		
Fuzzy Relations Relations – Bir Relations – Fuzz	: Crisp Versus Fuzzy Re nary Relations on a Sin zy Ordering Relations.	elations –Projection and Cyl gle Set – Fuzzy Equivalend	indrical Extension ce Relation- Fuz	ns- Bin zy Co	nary 1 mpat	Fuzzy ibility		
			Total Lecture	Hour	s 75	5		
Books for Stud GeorgeJ.Klir an India, 2012. UNIT-I: Chapte UNIT-II: Chapte UNIT-III: Chapte	y: d BoYuan , Fuzzy Sets a er 1: Sections: 1.1 to 1.4 er 2: Sections 2.1 to 2.3 ter 3: Sections 3.1 to 3.6	nd Fuzzy Logic Theory and	I Applications , P	Prentic	e – H	all of		
Academic	Council Meeting Held (On 20.04.2023		Pag	e 181	 ■ [

UNIT-IV: Chapter 4: Sections 4.1 to 4.6

UNIT-V: Chapter 5: Sections 5.1 to 5.7

Books for References:

1. George J. Klir and Tina, A., Folger, Fuzzy Sets, Uncertainty and Information, PHI Learning

Private Limited, 2012.New Delhi-110001

2. Ganesh, M., Introduction to Fuzzy Sets and Fuzzy Logic, Prentice-Hall of India. 2015

3. Chander Mohan, An Introduction to Fuzzy Set Theory and Fuzzy Logic, MV Learning.

Web Resources

- 1. https://cours.etsmtl.ca/sys843/REFS/Books/ZimmermannFuzzySetTheory2001.pdf
- 2. https://www.pdfdrive.com/fuzzy-sets-and-fuzzy-logic-e33448886.html
- 3. https://www.mdpi.com/books/pdfdownload/book/2133

COURSE OUTCOME					
On the successful completion of the course, the students will be able to					
CO1:	compare fuzzy sets and crisp sets	K2			
CO2:	represent fuzzy sets in terms of α - cuts	K3			
CO3:	discuss various operations on fuzzy sets	K4			
CO4:	apply arithmetic operations on fuzzy sets	K3			
CO5:	Explain fuzzy relations	K4			

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
Ι	Crisp Sets to Fuzzy Sets: Introduction – Crisp Sets: An Overview – Fuzzy Sets: Basic types – Fuzzy Sets: Basic Concepts.	15	Chalk & Talk
II	Fuzzy Sets versus Crisp Sets - Additional properties of α – Cuts - Representation of Fuzzy Sets - Extension Principle for Fuzzy Sets	15	Chalk & Talk
ш	Operations on Fuzzy Sets: Types of operations – Fuzzy Complements – Fuzzy Intersection: t- Norms – Fuzzy Unions' – Conforms – Combinations of Operations- Aggregation Operations	15	Chalk & Talk
IV	Fuzzy Arithmetic: Fuzzy Numbers - Linguistic Variables - Arithmetic Operations on Intervals - Arithmetic Operations on Fuzzy Numbers - Lattice of Fuzzy Numbers - Fuzzy Equations.	15	Chalk & Talk
V	Fuzzy Relations: Crisp Versus Fuzzy Relations –Projection and Cylindrical Extensions- Binary Fuzzy Relations – Binary Relations on a Single Set – Fuzzy Equivalence Relation- Fuzzy Compatibility Relations – Fuzzy Ordering Relations.	15	Chalk & Talk

Course Designed by: Dr.S.Andal & Dr.A.Arivu Chelvam

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte rnal Cos		K Level	Section MC No. of. Questions	on A Qs K - Level	Section Short An No. of. Questions	n B swers K - Level	Section Section C Either or Choice	Section Section D Open Choice		
CI	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)		
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)		
CI	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
AII	CO4	Upto K3	2	K1&K2	2	K2	2(K2&K2)	1(K3)		
		No. of Questions to be asked	4		3		4	2		
Question Pattern		No. of Questions to be answered	4		3		2	1		
CIA	1 & 11	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		Dist	tribution of	Marks wit	h K Level	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	8	60
	K2	2	4	10	10	26	52	00
CIA	K3			10	10	20	40	40
I	K4							
-	Marks	4	6	20	20	50	100	100
	K1	2	2			4	8	40
	K2	2	4	10		16	32	40
CIA	K3			10	10	20	40	40
II	K4				10	10	20	20
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			MO	Qs	Short Answers		Section C	Section D		
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open		
			Questions	Level	Question	Level	Choice)	Choice)		
1	CO1	Upto K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)		
2	CO2	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)		
3	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
4	CO4	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)		
5	CO5	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
No.	of Questi	ons to be	10		5		10	5		
	Aske	d	10		5		10	5		
No.	of Questi	ons to be	10		5		5	3		
	answer	red	10		5		5	3		
Marks for each question		1		2		5	10			
Total Marks for each section		10		10		25	30			
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)		

		Dis	tribution of	Marks with	n K Leve	1	
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	50
K2	5	6	30	10	51	42.5	50
K3			20	20	40	33.33	33.33
K4				20	20	16.67	16.67
Marks	10	10	50	50	120	100	100
NB: Hig levels.	her level of per	formance of th	ne students is t	o be assessed	by attemp	ting higher	level of K

Section	Section A (Multiple Choice Questions)							
Answer	All Qu	estions	(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						
Section	B (Sho	rt Answers)						
Answer	All Qu	estions	(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 (Eith	er/Or Type	2)					
Answer	All Qu	estions	(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	K3						
18) b	CO3	K3						
19) a	CO4	K2						
19) b	CO4	K2						
20) a	CO5	K3						
20) b	CO5	K3						
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K					
levels								
Section	D (Ope	n Choice)						
Answer	Any T	nree questic	ons (3x10=30 marks)					
Q.No	CO	K Level	Questions					
21	CO1	K2						
22	CO2	K3						
23	CO3	K4						
24	CO4	K3						
25	CO5	K4						

Summative Examinations - Question Paper – Format



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

Course Name	FORMAL LANGUAGE	S AND AUTOMATA							
Course Code	21UMTE66			L	Р	С			
Category	Elective			5	-	5			
NATURE OF COURSE:	EMPLOYABILITY ,	SKILL ORIENTED	ENTREPREM	NURS	HIP				
COURSE OB	JECTIVES:								
To defi To insp To find To con To und Unit: I Definition – re finite automato Unit: II Definition – ac FA equivalent Unit: III Properties of re a finite state m	ne finite automata pect the properties of NFA monoid of a finite state ma struct grammars for langua erstand Greibach normal for presentation of a finite aut n. ceptability of a string by N to a given NFA. egular sets – decision algor achine – machine of a mon	achine ges orm grammar for a given g omaton – acceptability of FA – equivalence of FA a ithms for regular sets –fin oid	rammar a string and langua nd NFA – procedur ite state machines –	ge act	15 cepted 15 finding 15 oid of	by a g a			
Unit: IV	Unit: IV 15								
Definition and grammars – no precedence gra Unit: V Construction o context-free gr	Definition and examples – Chomsky hierarchy of languages – derivation trees for context free grammars – normal forms for context free grammars – ambiguity– parsing and polish notation – simple precedence grammar – algorithm. Unit: V 15 Construction of a regular grammar – derivation trees for context-free grammars – normal forms for								
			Total Lecture	Hour	s 75				
Books for Study: Venkataraman M.K., Sridharan N. and Chandrasekaran N., (2001). Discrete Mathematics, Chennai:The National Publishing Company. Print. Unit-I To V (Chapter XII (1-20)).									
DUUKS IOF KEI				11 .					
1. Peter Linz, (2008). An Introduction to Formal Languages and Automata, New Delhi:									
NarosaPublishing House. Print									
2. Sundaresan V., Ganapathy Subramanian K.S. & Ganesan K., (2001). Discrete Mathematics, Sirkali:									

A.R. Publications. Print.

3.Basavaraj S.Amami, Karibasappa K.G.,**Formal Languages and Automata Theory**, Wiley Precise Publications

Web Resources

1. https://www.pdfdrive.com/formal-languages-and-automata-theory-books.html

2. https://www.iitg.ac.in/dgoswami/Flat-Notes.pdf

3. <u>http</u>	3. <u>https://cse4projects.files.wordpress.com/2013/09/theory_of_computation_reference_e-book.pdf</u>						
COUI	RSE OUTCOME	K Level					
On th	On the successful completion of the course, the students will be able to						
CO1:	find the acceptability of a language by a finite automaton	K3					
CO2:	convert NFA to FA in terms of algorithms	K3					
CO3:	explain the properties of regular sets	K4					
CO4:	change context free grammar to various normal forms	K 3					
CO5:	construct Greibach normal form grammar for a given grammar	K3					

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Pedagogy
т	Definition – representation of a finite automaton – acceptability of a string and	15	Chalk &
1	language accepted by a finite automaton	15	Talk
п	Definition - acceptability of a string by NFA - equivalence of FA and NFA -	15	Chalk &
11	procedure for finding a FA equivalent to a given NFA.	15	Talk
тт	Properties of regular sets - decision algorithms for regular sets -finite state	15	Chalk &
111	machines - monoid of a finite state machine - machine of a monoid	13	Talk
	Definition and examples - Chomsky hierarchy of languages - derivation trees		
137	for context free grammars - normal forms for context free grammars -	15	Chalk &
1 V	ambiguity- parsing and polish notation - simple precedence grammar -	15	Talk
	algorithm		
V	Construction of a regular grammar – derivation trees for context-free grammars	15	Chalk &
V	- normal forms for context-free grammars - Greibach normal form.	13	Talk

Course Designed by: Dr.S.Andal & Dr.V.Ramachandran

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Inte rnal	Cos	K Level	K Level Section A Section B MCQs Short Answers No. of. K - Ouestions Level		Section Section C Either or Choice	Section Section D Open Choice					
CI	CO1	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)			
AI	CO2	Upto K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)			
CI	CO3	Upto K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)			
AII	CO4	Upto K3	2	K1&K2	2	K2	2(K2&K2)	1(K3)			
		No. of Questions to be asked	4		3		4	2			
Question Pattern		No. of Questions to be answered	4		3		2	1			
CIA	1 & 11	Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

	Distribution of Marks with K Level 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	8	40				
	K2	2	4	10		16	32					
CIA	K3			10	20	30	60	60				
I	K4											
-	Marks	4	6	20	20	50	100	100				
	K1	2	2			4	8	40				
	K2	2	4	10		16	32	40				
CIA	K3			10	10	20	40	40				
II	K4				10	10	20	20				
	Marks	4	6	20	20	50	100	100				

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Sumn	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			MO	Qs	Short Answers		Section C	Section D		
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open		
			Questions	Level	Question	Level	Choice)	Choice)		
1	CO1	Upto K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)		
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 K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)		
5	CO5	Upto K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)		
No.	of Questi	ons to be	10		5		10	5		
	Aske	d	10		5		10	5		
No.	of Questi	ons to be	10		5		5	2		
answered		10		5		5	5			
Marks for each question		1		2		5	10			
Total Marks for each section		10		10		25	30			
	(Figu	res in parent	hesis denotes,	questions s	hould be ask	ed with t	the given K lev	el)		

		Dis	tribution of	Marks with	n K Leve	1	
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	11 67
K2	5	6	30		41	34.17	41.07
K3			20	40	60	50	50
K4				10	10	8.33	8.33
Marks	10	10	50	50	120	100	100
NB: Hig levels.	her level of per	formance of th	ne students is t	o be assessed	by attemp	ting higher	level of K

Section	A (Mul	tiple Choic	e Questions)	
Answer All Questions(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		
Section	B (Sho	rt Answers)		
Answer	All Qu	estions	(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 (Eith	er/Or Type		
Answer	All Qu	estions	(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	K2		
19) b	CO4	K2		
20) a	CO5	K2		
20) b	CO5	K2		
NB: Hig	gher lev	el of perfor	mance of the students is to be assessed by attempting higher level of K	
levels				
Section	D (Ope	n Choice)		
Answer	Any T	hree questic	ons (3x10=30 marks)	
Q.No	CO	K Level	Questions	
21	COl	K3		
22	CO2	K3		
23	CO3	K4		
24	CO4	K3		
25	CO5	K3		

Summative Examinations - Question Paper – Format



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

Course Name	SPSS LAB						
Course Code	21UMTSP3				L	Р	С
Category	Skill					2	2
NATURE OF COURSE:	EMPLOYABILITY 🖌 SKILL ORIENTED ENTREPRENURSH					SHIP	
COURSE OBJ	IECTIVES:						
• To understand the basic working of SPSS							
• To prov	• To provide data handling experience using SPSS.						
• To familiar with presentation of Statistical output in SPSS software.							
• To organize and save data in suitable way							
• To create and edit graphical displays of data							
List of Prog	grams:						
1. Data Aggreg	ation –Sorting, Selecting	g cas	es, Splitting file and Lis	ting Cases.			
2 Frequencies and Descriptive statistics- Measures							
2. Prequencies and Descriptive statistics-inteasures							
3. Graphs and diagrams: Pie, bar, line and Histogram							
4. Correlation coefficient							
5. Regression Analysis							
6. One sample t-test							
7. Chi square test							
8. ANOVA- Or	ne way classification						
				Total Le	cture H	Iours	30
Books for Stud	ly:						
Kiran Pandya, Smruti Bulsari and Sanjay Sinha, " SPSS in Simple Steps " Published by dreamlech press, New Delhi, 2016.							
Books for References:							
1. Anil Kumar Mishra, "A Hand Book on SPSS for Research Work" Himalaya Publishing House,							
Mumbai, 2019.							
2. A.Rajathi, and P.Chandran "SPSS for you" MJP Publishers, Chennai, 2010.							
3. Sabine Landau and Brian S. Everitt "A Handbook of Statistical Analyses using SPSS							

"CHAPMAN & HALL/CRC, Press Company, New York, 2004

Web Resources:

- 1. <u>https://onlinecourses.swayam2.ac.in/arp19_ap77/preview</u>
- 2. <u>https://nptel.ac.in/courses/110/107/110107113/</u>
- 3. <u>https://lo.unisa.edu.au/mod/book/view.php?id=646443&chapterid=106605</u>

COURSE OUTCOME				
On the successful completion of the course, the students will be able to				
CO1:	Examine Data Aggregation in SPSS	K1		
CO2:	Calculate the statistics measures using SPSS	K3		
CO3:	Construct Graphs and diagrams using SPSS	K3		
CO4:	Determine correlation coefficient and Regression lines using SPSS	K3		
CO5:	Analyze t-Test, Chi square test and ANOVA- One way classification using			
	SPSS	124		

CO & PO Mapping:

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

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

Course Designed by: Dr.V.Ramachandran & Dr.S.Andal