NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)



Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW



Evaluation Scheme & SyllabusFor

 $\label{eq:master} \begin{tabular}{ll} \textbf{Master of Computer Applications} \\ \textbf{MCA} \end{tabular}$

First Year

(Effective from the Session: 2025-26)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

Master of Computer Applications

MCA

Evaluation Scheme

SEMESTER-I

Sl.	Subject	Subject	Types of	Peri	iods		Evalu	uation	Schemes		End Semester		Total	Credit
No.	Codes		Subjects	L	T	P	CT	TA	TOTAL	PS	TE	PE		
		3 WEE	KS COMPULS	ORY I	NDU	CTIO	N PRO	GRAN	1					
1	CMCA0104	Discrete Mathematics	Mandatory	3	1	0	30	20	50		100		150	4
2	CMCA0103	Operating Systems	Mandatory	3	1	0	30	20	50		100		150	4
3	CMCA0105	Workplace Communication Competence 1	Mandatory	3	0	0	30	20	50		100		150	3
4	CMCA0101	Computer System & Organization	Mandatory	3	1	0	30	20	50		100		150	4
5	CMCA0102	Programming in C	Mandatory	3	0	0	30	20	50		100		150	3
6	CMCA0153	Operating Systems Lab	Mandatory	0	0	4				50		50	100	2
7	CMCA0151	Computer System & Organization Lab	Mandatory	0	0	2				50		50	100	1
8	CMCA0155	Workplace Communication Competence 1- Lab	Mandatory	0	0	4				50		50	100	2
9	CMCA0152	Programming in C	Mandatory	0	0	4				50		50	100	2
	*Massive Open Online Courses MOOCs *MOOCs													
		TOTAL							250	200	500	200	1150	25

First Semester Bridge Course (for the students of non-computing background):

Course Code	Course Type	Course Title
CMCABC0101	Bridge	Computers Concepts & Emerging Technologies

* List of MOOCs Based Recommended Courses for First Year (Semester-I) MCA Students

Sr. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	CMC0021	C Programming Course	Infosys Wingspan (Infosys Springboard)	8h 49m	-
2	CMC0018	Linux for Beginners	Infosys Wingspan (Infosys Springboard)	6h 2m	-

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

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$\label{eq:master} \textbf{Master of Computer Applications} \\ \textbf{MCA}$

Evaluation Scheme SEMESTER-II

Sl.	Subject Codes	Subject	Types of	P	eriod	S	Evaluation Schemes				End Semester		Total	Credit
No.	Subject Souch	Susject	Subjects	L	T	P	CT	TA	TOTAL	PS	TE	PE	2000	Crourt
1	CMCA0202	Database System	Mandatory	3	1	0	30	20	50		100		150	4
2	CMCA0203	Data Structures	Mandatory	3	1	0	30	20	50		100		150	4
3	CMCA0204	Design Thinking – I	Mandatory	3	0	0	30	20	50		100		150	3
4		Departmental Elective-I	Departmental Elective	3	0	0	30	20	50		100		150	3
5	CMCA0201	Cognitive Ability Mandato		2	1	0	30	20	50		50		100	3
6	CMCMO255	Object Oriented Techniques using JAVA	Mandatory	0	0	6				50		100	150	3
7	CMCA0253	Data Structures Lab	Mandatory	0	0	2				50		50	100	1
8	CMCA0252	Database System Lab	Mandatory	0	0	2				50		50	100	1
9		Departmental Elective-I Lab	Departmental Elective	0	0	2				25		25	50	1
10	CMCA0257	Workplace Communication Competence 2 Lab	Mandatory	0	0	4				50		50	100	2
		*Massive Open Online Courses MOOCs *MOOCs												
		TOTAL							250	225	450	275	1200	25

* List of MOOCs Based Recommended Courses for First Year (Semester-II) MCA Students

S	5. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
	1	CMC0019	Design Thinking	Infosys Wingspan (Infosys Springboard)	3h 31m	-
	2	CMC0001	Next Gen Technologies	Infosys Wingspan (Infosys Springboard)	10h 14m	-

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

List of Departmental Elective Subjects

Sl. No.	Subject Codes	Subject Name	Types of Subjects	Bucket Name	Branch	Semester
1	CMCA0211	Fundamentals of Digital Marketing and Analytics	Departmental Elective		MCA	II
2	CMCA0212	Fundamentals of Digital Marketing and Optimization	Departmental Elective	Departmental	MCA	II
3	CMCA0213	CRM Administration	Departmental Elective	Elective - 1	MCA	II
4	CMCA0214	Software Testing	Departmental Elective		MCA	II
5	CMCA0211P	Fundamentals of Digital Marketing and Analytics Lab	Departmental Elective		MCA	II
6	CMCA0212P	Fundamentals of Digital Marketing and Optimization Lab	Departmental Elective	Departmental Elective – 1	MCA	II
7	CMCA0213P	CRM Administration Lab	Departmental Elective	Lab	MCA	II
8	CMCA0214P	Software Testing Lab	Departmental Elective		MCA	II



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Course Code: CMCA0104	Course Name: Discrete Mathematics	L	T	P	C
Course Offered in: MCA First Year		3	1	0	4

Pre-requisite: Basic Knowledge of Mathematics

Course Objectives: To develop mathematical ability in understanding mathematical reasoning, ability to perform combinatorial analysis and knowledge about discrete structures, perform operations on discrete mathematics such as sets, functions and relations, Verify the correctness of an argument using symbolic logic and truth tables. Solve problems using counting techniques and combinatorics, to improve formal reasoning skills acquisition and mathematical knowledge

Course	Outcome: After completion of the course, the student will be able to	Bloom's
		Knowledge Level
		(KL)
CO1	Use Mathematical and logical notation to define basic discrete structures such as Sets, Relations, Functions, and Inductions	K2
CO2	Analyze and Apply Concepts of posset, Graphs and Trees	K4
CO3	Identify and prove properties of Algebraic Structures and their applications	K3
CO4	Apply Propositional and predicate logic for logical Reasoning	K3
CO5	Solve Recurrence Relations and Apply Combinatorics Techniques	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

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

Course Contents / Syllabus

Module 1 SET THEORY, RELATIONS & FUNCTIONS 8 hours

Set Theory: Introduction, Size of sets and cardinals, Venn diagrams, Combination of sets, Multisets, ordered pairs, Set identities and Proofs of some general identities on sets.

Relations & Functions: Definition, Operations on relations, Composite relations, Properties of relations, Equality of relations, Partial order relation and Recursive definition of relation. Functions - Definition, Classification of functions, Operations on functions, recursively defined functions, and Growth of Functions.

Natural Numbers: Introduction, Piano's axioms, Mathematical Induction, Strong Induction, and Induction with Nonzero Base cases.

Module 2 POSSETS, HASSE DIAGRAM, LATTICES AND GRAPH 8 hours

Possets, Hasse Diagram and Lattices: Introduction, Partial order sets, Combination of partial order sets, Hasse diagram, Introduction of lattices, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.

Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring

Trees: Definition, Binary tree, Binary tree traversal (BFS and DFS), Binary search tree.

Module 3 ALGEBRAIC STRUCTURES, RINGS AND FIELDS 8 hours

Algebraic Structures: Introduction to algebraic Structures and properties. Types of algebraic structures: Semi group, Monoid, Group, Abelian group, and Properties of group. Subgroup, Cyclic group, cosets, Permutation and Symmetric groups, Homomorphism, and Isomorphism of groups.

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules



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Module 4 PROPOSITIONAL & PREDICATE LOGIC 8 hours

Propositional & Predicate Logic: Propositions well-formed formula, Truth tables, Tautology, Contradiction, Algebra of propositions, Theory of Inference and Natural Deduction.

Frequency: Chart Different frequency chart like Histogram, Frequency curve, Pi-chart.

Regression analysis: Linear and Non-linear regression, Multiple regressions

Module 5 RECURRENCE RELATIONS & COMBINATORICS 8 hours

Recurrence Relations and Generating Function: Introduction and properties of Generating Function, Growth of functions, Recurrences from algorithms, Simple Recurrence relation with constant coefficients and Linear recurrence relation without constant coefficients. Methods of solving recurrences

		Methods of solving recurrences						
		cs: Introduction, Counting Techniques, Pigeonly	tole Principle, Polya's Counting Theory. test, F-Test Application to medicine, agriculture etc.					
		and forecasting: Moving averages, smoothenin	**					
			Total Lecture Hours 40 hours					
Textbo	ook:							
S. No.	В	ook Title	Author					
1.	D	viscrete Mathematics and Its Applications	Kenneth H. Rosen, McGraw-Hill, 2006					
2.	D	riscrete Mathematical Structures	B. Kolman, R.C. Busby, and S.C. Ross, PrenticeHall,2004					
Referen	ce Boo	ks:						
S. No.	Book	x Title	Author					
1.	Appli	rete and Combinatorial Mathematics: An ied duction	Ralph P. Grimaldi, Pearson Education, 2003					
2.	Discr	rete Mathematical Structures	Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Pearson Education, 2008					
3.	Num	erical Methods in Engineering and Science	B.S. Grewal, Khanna Publishers ,2014					
NPTE	L/ You	Tube/ Faculty Video Link:						
Modul	e 1	https://www.youtube.com/watch?v=9AUCds	mBGmA&list=PL0862D1A947252D20&index=10					
Modul	e 2	https://www.youtube.com/watch?v=oU60Tu0	GHxe0&list=PL0862D1A947252D20&index=11					
Modul	e3	https://www.youtube.com/watch?v=_BIKq92	Xo_5A&list=PL0862D1A947252D20&index=13					
Module 4 https://www.youtube.com/watch?v=gs0dQF3pGqM&list=PLmXKhU9FNesTpQNP_OpXN7Write_a ProgramwGx7NWsq								
Modul	e 5	https://www.youtube.com/watch?v=Yk6-ZBb	9vh4					



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Course	Code: CMCA	0103	Cour	se Name: O	perating Sys	stems			L	T	P	C				
Course	Offered in: M	CA First Year	<u>'</u>						3	1	0	4				
Pre-req	uisite: Student	s are expected to	be familiar v	with Compute	er Organizati	on										
	•	bjective of this eliver the skills			_		c structure an	d function	s of a	n						
Course Outcome: After completion of the course, the student will be able to Bloom's Knowledge Level (KL)											el					
CO1	Describe operating system concepts, functions, and design CPU Scheduling algorithms								K2							
CO2	Analyze the Deadlocks.	issues related t	to inter proc	ess commur	nication like	Synchroni	zation and			k	ζ4					
CO3	Describe the concepts of Memory Management and Implement disk scheduling algorithms.									k	Κ2					
CO4	Design and use Linux utilities to create and manage simple file processing operations.									k	K 5					
CO5	Implement sh	nell scripts to per	form more co	omplex tasks	in shell prog	ramming e	nvironment.		K5							
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
СО-РС	O Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8							
CO1		3	2	2	2	-	-	-	- 1							

Course Contents / Syllabus

CO₂

CO3

CO4

CO5

Module 1 FUNDAMENTAL CONCEPTS OF OPERATING SYSTEM 8 hours

2

2

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Fundamentals of Operating Systems: Operating System, Operatic System characteristics, Functions of Operating Systems, Types of Operating System, Layered Structure, System call, Kernel, Multiprogramming and Multitasking, Overview of Windows OS, Unix/Linux OS.

2

2

3

3

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1

Process Management: Process Management: Process Concepts, State Transition Diagram. Types of Schedulers: Long Term, Mid Term, Short Term Process Control Block, Inter process communication

CPU Scheduling: CPU Scheduling Criteria, Pre-emptive and Non-Pre-emptive Scheduling, Scheduling Algorithm: FCFS, SJF, SRTF, Round Robin, Priority Scheduling, Multilevel Queue Scheduling and Multilevel Feedback Queue Scheduling, Context Switching

Module 2 PROCESSES AND DEADLOCK 8 hours

Process Synchronization: Critical Section problem & their solutions, Introduction to Semaphores Classical Problems of Synchronization (Producer Consumer Problem, Readers Writer Problem, Dining philosophers' problem)

Dead Locks: Characterization, Deadlock concepts & Handling Techniques (Prevention and Detection & Recovery), Dead Lock Avoidance: Banker's Algorithm.

Module 3 MEMORY MANAGEMENT 8 hours

Memory Management: Background, Swapping, Contiguous and Non-Contiguous memory allocation, Paging, Segmentation, Segmentation with Paging. Virtual Memory: Background, Demand paging, Allocation of frames: First Fit, Best Fit, and Worst Fit, Page replacement algorithms (FCFS, Optimal, LRU), Balady's Anomaly, Thrashing.

Disc Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK and C-LOOK

3

3

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2

File Management System: Concept and Organization, Access Methods, File System Implementation, Allocation Methods, Free Space Management, File System Security and Protection



Module 4

Module 5

https://www.youtube.com/watch?v=SjZ16yeUNyc

https://www.youtube.com/watch?v=ibHmB4GTuOQ

https://www.youtube.com/playlist?list=PL9ooVrP1hQOH3SvcgkC4Qv2cyCebvs0Ik

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				The second secon						
N (- J	1. 4		I INDIX ADMINISTRA	DATION.	0.1					
Modu			LINUX ADMINISTI		8 hours					
				allation of Linux, Virtualization: Definition, Types, Advantages, Virtualization: Common de Internal and Enternal de Internal and Enternal de Internal						
				rmissions, and manipulations Commands: Internal and External, l nmands. System Admin: man, uptime, users, service, pkill, ps	Directory and					
File C	Ommanc	is, 1/O commands	, ripes, riners, shen con	minands. System Admin. man, uptime, users, service, pkin, ps						
Modu			1	IMING AND VI EDITOR	8 hours					
				g - shell script features, shell variables, writing and executing a						
				tor Models, Invoking VI editor, Configuring the vi environment,						
				elated commands, branching control structures- if, case etc.,						
structi	ures– wi	ille, until, for, etc.	, Jumping control structi	ures – break, continue, exit, etc., Integer and Real arithmetic in sh	en programs					
				Total Lecture Hours	40 hours					
Textb										
S. No	Book	Title		Author						
1	Opera	ting System Conce	epts Essentials	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Wiley, 2012						
2	Mode	n Operating Syste	ems	Andrew S. Tanenbaum, Herbert Bos, Pearson, 2014						
3	Linux	for Beginners: Ar	Introduction to the	Jason Cannon, CreateSpace Independent Publishing Platform,						
	Linux			2018						
	Opera	ting System and C	Command Line							
4		ctical Guide to Lin		Mark G. Sobell, Pearson, 2017						
ъ		s and Shell Progra	mming							
		e Books:		A 41						
S. No	Book T	itie		Author						
1	Operation Principle	ng Systems: Interr	nals and Design	William Stallings, Pearson, 2014						
2			ign-oriented Approach	Charles Crowley, McGraw-Hill, 1997						
3		ng Systems: A Mo		Gary J. Nutt, Pearson, 2014						
			-	-						
		of the UNIX Oper		Maurice J. Bach, Prentice Hall, 1986						
NPTE	CL/ You'	Tube/ Faculty Vi	deo Link:							
Modu	le 1	https://www.you	tube.com/playlist?list=Pl	LEAYkSg4uSQ3RTwDexX T0TU7V9hHM RO						
Modu	le 2	https://www.you	tube.com/watch?v=OrM	7nZcxXZU						
Modu	lo 3	https://www.vo	tube.com/watch?v=xCxc	ADLEV way						
Modu	ic 3	nups.//www.you	tuoe.com/waten/v=xext	IDKI A_WW						



Course (Code: CMCA	0105	Со	urse Name:	Workplace (Communicat	ion Compet	ence 1	L	Т	P	C
Course	Offered in: M	ICA First Y	ear						3	0	0	3
Pre-requ	uisite: Compre	ehension of l	oasic English la	nguage								
			roficiency in th						omm	on Eu	ropea	ın
			art business con					nin and				
create a l	better version	of 'self.' and	d to introduce th	ne key concep	ots of ethics, e	etiquette, and	life skills.					
Course (Outcome: Aft	ter completion	on of the course	, the student v	will be able to)			Bloo	om's		
									Kno	wledg	ge Lev	el
									(KL			
CO1	Identify key										ζ3	
CO2	Develop effe										Κ3	
CO3 Compose clear and concise statements on a variety of subjects. CO4 Understand and analyze simple written texts.								<u>ζ</u> 6				
CO4				exts.							ζ4 /2	
CO5	Demonstrate			TT: ala)						K	ζ3	
CO-PO	Mapping (Sc	ale 1; Low,	2: Medium, 3:	nigii)								7
CO-PO	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7		PO8		
CO1		2	2	-	-	2	-	2			3	
CO2		2	2	-	-	3	-	-	3		3	
CO3	CO3 3		2	2	2	3	-	-	2		2	
CO4	CO4 2		3	-	2	2	-	-	-		2	
CO5	~	3	2	-	2	3	-	-			2	
	Contents / Sy											
Module			NTRODUCT		MMUNICA'	TION					8 hou	rs
			nicating in Engl	ish								
	.3: Levels of		ommunication									
	.4: Barriers to											
Module	2.		ART OF LIST	ENING							8 hou	rc
	.1: Developin			EI (II (G							<u> </u>	
	2.2: Active and											
Module2	.3: Empatheti	c listening										
Module	3	\$	SPEAKING TO	O EXPRESS						:	8 hou	rs
	3.1: Effective 3.2: Etiquette		Key to Profess	ional Success								
			king Verbal del	ivery effectiv	e							
			os and Don'ts	, , , , , , , , , , , , , , , , , , ,								
Module 4 READING WITH COGNITIVE SKILLS											8 hou	rs
Module 4	4.1: Levels of	comprehens	on							•		
	4.2: Critical re	-										
Module 4	4.3: Acquiring	vocabulary	& sentence stru	cture from te	xts							
Module	5]	HARNESSING	WRITING	SKILLS						8 hou	rs
		e writing ski	11			-	· · · · · · · · · · · · · · · · · · ·					



		Total Lecture Hours 40 hours					
Textboo	k:						
S. No	Book Title	Author					
1	"Technical Communication – Principles and Practices"	Meenakshi Raman & Sangeeta Sharma					
2	"ABC Workbook"	NIET Publishing House					
Refe	erence Books:						
S. No	Book Title	Author					
1	"Cambridge English Business Benchmark (Pre-intermediate to Intermediate)" Norman Whitby						
2	"Technical Communication: A Practical Guide"	William S. Pfeiffer and Kaye A. Adkins					
3	"The Essentials of Technical Communication"	Elizabeth Tebeaux and Sam Dragga,					
4	"Listening in the Language Classroom"	John Field,					
5	"Speaking: Second Language Acquisition, from Theory to Practice"	William Littlewood					
6	"Second Language Writing in Transitional Spaces: Teaching and Learning Across Languages and Cultures"	Viniti Vaish and Guangwei Hu					
NPTEL	YouTube/ Faculty Video Link:						
Module 1	https://www.youtube.com/playlist?list=PLbMVogVj5nJSZB8BV29_s	PwwkzMTYXpaH					
Module 2 https://www.youtube.com/watch?v=0HHdBcGSzT0							
Module 3	https://www.youtube.com/playlist?list=PLrpK1inhO61X_ZfHMjPkYc	.com/playlist?list=PLrpK1inhO61X_ZfHMjPkYq7R09rlR255j					
Module 4 https://archive.nptel.ac.in/courses/109/104/109104126/							
Module 5 https://www.youtube.com/playlist?list=PLrpK1inhO61Wb4eGBX09XpM0lfoZbxuGg							



Course	Code: CMCA)101		Cou	rse Name: Co	omputer Sy	stem & Orga	nization		L	T	P	C	
	Offered in: Mo									3	1	0	4	
	uisite of Subje													
	Objective: The													
	ational and Sequ ny of CPU, Mer								tand the de	esign,	Tuncu	ionant	.y and	
	d I/O device, 80				, 1/O ports, in	odes of data	a transier bety	veen						
	Outcome: Afte				he student wi	11 be able to				Bloc	m's			
Course	outcome. 7 mic	or comple	tion or	the course,	ine student wi	n oc abic to						edge Level		
										(KL)	•			
CO1	Apply the c	oncept of	f numb	er systems.	, logic gates	, Boolean	algebra, Min	imization			K3			
CO1	techniques	•										11.5		
CO2	Define the co											Κ2		
CO3	Discuss the co											K2		
CO4	Describe the			nory system	i, cache mem	ory and Inp	ut/output inte	rface and			I	Κ2		
	modes of data Discuss the 3			caccor arch	itecture add	raccina ma	de instructio	n ovolo ono	l formate		1	K2		
CO5	Discuss the d	5U63-1111C	cropro	cessor arci	mecture, add	ressing mod	ies, msu ucu	on cycle and	i ioiiiiais.		1	N2		
СО-РО	Mapping (Sca	le 1: Low	v, 2: M	edium, 3: H	(ligh)					1				
CO-PO	O Mapping	PO1		PO2	PO3	PO4	PO5	PO6	PO7		PO8			
CO1		3		2	2	2			_	- 2			_	
CO2		3		2	2	2	-	-				1	_	
CO3		3		2	2	2	-	-	-	1			_	
CO4		2		2	2	2	-	-	-	-		1		
CO5		3		2	2	2	-	-	-			2	<u></u>	
	Contents / Syll	abus	***			DED GLIGA	TIL DOOL		DD 4			0.1		
Module	21		INTE	RODUCTIO	ON TO NUM	BER SYST	EM, BOOLI	EAN ALGE	BRA			8 hou	rs	
	Computers and									Fiv	e vari	ables,	Data	
	Fixed point rep					btraction, f	loating point	Representa	tion,					
	Multiplication,	IEEE/54		<u> </u>			TAT GEN GE					0.1		
Module	2			RODUCTIC CUITS	ON TO COM	BINATIO	NAL CIRCU	ITS AND SI	EQUENT	IAL		8 hou	rs	
Combin	national Circui	ts – Code			dder. Full Ad	der. Half Si	ubtractor, Full	subtractor.	MUX. DE	EMUX	. Enc	oder a	and	
Decode					,	,	,,	, , , , , , , , , , , , , , , , , , , ,			-,			
	tial Circuits – I	Latch and		-										
Module	23		REG	ISTER TR	ANSFER A	ND ALU D	ESIGN					8 hou	rs	
_	Transfer Languation. Arithmeti				•		Common Bus	System, Tw	o Bus Org	aniza	tion, t	hree-l	ous	
										8 hou	rs			
-	y Hierarchy, Ma		•		•		•	•	.10'					
I/O interaccess (rface, I/O ports,	Interrupt	s, Mod	es of data T	ranster: Progi	rammed I/O	, Interrupt Ini	tiated I/O, ai	nd Direct i	memo	ry			
Module			2025	MICRAPE	COCESSORS							8 hou	re	
Module	. J		0003	MICKUP	CESSURS							o nou	19	



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8085: Architecture, General register Organization, Stack Organization, pin diagram, Addressing modes, Instruction formats, instruction cycles and sub cycles (Fetch, decode, execute etc.), Instructions- Data Transfer, Arithmetic, Logical, Branch and Assembly language programming

			Total Lecture Hours 40	hours					
Textb	ook:								
S. No	Book	Title	Author						
1	Compu	nter System Architecture	M. Morris Mano, Pearson, 2012						
2	Digital	Design Techniques and Exercises: A Practice Book for Digital	Vaibbhav Taraate,						
Logic Design		Design	Springer Nature Singapore, 2021						
Referer	nce Boo	ks:							
S. No	Book	Title	Author						
1	Struct	tured Computer Organization	Andrew S. Tanenbaum, Pearson, 2012						
2	Comp	puter Organization and Architecture	William Stallings, Pearson, 2015						
3	Micro	processor Architecture, Programming and Applications with the	R.S. Gaonkar, Penram						
	8085		International Publishing, 2000						
NPTE	EL/You	Tube/ Faculty Video Link:							
Modul	le 1	https://onlinecourses.nptel.ac.in/noc20 cs64/preview							
Module 2		https://archive.nptel.ac.in/courses/117/106/117106086/							
Module 3		https://archive.nptel.ac.in/courses/106/106/106106092/							
Module 4		https://onlinecourses.nptel.ac.in/noc20_cs64/preview							
Modul	le 5	https://archive.nptel.ac.in/courses/117/105/117105126/							



Module 3

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY GREATER NOIDA-201306

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8 hours

Course	Code: CMCA	0102	Cours	se Name: Pr	ogramming	in C			L	T	P	С
Course	Offered in: MO	CA First Year			0 0				3	0	0	3
Pre-req	uisite: Basic kn	nowledge of com	puters									
		e objective of a		ming cours	e is to provi	de students	with a solid	d founda	tion	in the	· C	
		e. The course a										ming,
		r ability to wri				,	1 / 1	1		•		<i>O</i> ,
Course	Outcome: Afte	er completion of	the course, th	ne student wil	l be able to				Bloc Kno (KL)	wledg	e Lev	el
CO1		ndamentals of C asic C programs		g to recogniz	e tokens, ope	rators, and d	ata types in		К3			
CO2 Implement control structures, loops, functions, recursion, and storage classes to develop structures, C programs solving basic computational problems.										k	(4	
Apply pointers, arrays, and string manipulations to perform memory-efficient operations and so problems using modular C programming techniques.							d solve		K	ζ4		
CO4 Develop programs using structures, unions, and dynamic memory allocation to handle compled data and optimize memory usage in C.								mplex	K4			
CO5 Implement file handling, sorting, searching, and command-line argument techniques to manage data input/output efficiently in C programs.										K4		
СО-РО	Mapping (Sca	le 1: Low, 2: M	edium, 3: Hi	gh)								_
CO\P	О	PO1	PO2	PO3	PO4	PO5	PO6	PO7		PO8		
CO1		3	2	2	2	1	1	-			1	
CO2		3	3	2	3	2	1	-			2	
CO3		3	3	3	3	2	2	-			2	
CO4		3	2	3	3	2	2	-			2	
CO5		3	3	3	3	3	3	-		,	3	
	Contents / Syll											
Module					ROGRAMM						8 hou	
Introduction to Algorithm and C Program: Programming using C: Concepts of Algorithm and Flowchart, Translator and its types Applications of C programming, Structure of C program, Overview of compilation and execution process in an IDE, Transition from algorithm to program, Syntax, logical errors and Run time errors, object and executable code Tokens & Operators: Keywords identifiers, constant, Operators and their types, Arithmetic expressions and precedence: Operators precedence and associativity, type conversion, mixed operands. Data Types & Variables: Basic data types, type modifiers, variable declaration, memory allocation												n from words,
Module	2	CON	TROL STR	UCTURES A	AND FUNC	ΓΙΟΝS					3 hou	rs
Condition Concept Function Recursion	onal Branchin of loops, for, ns: Concept of on: Definition,	g: if, else-if, no while and do- Sub-programm. Types of recursi of variable, loca	ested if - else while, multi ing, function we functions,	e, switch state tple loop var types of fur Tower of Ha	ements, use oriables, use of actions, passionoi problem	of break, and of break and ng parameter	continue stars to function	atements, as: call by	neste y valu	tion a	nd lo	oops:

ARRAY AND POINTERS

Pointers: Defining and declaring pointer, pointer arithmetic and scaling, Pointer Aliasing. call by reference



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Arrays: Array notation and representation (one and two dimensional), array using pointers, manipulating array elements, 2-D array s used in matrix computation. Sorting and searching algorithms

Strings: Introduction, initializing strings, accessing string elements, Array of strings, Passing strings to functions, String manipulation functions.

Module 4 DERIVED DATA TYPES AND MEMORY MANAGEMENT 8 hours

Structure: Introduction, Initializing, defining, and declaring structure, accessing members, Operations on individual members, Operations on structures, Structure within structure, Array of structure

Union: Introduction, Initializing, defining, and declaring structure, Accessing members, Operations on individual members, Operations on Union, Difference between Structure and Union

Dynamic Memory Allocation: Introduction, Library functions-malloc (), calloc(), realloc() and free()

Moau	viodule 5 FILE MANAGEMENT 8 hours								
			r, File opening modes, File handling functions, Command Lin	e Argument					
File ha	andling	through command line arguments, Record I	/O in files						
			Total Lecture Hours	40 hours					
Textbo	ook:								
S. No	Book	Title	Author						
1	C: Th	e Complete Reference	Herbert Schildt, McGraw-Hill, 2000						
2	Progr	amming in ANSI C	E. Balagurusamy, 9th Edition, McGraw-Hill Education India,	2024.					
3	Let U	Js C	Yashavant P. Kanetkar, 20th Edition, BPB Publications, 2024						
Refere	ence Bo	ooks:							
S. No	Book	Book Title Author							
1	Mode	Modern C, Third Edition Jens Gustedt, Manning Publications, 2023							
2	Head	First C: A Brain-Friendly Guide	David Griffiths & Dawn Griffiths, O'Reilly Media, 2012						
3	C Pro	gramming in Easy Steps	Mike McGrath, In Easy Steps Limited, 2022						
NPTE	L/You	Tube/ Faculty Video Link:							
Modul	e 1	https://www.youtube.com/watch?v=KnvbU	iSxvbM&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&a						
		b channel=Programiz							
Modul	e 2	https://www.youtube.com/watch?v=JYHpDndex=25&ab_channel=Programiz	99huNR4&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&i						
Modul	e3	https://www.youtube.com/watch?v=MOeGondex=19&ab_channel=Programiz	namlUP4&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&i						
Modul									
Modul	* * * * * * * * * * * * * * * * * * * *								



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Get Pulsare Hear	v Autenamous I	stuffice			•		er Applica	•				
I AR Ca	ourse Code: C	MCA0153	T A 1	B Course Na	me: Onersti	ing Systems	I ah		L	T	P	С
LAD CO	Jurse Coue: C.	WICAU155	LAI	D Course Na	ше: Ореган	ing Systems	Lau		L	1	Г	
		CA First Year							0	0	4	2
		s are expected to										
		nis course gives					and basics o	f OS mech	anism	is and	Hano	ds-on
		e with usage of the completion of							Bloc	?		
Course			m s wledg	e I ev	7e1							
									(KL)	_	,c Lcv	CI
CO1	Implement Linux commands to understand the concept of virtualization										<u>4</u>	
CO2	Solve the real-world problems using shell programming and shell scripting.										<u> </u>	
	Analyze process management and simulate CPU Scheduling Algorithms like FCFS, Round Robin,								K5			
CO3	SJF, and Priority.											
CO4	Implement P	rocess Synchron	ization and	analyze dead	lock handling	g techniques.			K5			
CO5	Simulate the algorithms.	continuous and	non-continu	ous memory	allocation co	oncepts and a	nalyze disk s	cheduling		ŀ	ζ5	
CO-PO		ale 1: Low, 2: M	ladium 3· I	High)								
	Mapping (Bed	PO1	PO2	PO3	PO4	PO5	PO6	PO7		PO8		
CO1		3	2	2	3	1	-	-			2	1
CO2		3	2	3	3	2	-	-			3	1
CO3		3	3	3	3	-	-	-	-		2	
CO4		3	3	3	3	-	-	1	2			
CO5		3	3	3	3	ı	-	-			2	
List of I	Practical's (In	dicative & Not 1	Limited To)								
1.		ation Comman nd, find comma										
	G Al C	v 1 1		1 1	1.0.1		1					

- 2. Status Alter Commands: chgrp command, chown command & chmod command
- 3. Compile Commands: cc command
- 4. **Process Commands:** ps command, kill command
- 5. Miscellaneous Commands: Echo command, cal command, date command, whoami command, expr command & test command
- 6. Filter Commands: cut command, paste command, head command & tr command
- 7. Write a program to create a child process and print the process ids of parent and child process
- 8. Write a Shell program to check the given number is even or odd.
- 9. Write a Shell program to find the factorial of a number
- 10. Write a Shell program to swap the two integers.
- 11. Write a shell script to calculate the gross salary if basic salary is given. DA is 40% of basic salary and HRA is 60% of basic salary.
- 12. Write a shell script to reverse the digits of a number.
- 13. Write a shell script to compute the sum of digits.
- 14. Write a shell script to convert the contents of files to uppercase, given multiple files on command line.
- 15. Write a shell script to print the just the time, just the day of month and just the day of week as desired by user.
- 16. Write a shell script to print a word n times. Taking the n and the word from command line.



- 17. Write a shell script to print the area and perimeter of a rectangle and area and circumference of a circle. The length, breadth and radius are inputted through keyboard.
- 18. Write a shell script to delete all lines containing the word "unix" from all files provided as command line arguments.
- 19. Write a shell script to search a number in the given List of numbers. Number is provided as first argument in command line arguments; the List of numbers follows that.
- 20. Write a shell script to sort the numbers provided as command line arguments in a descending order.
- 21. Write a shell script to count the number of negative and positive numbers provided as command line arguments.
- 22. Write a shell Script to Concatenate Two Strings.
- 23. Write a shell script to print Fibonacci series.
- 24. Write a shell script to find whether a year is leap year or not.
- 25. Write a shell script to find whether a number is prime or not.
- 26. Write a program Using First-Come, First-Served (FCFS) Scheduling to find average turnaround time and average waiting time.
- 27. Write a program Using SJF CPU scheduling algorithm to find average turnaround time and average waiting time.
- 28. Write a program Using **Priority** CPU scheduling algorithm to find average turnaround time and average waiting time.
- 29. Write a program Using Round Robin scheduling to calculate average turnaround time and average waiting time.
- 30. Write a Program to execute **Race Condition** of Process Synchronization.
- 31. Write a program to implement **Producer Consumer** Problem.
- 32. Write a Program to Implement **Dinning Philosophers** Problem.
- 33. Write a Program to Implement Banker's Algorithm
- 34. Write a Program to Implement FIRST FIT, BEST FIT, WORST FIT Memory Allocation.
- 35. Write a Program to Implement FIFO, LRU and Optimal Page Replacement Algorithm.
- 36. Write a Program to Implement FCFS, SSTF Disk Scheduling Algorithm.
- 37. Write a Program to Implement SCAN, CSCAN Disk Scheduling Algorithm.
- 38. Write a Program to Implement LOOK, CLOOK Disk Scheduling Algorithm.



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LAB C	LAB Course Name: Computer System & Organization Lal					С			
Course	Offered in: MCA First Year		0	0	2	1			
Pre-rec	Pre-requisite: Basic Knowledge of Mathematics and Computer Fundamentals								
	Course Objectives: Students will gain practical experience with designing and implementing concepts of gates, Multiplexer, Flip Flops, 8085 microprocessors								
Course	Bloom's Knowledge Level (KL)								
CO1	Design and verify logic gate		К3						
CO2	Design and verify and implement combinational circuit: Half adder, Full adder, Half subtractor, Full subtractor, Code convertor								
CO3 Design and implement Decoder, Multiplexer									
CO4	Demonstrate the working of flip-	K2							
CO5	Demonstrate the working of 8085	K2							

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

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

List of Practical's (Indicative & Not Limited To)

- 1. Verification of the functionality of all logic gates.
- 2. Implementing HALF ADDER, FULL ADDER using basic logic gates.
- 3. Implementing HALF SUBTRACTOR, FULL SUBTRACTOR using basic logic gates.
- 4. Implementing Binary -to -Gray, Gray -to -Binary code conversions.
- 5. Implementing 3–8-line DECODER.
- 6. Implementing 4x1 and 8x1 MULTIPLEXERS.
- 7. Verify the excitation tables of various FLIP-FLOPS.
- 8. Introduction of 8085 microprocessor.
- $9. \ \ Write a program to add two \ 8-bit hexadecimal numbers in \ 8085 \ microprocessors.$
- 10. Write a program to subtract two 8-bit hexadecimal numbers in 8085 microprocessors.



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LAB Course Code: CMCA0155	LAB Course Name: Workplace Communication Competence 1- Lab	L	T	P	С
Course Offered in: MCA First Year		0	0	4	2

Pre-requisite: Comprehension of basic English language

Course Objectives:

- To improve proficiency in the English language to the lower intermediate level of CEFR (Common European Framework of Reference).
- To impart business communication skills.
- To motivate students to look within and create a better version of 'self.'
- To introduce the key concepts of ethics, etiquette, and life skills.

Course	Outcome: After completion of the course, the student will be able to	Bloom's
		Knowledge Level
		(KL)
CO1	Identify key concepts of life-skills	K3
CO2	Develop effective listening skills	К3
CO3	Compose clear and concise statements on a variety of subjects	K6
CO4	Understand and analyze simple written texts	K4
CO5	Demonstrate clarity while writing	К3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	2	2	-	-	2	-	2	3		
CO2	2	2	-	-	3	-	-	3		
CO3	3	2	2	2	3	-	-	2		
CO4	2	3	-	2	2	-	-	2		
CO5	3	2	-	2	3	-	-	2		

List of Practical's (Indicative & Not Limited To)

- 1. The students will be familiarized with the examination pattern. Getting rid of stage fright and developing a sense of freedom and creativity
- 2. The students will be able to understand the meaning of messages conveyed using body language (through videos & games like Dumb Charades).
- 3. The students will practice greeting the peers and building rapport with the people around.
- 4. Developing active listening and accurate communication skills. Students will practice conveying information accurately and understand the importance of clear communication (through activities like Chinese whisper).
- 5. Students will enhance their reading comprehension abilities, improve vocabulary and language skills, and develop strategies for efficient and effective reading.
- 6. The students will practice and learn outcome-based writing
- 7. The students will practice professional introductions.
- 8. The students will learn to comprehend verbal instructions, pay attention to detail, and develop the ability to follow multi-step directions accurately.
- 9. The students will practice retention of the information given verbally and re-produce it through speaking.
- 10. Develop critical thinking skills, analyze the effectiveness of communication practices, and gain insights into real-world communication challenges and their solutions



- 11. Participants will be exposed to General Service List (GSL) by West and Academic Word List (AWL); the students will be asked to keep a journal of new words learnt every day.
- 12. The students will practice basic writing skills through sentence construction by understanding the requisites of a good sentence.
- 13. The students will practice listening to statements and writing exactly what they hear.
- 14. The students will practice responding effectively to queries/questions related to general everyday subjects (customer care, delivery agents, outlets etc.)
- 15. The students will be able to remove verbosity from their language. Students will participate in activities based on sample sentences and paragraphs.
- 16. Participants will listen to their peers reading aloud and write down the gist; and will repeat verbatim what is read.
- 17. Students will listen to the motivational speech by Dr A. P. J. Abdul Kalam and reflect on it.
- 18. Students will pair up and have short conversations with each other extracting specific information.
- 19. Students will learn to give directions, develop spatial awareness, and improve their navigational skills.
- 20. Students will learn to speak with confidence in public, using various verbal and non-verbal aspects of speech.

 Students will gain awareness of speaking in a professional environment and enhance their overall communication in English
- 21. To foster critical thinking, encourage creativity and expression, promote media literacy, and create an enjoyable learning experience by writing reviews.
- 22. Engaging in realistic scenarios, students will develop their communication abilities, cultural awareness, confidence, and proficiency in the target language.
- 23. Students will develop the ability to express their opinions, actively listen to others, and engage in constructive group discussions to develop well-rounded perspectives.
- 24. The students will share their key learnings from the course.



LAB C	ourse Code: C	CMCA0152	LA	B Course Na	me: Progra	mming in C	Lab		L	Т	P	C
Course	Offered in: M	ICA First Yea	r						0	0	4	2
Pre-rec	quisite: Basic k	nowledge of co	mputers									
	-	The objective of		_	•							
		e. The course a			s with the sy	ntax, concept	s, and princip	oles of C p	rogra	mmin	g, as v	well a
		write efficient			211.1 1.1				Dla	om's		
Course	Outcome: An	ter completion of	of the course,	the student v	viii de adie to)				wledg	ge Lev	el
CO1	Implement and trace the execution of conditional and iteration programs. K3											
CO2		e use of arrays,								ŀ	ζ3	
CO3		mplex problem		-						ŀ	ζ3	
CO4	Compare an allocation	d contrast betwe	een Structure	and union alo	ong with cond	cepts of dynar	nic memory			ŀ	ζ4	
CO5	Apply the co	oncepts of File l	Handling							ŀ	ζ3	
CO-PO) Mapping (Sc	ale 1: Low, 2: 1	Medium, 3: 1	High)								
CO\F		PO1	PO2	PO3	PO4	PO5	PO6	PO7		PO8		
CO1		3	2	2	2	1	1	1			1	
CO2		3	3	2	2	2	1	1			2	1
CO3		3	3	3	3	2	2	1			2	
CO4		3	2	3	3	2	2	1			2	
CO5		3	3	3	3	2	2	1			3	
List of	Practical's (In	dicative & Not	t Limited To)				<u> </u>		<u> </u>		
		gram that simul			pable of perf	forming basic	arithmetic o	perations				
2)	Develop a calc	culator applicat	ion that perfo	orms conversi	ions between	different nur	mber systems					
3)	Write a progra	am in C to evalu	ate the giver	polynomial	equation							
4)	Write a progra	am (write a prog	gram) in C to	calculate po	w (x,n)							
5)	Write a progra	am in C to find	largest numb	er among thr	ee numbers							
6)	Write a progra	am in C to find	roots of a qua	adratic equati	on							
7)	Write a progra	am in C to chec	k leap year. I	Evaluate all th	ne cases							
8)	Write a progra	am in C to chec	k whether a r	number is pos	sitive or nega	tive						
9)	Write a progra	am in C to chec	k whether a c	haracter is a	n alphabet or	not						
10)	Write a progra	am in C to make	e a simple cal	culator using	switchcase	2						
11)	Write a progra	am in C to chec	k whether a r	number is eve	en or odd							
12)) Write a progra	am in C to chec	k whether a c	character is a	vowel or con	isonant						
12)	, a progra		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	15 d								



13) Write	a program in C to find the largest number among three numbers
14) Write	a program in C to check whether a number is positive or negative
15) Write	a program in C to calculate the sum of natural numbers
16) Write	a program in C to find factorial of a number
17) Write	a program in C to generate multiplication table
18) Write	a program in C to display Fibonacci sequence
19) Write	a program in C to find GCD of two numbers
20) Write	a program in C to find LCM of two numbers
21) Write	a program in C to display characters from a to z using loop
22) Write	a program in C to reverse a number using looping concepts
23) Write	a program in C to check whether a number is palindrome or not
24) Write	a program in C to check whether a number is prime or not
25) Write	a program in C to check Armstrong number
26) Write	a program in C to display Armstrong number between two intervals
27) Write	a program in C to display factors of a number
28) Write	a program in C to calculate the sum of natural numbers
29) Write	a program in C to find factorial of a number
30) Write	a program in C to convert binary number to decimal and vice-versa
31) Write	a program in C to display a diamond-shaped pattern
32) Write	a program in C to display Floyd's triangle
33) Write	a program in C to display Pascal triangle
34) Write	a program in C to print star patterns
35) Write	a program in C to print pyramid patterns
36) Write	a C program that performs grade calculation for multiple students
37) Desig	n a C program with hierarchical menu system for geometric calculations
38) Write	a program in C to display prime numbers between intervals using function
39) Write	a program in C to check whether a number can be expressed as sum of two prime numbers
40) Write	a program in C to check prime or Armstrong number using user-defined function
41) Deve	lop a menu-driven C program to manage student records



42)	Write a program in C to find the sum of natural numbers using recursion
43)	Write a program in C to find factorial of a number using recursion
44)	Write a program in C to find GCD using recursion
45)	Write a program in C to calculate the power using recursion
46)	Write a program in C to find the sum of natural numbers using recursion
47)	Write a program in C to add two number using recursion
48)	Write a program in C to find sum of digit of number using recursion
49)	Write a program in C which will remove any given character from a string
50)	Write a program in C to find the frequency of characters in a string
51)	Write a program in C to count the number of vowels, consonants and so on
52)	Write a program in C to remove all characters in a string except alphabets
53)	Write a program in C to find the length of a string
54)	Write a program in C to concatenate two strings
55)	Write a program in C to copy string without using strcpy ()
56)	Write a program in C to sort elements in lexicographical order (dictionary order)
57)	Write a program in C to find the frequency of characters in a string
58)	Write a program in C to count occurrence of a given character in a string
59)	Write a program in C to check if two strings are anagram
60)	Write a program in C to check a string is palindrome or not
61)	C program to check given character is vowel or consonant
62)	Write a program in C program to check given character is digit or not
63)	Write a program in C program to replace the string space with a given character
64)	Write a program in C program to convert lowercase char to uppercase of string
65)	Write a program in C program to convert lowercase vowel to uppercase in string
66)	Write a program in C program to delete vowels in each string
67)	Write a program in C program to count occurrence of vowels & consonants in a string
68)	Write a program in C program to print the highest frequency character in a string
69)	Write a program in C program to replace first occurrence of vowel with '-' in string
70)	Write a program in C program to count alphabets, digits, and special characters



71) Write a program in C program to separate characters in each string
72	2) Write a program in C program to remove blank space from string
73	3) Write a program in C program to count blank space from string
74	Write a program in C program to concatenate two strings
75	S) Write a program in C program to remove repeated character from string
76	5) Write a program in C program to calculate sum of integers in string
77	Write a program in C program to print all non-repeating character in string
78	3) Write a program in C program to copy one string to another string
79	Write a program in C program to sort characters of string
80) Write a program in C program to sort character of string in descending order
81) Write a program in C to calculate average using arrays
82	2) Write a program in C to find largest element in an array
83	B) Write a program in C to search an element from given array
84	Write a program in C to add two matrices using multi-dimensional arrays
85	5) Write a program in C to multiply two matrices using multi-dimensional arrays
86	6) Write a program in C to find transpose of a matrix
87	7) Write a program in C to access array elements using pointer
88	3) Write a program in C to find largest number using dynamic memory allocation
89	Write a program in C to calculate average using arrays
90)) Write a program in C to find largest element in an array
91) Given an array containing numbers from 1 to 100 with one number missing, write a C program to find the missing number efficiently
92	2) Given an array containing numbers from 1 to 100 where multiple numbers may be duplicated, write a C program to identify and display all the duplicate numbers
93	3) Write a program in C to remove duplicate elements form array in C
94	Write a C program to find and display the numbers that appear in Array 1 but are not present in Array 2
95	5) Write a program in C for, how to compare two array is equal in size or not
96	5) Write a program in C to find largest and smallest number in array
97	7) Write a program in C to find second highest number in an integer array
98	8) Write a program in C to find top two maximum number in array



99)	Write a C program to print array in reverse Order
100)	Write a C program to reverse an Array in two ways
101)	Write a C Program to calculate length of an array
102)	Write a C program to insert an element at end of an Array
103)	Write a C program to insert element at a given location in Array
104)	Write a C Program to delete element at end of Array
105)	Write a C Program to delete given element from Array
106)	Write a C Program to delete element from array at given index
107)	Write a C Program to find sum of array elements
108)	Write a C Program to print all even numbers in array
109)	Write a C Program to print all odd numbers in array
110)	Write a C program to perform left rotation of array elements by two positions
111)	Write a C program to perform right rotation in array by 2 positions
112)	Write a C Program to merge two arrays
113)	Write a C Program to find highest frequency element in array
114)	Write a C Program to Store Information of a Student Using Structure
115) an	Develop a C program that Dynamically allocates memory for storing multiple instances of the structure using pointers d malloc (or calloc)
116)	Write a C Program to Add Two Distances (in inch-feet system) using Structures
117) ho	Write a C program to define a union for student information containing roll number, name, and marks. Demonstrate w memory is shared in a union.
118) the	Create a union for employee information with fields: emp_id, salary, and name. Input values for each field and print em to show how union stores only one value at a time.
	1 7
119) 120)	em to show how union stores only one value at a time.
119) 120)	em to show how union stores only one value at a time. Demonstrate accessing a union variable through pointer dereferencing. Use a union within a structure to represent different types of bank accounts (e.g., savings and current). Input account
119) 120) typ	Demonstrate accessing a union variable through pointer dereferencing. Use a union within a structure to represent different types of bank accounts (e.g., savings and current). Input account be and show relevant fields using union.
119) 120) typ 121)	Demonstrate accessing a union variable through pointer dereferencing. Use a union within a structure to represent different types of bank accounts (e.g., savings and current). Input account be and show relevant fields using union. Write a C program to write a sentence to a text file



125)	Write a C program to copy one file into another
126)	Write a C program to write a structure into a file and display its content
127)	Write a C program to search a record in a file
128)	Write a program in C to read an existing file
129)	Write a program in C to write multiple lines to a text file
130)	Write a program in C to read the file and store the lines in an array
131)	Write a program in C to find the number of lines in a text file
132)	Write a program in C to find the content of a file and the number of lines in a text file
133)	Write a program in C to count the number of words and characters in a file
134)	Write a program in C to list all files and sub-directories in a directory
135)	Write a program in C to count number of lines in a file
136)	Write a program in C to merge contents of two files into a third file
137)	Write a program in C to count number of lines, words, characters, blank space in a file
138)	Write a program in C to Shutdown Computer in Linux
139)	Create a C program that simulates basic functionalities of an ATM system
140)	Develop a C program to manage the information of workers or employees in an organization using file handling
141)	Design a C program that helps a library in-charge efficiently manage books and customers



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K4

K3

K3

Course	urse Code: CMCA0202 Course Name: Database System					C
Course	Offered in: MCA First Year	•	3	1	0	4
_	uisite: Students are expected to be reasoning.	familiar with basic computer knowledge, as well as the fundamen	ntals of mat	hema	itics a	nd
	Objectives: To introduce DBMS cal and non-relational databases.	oncepts emphasizing efficient organization, maintenance, and retu	rieval of in	forma	ation i	in
Course	Outcome: After completion of the	course, the student will be able to	Bloo	m's		
			(KL)	-		
CO1	Understand the basic concepts algebra/calculus.	of DBMS, data models, ER/EER models, and relational		K2		
CO2	Apply SQL queries to perform		K3			

Analyze and construct complex SQL queries including nested, joins, set operators, and

Develop PL/SQL programs and manage transactions with concurrency control mechanisms.

Implement and manage NoSQL databases using MongoDB and understand cloud database

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

implement database connectivity.

normalization techniques.

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

Course Contents / Syllabus

concepts.

CO₃

CO4

CO5

Module 1 INTRODUCTION OF DATABASE & CONCEPTUAL DESIGNING 8 hours

Introduction about the DBMS: Basic Concept: - Introduction of Data, Information, Database, DBMS, database system, structured, semi-structured and unstructured data. Database system Vs File system.

Data models & Types of Data Models: Relational Database: Relation, Tuple, Attribute and Domain, Codd Rules, Design & Implement the ER Diagram

Data Modelling using the Entity Relationship Model: ER model concepts, Degree of relationship, Notations for ER diagram, mapping constraints, reduction of ER diagrams to tables. Extended Entity Relationship Diagram & reduction of EER diagram to tables. **Introduction on SQL:** Implement the DDL, DML, DCL & TCL: Introduction on SQL & Types of SQL commands: - DDL, DML, DCL, TCL.

Introduction on Relational Algebra & relational Calculus: Basic of Relation Algebra and Relational calculus

Module 2 BASIC OF SQL & NORMALIZATION 8 hours

Implementation of the Keys: Keys & Types of Keys: - Super key, Candidate Key, Primary Key, Alternative Key Composite Primary key, Foreign Key, unique and Composite Unique key

Implementation of Data Constraint: Data Constraint: - Null, Not Null, Default and check Constraint

Implementation of Aggregate function & clause: Use of Aggregate Function: -Min (), Max (), Count (), AVG (), Sum (). Use of Clause: Where, Group by, Having and Order by

Understand & implement the normalization: Uses of String Functions in SQL, Uses of mathematical functions in SQL. Uses of Advanced Functions in SQL Armstrong's axioms. Functional Dependencies, Normalization & Types of



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Normalization,1NF, 2NF, 3NF, BCNF. Multivalued Dependency, Join Dependency. Minimal Cover of FD's, Closure of an attribute, Lossless join decomposition

Different types of functions in SQL: Uses of String Functions in SQL, Uses of mathematical functions in SQL. Uses of Advanced Functions in SQL

Module 3 INTRODUCTION OF COMPLEX QUERIES

8 hours

Operator & Predicates: Operator & Predicates: - Like, Between, Aliases, Distinct, Limit,

Implementation of Logical operator: And, Or, Not.

Set Theory Operator: Basic Set Operators: Selection, projection, rename, cross product, union, set difference

Derived Operators: Intersection, Division, Join. Inner Join: - Natural Join, Equi Join & Non Equi Join Outer Join: - Left Outer Join,

Right Outer Join and Full Outer Join.

Nested Query: Nested Query, Sub Query or Correlated Query: -IN, NOT IN, Exists, Not Exists, All, Any

Implementation the database connectivity: Database connectivity with Java or Python

Module 4 PL/SOL AND TRANSACTION & CONCURRENCY CONTROL

8 hours

Implementation index and Views: Managing Indexes, Synonyms and Sequences, Managing Views, Managing Data in Different Time Zones

Implementation of PL/SQL: Introduction of PL/SQL, Implementation of PL/SQL Function Procedure, Trigger, Cursor Implementation of Transaction management & concurrency control: Transaction system: - Life cycle of transaction, ACID Properties. Serial, non-serial schedule. Conflict Serializability. View Serializability. Recoverable Schedule, Cascade less schedule. Cascading rollback. Control Concurrency Techniques: Concurrency Control, Locking Techniques for concurrency control, 2-phase Locking protocol, strict 2 -phase locking protocol, rigorous 2-phase locking protocol

Transaction & Data Control: Grant, Revoke, commit & Rollback

Module 5 INTRODUCTION OF NoSQL WITH MongoDB

8 hours

Understand NoSQL Concept and implement the CURD operations: Introduction of NoSQL Data Models: Document, Key Value, Column family, Graph. Overview of NoSQL Databases with their Types, Uses& Features of NoSQL Document Databases. CAP theorem, BASE Vs ACID.

Introduction and Features of MongoDB: Sharding, Load Balancing, Indexing, Replication. MongoDB Shell & their commands Mongosh, MongoD, MongoDB Compass. MongoDB Collection, Document, Field & Value. MongoDB Operators, CRUD operations Implement the MongoDB Cursor

Relation and Aggregation in MongoDB: MongoDB Cursor & Methods, Relations in MongoDB, Aggregation in MongoDB **Understand the concept of cloud database:** Introduction of Cloud Database. MongoDB Cloud: - Atlas, Cloud Manager.

		Total Lecture Hours 40 hours						
Textboo	ok:	•						
S. No	Book Title	Author						
1	Database System Concepts	Korth, Silbertz, Sudarshan, Seventh Edition, McGraw - Hill. (2019)						
2	Fundamentals of Database Systems	Elmasri, Navathe, Seventh Edition Addison Wesley. (2017)						
3	SQL, PL/SQL The programming language of Oracle							
4	NoSQL with MongoDB in 24 Hours	Brad Dayley , Sams Publishing; 1st edition (2014)						
Refere	ence Books							
S. No	Book Title	Author						
1	Database Systems: A Practical Approach to Design,	Thomas Cannolly and Carolyn Begg, Third Edition,						
	Implementation and Management	Pearson Education, (2007)						
2	Database Management Systems	Raghu Ramakrishan and Johannes Gehrke						
		Third Edition, McGraw-Hill (2002)						
3	An Introduction to Database Systems	CJ Date, Eighth Edition, Pearson. (2004)						
4	NoSQL and SQL Data Modeling: Bringing Together	First Edition by Ted Hills.						
	Data,	(2016)						
	Semantics, and Software							



NPTEL/Yo	NPTEL/ YouTube/ Faculty Video Link:					
Module 1	https://archive.nptel.ac.in/courses/106/106/106106220/					
Module 2	https://onlinecourses.nptel.ac.in/noc21_cs04/preview					
Module 3	https://nptel.ac.in/courses/106106093					
Module 4	https://swayam-uat-node1.appspot.com/proc_9i/preview					
Module 5	https://www.udemy.com/course/sql-to-nosql-database-handson-with-mongodb/					



Course (T	P	C		
Course (Offered in: MO	CA First	Year	•						3	1	0	4
	isite: Students		ted to hav	e knowle	dge of progra	mming langu	ages, along v	vith a foundation	on in 1	nathei	natics	and	
	solving ability.		•	. 6.1	1.1 1 1	1 1.1		C1'	•	1.	1 .		
Course (Objectives: Le	arn the ba	sic conce	ots of algo	rithm analysi	s, along with	ımplementatı	on of linear an	d non			struct	ures.
Course (Course Outcome: After completion of the course, the student will be able to Bloom's Knowled (KL)									vledg	's edge Level		
CO1	Describe the roff.	need of da	ta structu	re and alg	orithms in pr	oblem solvin	g and Analyz	e Time space t	rade-		K	[4	
CO2	Describe the r	eal-world	application	ns using s	tack and que	ie.					K	2	
CO3	Discuss differ											3	
CO4	Evaluate the re										K	.5	
CO5	Identify and a problems	nalyze the	e computa	ational eff	iciencies of s	earching and	sorting algor	ithms in real w	orld		K	[4	
CO-PO	Mapping (Scal	e 1: Low,	2: Medi	ım, 3: Hiş	gh)								
со-ро	Mapping	PO1	F	PO2	PO3	PO4	PO5	PO6	PO	7	P	08	
CO1		3		3	2	2	-	-		-		2	
CO2		3		2	2	2	-	-		-		1	
CO3		3		2	2	2	-	-		-		1	
CO4		3		3	3	3	-	-		-	- 2		
CO5		3		3	3	3	-	-		-		3	
Course (Contents / Sylla	abus											
Module						STRUCTU						3 hou	
Index Fo	pes: Types of I ormulae for 1-I s of algorithms	D,2-D,3-D	and n-D	Array									
Module 2	2		STACK	& QUEU	ES						8	3 hou	rs
Recursion iteration	Primitive Stac on: Principles of and recursion. Operations on	k operation	ons: Push on, Types	& Pop, of Recur	mutual conv sions, Proble	m solving usi	ing iteration,	Tower of Ha	ınoi, T	rade-			
Module	3		LINKEI	LISTS							8	3 hou	rs
	ists: Linked list ist, Circular Lin	-		•		• •		ly Linked List	, Doul	oly			
Module 4			TREES		,		J				1	3 hou	rs
Trees: Tree, Ext	Basic terminol tended Binary T l, Binary Heaps	Tree, Tree	ry Trees, Traversal	algorithn	ns: In-order, l	Pre-order and	Post order. C	onstructing Bi	nary [Γree fi	mple om g	te Bir iven T	nary
Module :	5		GRAPH	S							1	3 hou	rs



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Graphs: Terminology used with Graph, Graph Sorting Techniques: Representations: Adjacency matrices, Adjacency List. Connected Component, Spanning Trees, Prim's and Kruskal's algorithm, Shortest Path algorithms: Dijkstra Algorithm, Floyd Warshall's Algorithm

Hashing: Sorting Algorithms. Hashing: Hash Functions, Collision- Resolution Techniques.

			Total Lecture Hours 40 hours					
Text	book:		<u> </u>					
S. No	Book T	Title	Author					
1		ructures and Algorithms in Python ian Adaptation)	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser Wiley Publication					
2	DATAS	STRUCTURES USING PYTHON	12 March 2021, Dr Shriram K. Vasudevan (Author), Mr Abhishek S. Nagarajan (Author), Prof Karthick Nanmaran (Author) Oxford Higher Education, First Edition					
3		n Solving in Data Structures & ms Using Python	Hemant Jain ,1 January 2022, Third Edition					
Refe	rence Bo	ooks:						
S. No	Book T	Title	Author					
1	Data St	ructure (Mumbai University)	Kiran Gurbani, Krupa Kamdar. Himalaya Publishing House					
2		ructures with Python: Get Familiar with the on Data Structures and Algorithms in Python	Harsh Bhasin, BPB Publications, 1 May 2023.					
3	Data St	ructures and Algorithms Using Python.	Sharma, Notion Press,13 April 2023.					
NPT	EL/ You	Tube/ Faculty Video Link:						
Mod	ule 1	https://nptel.ac.in/courses/106/106/106106127/ https://www.youtube.com/watch?v=zWg7U00EAoE&list=PLBF3763AF2E1C572F						
Mod	ule 2	https://www.youtube.com/watch?v=4OxBvBXon5w&list=PLBF3763AF2E1C572F&index=22						
Mod	ule 3	https://www.youtube.com/watch?v=cR4rxllyiCs&list=PLBF3763AF2E1C572F&index=23 https://nptel.ac.in/courses/106/106/106106127/						
Mod	ule 4	https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBI	F3763AF2E1C572F&index=24					
Mod	ule 5	https://www.youtube.com/watch?v=hk5rQs7TQ7E&list=PLE	BF3763AF2E1C572F&index=25					



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Course Code: CMCA0204	Course Name: Design Thinking – I	L	Т	P	С
Course Offered in: MCA First Year				0	3
TD 11/1 37					

Pre-requisite: None

Course Objectives: The objective of this course is to familiarize students with the design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite their minds to create innovative ideas as develop solutions for real-time problems.

Course	Course Outcome: After completion of the course, the student will be able to			
		Level (KL)		
CO1	Develop a strong understanding of the design process and apply it in a variety of business settings	K1		
CO2	Analyze self, culture, and teamwork to work in a multidisciplinary environment and exhibit empathetic behavior	K3		
CO3	Formulate specific problem statements of real-time issues and generate innovative ideas using design tools	K4		
CO4	Apply critical thinking skills to arrive at the root cause from a set of likely causes	K4		
CO5	Demonstrate an enhanced ability to apply design thinking skills for the evaluation of claims and arguments	K4		

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

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

Course Contents / Syllabus

Module 1 INTRODUCTION 8 hours

An overview of future skills, introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, design mindset. Introduction to elements and principles of design, 13 Musical Notes for Design Mindset, Examples of Great Design, Design Approaches across the world.

Case Studies: Mumbai Dabbawallas, Gillette, Singapore, Bengaluru, Bahubali, Google, Embrace Incubator

Activity: Observation, Wicked Problem

Module 2 ETHICAL VALUES AND EMPATHY 8 hours

Understanding humans as a combination of I (self) and body, basic physical needs up to actualization, prosperity, the gap between desires and actualization. Understanding culture in family, society, institution, startup, socialization process. Ethical behavior: effects on self, society, understanding core values and feelings, negative sentiments and how to overcome them, definite human conduct: universal human goal, developing human consciousness in values, policy, and character.

Understanding stakeholders, techniques to empathize with, identify key user problems. Empathy tools- Interviews, empathy maps, emotional mapping, immersion and observations, Emotional Intelligence, customer journey maps, classifying insights after Observations, Classifying Stakeholders.

Case Studies: Pure-it, Royal Enfield, Big Basket, Air-bnb.

Activity: Moccasin Walk, Persona, Empathy map, Journey Map



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Module 3 PROBLEM STATEMENT AND IDEATION 8 hours

Defining the problem statement, creating personas, Point of View (POV) statements. Research identifying drivers, information gathering, target groups, samples, and feedbacks. Idea Generation basic design directions, Themes of Thinking, inspirations and references, brainstorming, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W's, 5 why's, "How Might We", Defining the problem using Ice-Cream Sticks, Metaphor & Random Association Technique, Mind-Map, ideation activity games - six thinking hats, million-dollar idea, introduction to visual collaboration and brainstorming tools - Mural, JamBoard.

Case Studies: The Good Kitchen, Flipkart, Uber, Redbus, Big Bazaar

Activity: 5 Why, HMW, Brainstorming, Six Thinking Hats, 30 Circles, paper prototype

Module 4 CRITICAL THINKING 8 hours

Fundamental concepts of critical thinking, the difference between critical and ordinary thinking, characteristics of critical thinkers, critical thinking skills- linking ideas, structuring arguments, recognizing incongruences, five pillars of critical thinking, argumentation versus rhetoric, cognitive bias, tribalism, and politics. Case study on applying critical thinking on different scenarios.

Case Studies: Byju's, Maggi noodles, Tata Nano

Activity: debate, role play

Module 5 LOGIC AND ARGUMENTATION 8 hours

The argument, claim, and statement, identifying premises and conclusion, truth and logic conditions, valid/invalid arguments, strong/weak arguments, deductive argument, argument diagrams, logical reasoning, scientific reasoning, logical fallacies, propositional logic, probability, and judgment, obstacles to critical thinking. Group activity/role plays on evaluating arguments.

Case Studies: Aadhaar Card, Demonetization, Odd-Even Policy, Jio

Activity: Logical Fallacy Detective, Fact-Checking Challenge

Total Lecture Hours 40 hours

Textbook:

S. No	Book Title	Author
1	Science & Art of Design Thinking	Arun Jain, UnMukt, 2020, Polaris
2	Solving Problems with Design Thinking – Ten Stories of What Works	Jeanne Liedta, Andrew King and Kevin Benett 2013, Columbia Business School Publishing
3	A Foundation Course in Human Values and Professional Ethics Bagaria 2009	First Edition, RR Gaur, R Sangal, G P Bagaria 2009, Excel Books: New Delhi

Reference Books:

IXCICI	chec books.	
S. No	Book Title	Author
1	Design Methods: A Structured Approach for Driving Innovation in Your Organization	Vijay Kumar 2013, John Wiley and Sons Inc, New Jersey
2	Design thinking for strategic innovation: What they can't teach you at business or design school	Mootee, I. (2013) John Wiley & Sons.
3	Basics Design 08: Design Thinking	Gavin Ambrose and Paul Harris, 2010, AVA Publishing SA
4	Design of Business: Why Design Thinking is the Next Competitive Advantage	Roger L. Martin 2009, Harvard Business Press, Boston MA

NPTEL/ YouTube/ Faculty Video Link:



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Module 1	https://youtu.be/rUUuhnLkJ2s?si= XCHnDbt U1z0Frx
	https://www.youtube.com/watch?v=ldYzbV0NDp8
	https://www.youtube.com/watch?v=0Fi83BHQsMA
Module 2	https://www.youtube.com/watch?v=q654-kmF3Pc
	http://www.uhv.org.in/
	https://swayam.gov.in/nd1_noc19_mg60/preview
Module 3	https://www.udemy.com/course/design-thinking-for-beginners/
112000000	https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them
Module 4	https://www.forbes.com/sites/sap/2016/08/25/innovation-with-design-thinking-demands-critical-
11200000	thinking/#340511486908
	https://www.criticalthinking.org/pages/defining-critical-thinking/766
Module 5	https://www.udemy.com/course/critical-thinker-academy/
1, Louise C	https://swayam.gov.in/nd2_aic19_ma06/preview



Course Code: CMCA0201 Course Name: Cognitive Ability									L	T	P	C	
Course Offered in: MCA First Year										2	1	0	3
Pre-requisite: Basic understanding of elementary mathematics													
Course Objectives: The objective of this course is to develop students' quantitative aptitude and logical reasoning skills through number theory, analytical puzzles, and business mathematics, enabling them to solve real-world and competitive exam problems with													
speed, accuracy, and logical thinking.													
	Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			ge		
CO1	Apply fundamental number theory concepts such as divisibility, HCF & LCM, remainder theorem, and cyclicity to solve quantitative problems efficiently.									Level	K3		
CO2	Solve	problems in	volving lo	gical reasonin			cluding directi	on sense, bloc	d relations,	К3			
CO3	Solve decod		volving F	ercentage, I	Ratio, Propor	rtion, Partne	rship, Proble	m of ages a	nd coding		k	Κ3	
CO4	averag	es, mixtures	s, and ratio	s using appro	priate mathen	natical method					k	Κ3	
CO5							es, pipes and ll-world applic		d-distance-		k	Κ3	
CO.PO M	[anning	r (Scala 1.	I ov. 2.	Medium, 3	· High)								
CO-F Mapp	PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PS	01	PS	O2
CO1		1	1	1	1	-	-	-	-		-	-	
CO2		1	1	1	1	-	-	-	-		-	-	
CO3		1	1	1	1	-	-	-	-		•	-	
CO4		1	1	1	1	-	-	•	-		-	-	
CO5		1	1	1	1	-	-	-	-		-	-	
Course C	ontents	/ Syllabus	S										
Module 1						lumber Syst						3 hour	s
Classificat	ion of 1	number, Di	ivisibility	Rule, Facto	rs, Factoriza	tion, HCF &	LCM, It's A	Application,	Direction ar	nd Sens	e		
Module 2			Α	dvance Nu	mber Systen	n and Lagic	al Reasoning	σ			5	3 hours	<u> </u>
	s, Last t	wo digits,					power, Bloo		Number Ser	ies and			
Module 3			В	usiness Ma	th and Logi	cal Reasonii	ng-I				8	3 hours	<u> </u>
	neric se	ries, Codin					, Partnership	, Problem o	fages				
Module 4			В	usiness Ma	th and Logi	cal Reasonii	ng - II		-		8	3 hour	s
	Loss, I	Discount, S			ompound Inte	erest, Clock	and Calendar	•					
Module 5				rithmetic							8	3 hour	S
Average, l	Mixture	& Allegat	tion, Time	e and Work,	Pipe and Cis	stern, Time s	peed and dis		and Stream Fotal Lectu	re Hou	ırs 4	0 hour	'S
	Reference Books:												
S. No.	Boo	k Title						Author					
1	Qui	cker math		-				M. Tyra	(BSC publi	cation o	co. Pv	t. Ltd)	
2		ntitative A	-					RS Agga	rwal				
3	Verbal & Non-Verbal Reasoning RS Aggarwal												
4	Qua	Quantitative Aptitude - Quantum CAT Sarvesh K Verma											



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Course Code: CMCA0255	Course Name: Object Oriented Techniques using JAVA	L	T	P	C
Course Offered in: MCA First Year		0	0	6	3

Pre-requisite: Understanding of basic Java syntax, familiarity with object-oriented concepts (classes, objects, inheritance, polymorphism), and problem-solving skills

Course Objectives: The objective of this course is to understand the object-oriented methodology, and its techniques to design stand alone and GUI applications using hands-on engaging activities.

Course	Bloom's	
		Knowledge Level
		(KL)
CO1	Define the concepts of object-oriented programming.	K1
CO2	Describe OOP principles and concepts of lambda expressions.	K6
СОЗ	Analyze packages with different protection level resolving namespace collision and error handling concepts for uninterrupted execution.	K4
CO4	Describe Concurrency control, I/O Streams, and Annotations concepts.	K6
CO5	Explain GUI based application, Generics and Collections in Java to solve the real-world problem.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping					PO3 PO4		PO5	O5 PO6		PO8
CO1	3	2	-	-	-	-	-	1		
CO2	3	2	2	-	-	-	-	1		
CO3	3	3	3	2	=	-	-	2		
CO4	2	2	2	2	=	-	-	2		
CO5	3	3	3	3	2	-	-	3		

Course Contents / Syllabus

Module 1 BASICS OF JAVA PROGRAMMING 8 hours

Object Oriented Programming: Introduction and Pillars of OOP with real life example, JVM architecture and its components. **Control Statements:** Decision Making, Looping and Branching, Argument Passing Mechanism: Command Line Argument, Console Input/Output.

Class and Object: Object Oriented Concept in Java, Object Reference, Constructor, Abstraction: Abstract Class, Defining Methods, Static Class and Methods, Garbage Collection and finalize () Method etc.

Module 2 OOPs FEATURES, ARRAYS AND LAMBDA EXPRESS IONS 8 hours

Inheritance: Introduction and Types of Inheritance in Java, Implementing Multiple Inheritance, Interface, and it uses, Access Modifiers, Constructors in inheritance, Use of "this" and "super" keyword

Polymorphism: Introduction and Types, Overloading and Overriding **Lambda expression:** Introduction and Working with Lambda Variables

Arrays: Introduction and its Types

Module 3 PACKAGES, EXCEPTION HANDLIN G AND STRING HANDLING 8 hours

Packages: Introduction and Types, Access Protection in Packages, Import and Execution of Packages.

Exception Handling: Introduction and Types, Exceptions vs. Errors, Handling of Exception Finally, Throws and Throw keyword, Multiple Catch Block, Nested Try and Finally Block.

String Handling: Introduction and Types, Operations, Immutable String, Method of String class, String Buffer and String Builder class.

Module 4 CONCURRENCY IN JAVA AND I/O STREAM 8 hours

Threads: Introduction and Types, Creating Threads, Thread Life- Cycle, Thread Priorities, Daemon Thread, Runnable Class, Synchronizing Threads etc.



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I/O Stream: Introduction and Types, Common I/O Stream Operations, Interaction with I/O Streams Classes.

Annotations: Introduction, Custom Annotations and Applying Annotations.

Module 5 V GUI PROGRAMMING, GENERIC S AND COLLECTIONS

8 hours

Programming: Introduction and Types, Swing, Components and Containers, Layout Managers and User- Defined Layout and Event Handling concept.

Generics: Introduction to Generic Classes, Initializing a Generic Object, Generic Cell Driver Class, Generic Methods, Use enumerated type

Collections: Introduction, Using Method References, Using Wrapper Class, Using Lists, Sets, Maps and Queues, Collection using Generics, Iterators.

			Total Lecture Hours 40 h	ours
Textb	ook:		·	
S. No	Book '	Title	Author	
1.	Java: 7 Refere	The Complete ence	McGraw-Hill Education, Herbert Schildt,12th Edition, 2021	
2.	Core Ja Approa	ava: An Integrated ach	Dreamtech Press, R. Nageswara Rao,1st Edition, 2008	
3.	Progra	mming with Java	McGraw-Hill Education, E. Balagurusamy,6th Edition, 2019	
Refer	ence Bo	oks:		
S. No	Book '	Title	Author	
1.		m's Outline of amming with Java	McGraw-Hill Education, John R. Hubbard,2nd Edition, 2004	
2.		ava Volume I – mentals	11th Edition, Cay S. Horstmann, Prentice Hall, 2018	
NPTE	EL/ You	Tube/ Faculty Vid	eo Link:	
Modu	le 1	https://www.youtu	ube.com/watch?v=AEo4KgwKYoU	
Modu	le 2	https://www.youtu	ube.com/watch?v=5RkikYKPvpc&t=284s	
		https://www.youtu 9UOs9C8dmir Y	lbe.com/watch?v=bxcZ7cXbDI0&list=PLqleLpAMfxGAEfyXJyF-	
Module 4 https://www.yout.			ube.com/watch?v=jmZfuI3lDK0	
-			ube.com/watch?v=R0USRU90TOo https://www.youtube.com/watch?v=aXZrz8XKQpEube.com/watch?v=hKhlkx_6HeI&list=PLUDwpEzHYYLu9-xrx5ykNH8wmN1C1qClk	

List of Practical's (Indicative & Not Limited To)

- 1. Write Programs Compile and run first java file Byte Code and class file
- 2. Program to display default value of all Primitive data types
- 3. Implement the code using main () method to calculate and print the Total and Average marks scored by a student from the input given through the command line arguments.
- 4. Assume that four command line arguments name, marks1, marks2, marks3 will be passed to the main () method in the below class with name Total and Avg Marks.



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5. Write code which uses if-then-else statement to check if a given account balance is greater or lesser than the minimum balance. Write a class Balance Check with public method check Balance that takes one parameter balance of type double. Use if-then- else statement and print Balance is low if balance is less

than 1000. Otherwise, print Sufficient balance.

- 6. A class Number Palindrome with a public method is Number Palindrome that takes one parameter number of type int. Write a code to check whether the given number is palindrome or not. For example, Command Arguments: 333333 is a palindrome.
- 7. Write a class Fibonacci Series with a main method. The method receives one command line argument. Write a program to display Fibonacci series i.e. 0 1 1 2 3 5 8 13 21
- 8. Write a Java Program to find the Factorial of a given number.
- 9. Java Program to create a class, methods and invoke them inside main method
- 10. Write a Java program to illustrate the abstract class concept. Create an abstract class Shape, which contains an empty method number Of Sides (). Define three classes named Trapezoid, Triangle and Hexagon extends the class Shape, such that each one of the classes contains only the method number Of Sides (), that contains the number of sides in the given geometrical figure. Write a class Abstract Example with the main() method, declare an object to the class Shape, create instances of each class and call number Of Sides() methods of each class.
- 11. Java program to illustrate the static field in the class.
- 12. Java Program to illustrate static class.
- 13. Java program to explicit implementation of garbage collection by using finalize() method.
- 14. Java program to implement Single Inheritance.
- 15. Java program to implement multi-level Inheritance.
- 16. Java program to implement constructor and constructor overloading
- 17. Write a java program to access the class members using super keyword.
- 18. Java program to access the class members using this keyword.
- 19. Implement an interface named Mountain Parts that has a constant named TERRAIN that will store the String value "off_ road". The interface will define two methods that accept a String argument name new Value and two that will return the current value of an instance field. The methods are to be named:
- get Suspension, set Suspension, get Type, set Type.
- 20. Java program to demonstrate nested interface inside a interface
- 21. Java program to demonstrate nested interface inside a class.
- 22. Javaprogram implement method overloading.
- 23. Javaprogram to implement method overriding.
- 24. Java program to implement lambda expression without parameter.
- 25. Java program to implement lambda expression with single parameter.
- 26. Java program to implement lambda expression with multi parameter.
- 27. Java program to implement lambda expression that iterate List of objects
- 28. Java program to define lambda expressions as method parameters.
- 29. Write a class Count Of Two Numbers with a public method compare Count Of that takes three parameters one is arr of type int[] another two are arg1 and arg2 are of type int and returns true if count of arg1 is greater than arg2 in arr. The return type of compare Count of should be boolean.



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Assumptions:

arr is never null

arg1 and arg2 may be same

- 30. Java program to show the multiplication of two matrices using arrays.
- 31. Java Program to search an element using Linear Search
- 32. Java program to search an element using Binary Search
- 33. Java Program to sort element using Insertion Sort
- 34. Java Program to sort element using Selection Sort Largest element Method
- 35. Java program to Sort elements using Bubble Sort
- 36. Java program to create user defined package.
- 37. Java Program to create a sub- classing of package.
- 38. Implement the following:

Import package. *; import package. classname; Using fully qualified name.

- 39. Implement and demonstrate package names collision in java.
- 40. Java program to handle and Arithmetic Exception Divided by zero
- 41. Java Program to implement User Defined Exception in Java
- 42. Java program to illustrate finally block
- 43. Java program to illustrate Multiple catch blocks
- 44. Java program for creation of illustrating throw
- 45. Java program to print the output by appending all the capital letters in the input string.
- 46. Java program that prints the duplicate characters from the string with its count.
- 47. Java program to check if two strings are anagrams of each other
- 48. Java Program to count the total number of characters in a string
- 49. Java Program to count the total number of punctuation characters exists in a String
- 50. Java Program to count the total number of vowels and consonants in a string
- 51. Java Program to show. equals method and == in java
- 52. Given a string, return a new string made of n copies of the first 2 chars of the original string where n is the length of the string. The string may be any length. If there are fewer than 2 chars, use whatever is there. If input is "Wipped" then output should be "WiWiWiWiWi".
- 53. Given two strings, a and b, create a bigger string made of the first char of a, the first char of b, the second char of a, the second char of b, and so on. Any leftover chars go at the end of the result. If the inputs are "Hello" and "World", then the output is "HWeolrllod".
- 54. Java program to show the usage of string builder.
- 55. Java program to show the usage of string buffer.
- 56. Creating and Running a Thread
- 57. Implementing Runnable Interface
- 58. Synchronizing Threads with lock



- 59. Synchronizing Threads without lock
- 60. Java program to implement even and odd threads by using Thread class.
- 61. Java program to implement even and odd threads byusing Runnable interface.
- 62. Java program to synchronize the threads byusing Synchronize statements and Synchronize block.
- 63. Demonstrate the concept of type annotations in the JAVA programming language.
- 64. Java program to implement that read a character stream from input file and print it into output file.
- 65. Write a Java program that reads a text file and adds line numbers to each line. The program should create a new file with the line numbers added to the beginning of each line.
- 66. Java program to implement that merge the content of two files (file1.txt, file2.txt) into file3.txt.
- 67. Write a Java program that reads two binary files and compares them byte by byte to determine if they are identical. Display a message indicating whether the files are the same or different.
- 68. Write a Java program that reads the contents of one file and copies them to another file.
- 69. Write a Java program that reads a text file and counts the number of words in it.
- 70. Write a Java program that reads a text file and counts the frequency of each word in it.
- 71. Program to create a frame with three buttons.
- 72. Program to display message with radio buttons.
- 73. Program to display "All the Best" in 5 different colors on screen.
- 74. Program to implement event handling in a button "OK"
- 75. Java Program to implement Border Layout
- 76. Java Program to implement Grid Layout
- 77. Java Program to implement Box Layout
- 78. Java Program to implement Card Layout
- 79. Java program to implement Generic class
- 80. Java program to illustrate Generic methods
- 81. Java program to implement wild card in generics
- 82. Java program to implement of methods of Hash Set
- 83. Java Program to implement methods available in Hash Map class
- 84. Program to add, retrieve, and remove element from Array List
- 85. Create a method which can accept a collection of country names and add it to Array List with generic defined as String and return the List.
- 86. Create a method which can create a Hash Set containing values 1-10. The Set should be declared with the generic type Integer. The method should return the Set.



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87. Develop a java class with a method store Even Numbers (int N) using Array List to store even numbers from 2 to N, where N is a integer which is passed as a parameter to the method store Even Numbers ().

The method should return the Array List (A1) created.

- 88. Create a method that accepts the names of five countries and loads them to an array list and returns the list.
- 89. Java program to implement auto boxing
- 90. Java program to implement unboxing



LAB Co	ourse Code: C	CMCA0253	LA	B Course Na	me: Data St	ructures Lal	b		L	T	P	С		
Course Offered in: MCA First Year							0	0	2	1				
mathem	Pre-requisite: Students are expected to have knowledge of programming languages, along with a foundation in mathematics and problem-solving ability. Course Objectives: Learn to implement linear and non-linear data structures.													
	Ť					5.			Bloc					
Course	Course Outcome: After completion of this course students will be able to:													
											Knowledge Level (KL)			
CO 1	Ability to u	understand a s	ystematic ap	proach to or	ganizing, w	riting, and d	lebugging C ₁	programs		K	2			
CO 2		nplement sortin				ınt data struct	ures			K	4			
CO 3	_	Stack and Queu								K	5			
CO 4	· ·	nplement linear			*					K	5			
CO 5		lex problems us ng of searching		ır data structu	res like tree a	and graph alo	ong with the			K	5			
СО-РО	Mapping (Sc	ale 1: Low, 2:	Medium, 3:	High)	1	1						_		
со-ро) Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7		PO8				
CO1		3	2	2	2	-	-	-			1			
CO2		3	3	3	3	-	-	-			2			
CO3		3	3	3	3	-	-	_			2			
CO4		3	3	3	3	-	-	-	- 2		2			
CO5		3	3	3	3	-	-	-			2			
List of I	Practical's (In	ndicative & No	t Limited To)		•								
1. C	Construct a Co	de to find the m	naximum elen	nent in an arra	ay.									
2. (Construct a Co	de to calculate	the sum of all	elements in a	an array									
3. (Construct a Co	de to reverse th	e elements of	an array.										
4. (Construct a Co	de to check if a	n array is sort	ed in ascendi	ng order.									
5. C	Construct a Co	de to count the	occurrence o	f a specific ele	ement in an a	array.								
6. C	Construct a Co	de creation and	traversal of 2	2D Array in ro	ow major and	l column maj	or order							
7. 0	Construct a coc	le to print the tr	anspose of a	given matrix	using function	on								
8. P	Program to find	l if a given mat	rix is Sparse	or Not and pri	nt Sparse Ma	atrix								
9. C	Construct a cod	le to Implemen	t Linear Searc	ch										
10. C	Construct a coo	de to implement	Binary Sear	ch										
11. I	mplementation	n of stack using	a list											
12. 0	Construct a pyt	thon code to Inf	ïx to postfix (conversion us	ing a stack									



13. Construct a code for Balanced parentheses checker using a stack
14. Implement Reverse a string using a stack.
15. Implement Binary Search using Recursion.
16. Construct a python program to print Fibonacci Series using Recursion.
17. Queue implementation using a list
18. Construct a code for Simulating a printer queue using a queue.
19. Construct a code for Implementing a circular queue.
20. Implement queue using stack
21. Create a single linked list and perform basic operations (insertion, deletion, traversal).
22. Create a double linked list and perform basic operations (insertion, deletion, traversal)
23. Create a circular linked list and perform basic operations (insertion, deletion, traversal).
24. Reverse a single linked list.
25. Check if a linked list is palindrome.
26. Find the middle element of a single linked list.
27. Find the middle element of a double linked list.
28. Merge two sorted single linked lists.
29. Detect and remove a loop in a circular linked list.
30. Construct a code to Insert, Delete, and search and update a data in Binary Search Tree (BST)
31. Construct a code for Tree Traversal (Preorder, Inorder, Postorder)
32. Construct a code Count the number of Leaves in a Binary Tree
33. Construct a code to find the Height of a Binary Tree
34. Construct a code to print all Paths from the Root to Leaf Nodes in a Binary Tree
35. Construct a code to convert a Binary Tree to its Mirror Tree
36. Construct a code to convert a Binary Tree to its Mirror Tree
37. A program to check if a Binary Tree is a Binary Search Tree (BST)
38. Construct a code to check if a Binary Tree is a Balanced Binary Tree
39. Construct a code to represent graph using adjacency matrix and adjacency list
40. Implement BFS and DFS algorithm.
41. Implement the minimum cost spanning tree



42. Implement bubble sort in a non-recursive way.
43. Implement selection sort in a non-recursive way.
44. Implement insertion sort in a non-recursive way.
45. Implement Merge sort in a non-recursive way.
46. Implement Merge sort in a recursive way.
47. Implement Quick sort in a recursive way.
48. Array-based Student Performance Analysis System
49. Design a project based on stack data structure to create a web history checker.
50. Design a dynamic Music Playlist using Linked List
51. Design Decision Tree Classifier for Disease Diagnosis using tree data structure.
52. Design Road Network Navigation: Implementing a navigation system to find the shortest path between locations using road networks.



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LAB Course Code: CMCA0252	LAB Course Name: Database System Lab	L	T	P	С
Course Offered in: MCA First Year		0	0	2	1

Pre-requisite: Students are expected to be familiar with basic computer knowledge, as well as the fundamentals of mathematics and logical reasoning.

Course Objectives: The objective of the course is to introduce about database management systems, with an emphasis on how to organize, maintain and retrieve -efficiently, and effectively - information in relational & non- relational databases

Course Outcome: After completion of the course, the student will be able to					
		Knowledge			
		Level (KL)			
CO 1	Design ER and EER diagram of database for solving the real-world problems.	K2			
CO 2	Apply and analyze the Structured Query Language (SQL) to solve the complex queries and implement normalization.	К6			
CO 3	Implement the operators in complex queries and apply database connectivity for different applications	K6			
CO 4	Discuss PL/SQL programs to solve complex problems in databases	K2			
CO 5	Design and implement relational and non-relational database for the need of the real-world project.	K5			

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

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

List of Practical's (Indicative & Not Limited To)

- 1. Creating ER Diagram for company Database. Company databases have entities like employee, departments, projects, and dependents also implement the relationship and cardinalities between the entities with their relevant attribute
- 2. Design an ER diagram for a travel agency that includes entities such as travelers, bookings, destinations, and itineraries. Also implement the relationship and cardinalities between the entities with their relevant attribute
- 3. Convert Company ER Model to Relational Model (Represent entities and relationships in tabular form, represent attributes as columns, identifying keys).
- 4. Convert Travel Agency ER Model to Relational Model (Represent entities and relationships in tabular form, represent attributes as columns, identifying keys).

5. Data Definition Language Queries:

Create Tables STUDENT, BOOK, TRANS.

STUDENT (Roll no, Name, Branch, Year, Section, Hostel, F_name, Address) BOOK (Bookid, Title, Author, Publisher, Cost, Copies)

TRANS (Roll no, Bookid, date issue, date return, fine)



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- 1. Add a new attribute state in student table
- 2. Remove attribute address from student table
- 3. Modify the data type of state attribute
- 4. Change the name of attribute hostel to resident
- 5. Change a table's name, student to stud
- 6. Use truncate to delete the contents of trans table
- 7. Remove the book table from database

6. Data Manipulation Language Queries

- 1. Insert at least 10 records in tables student, book, and trans
- 2. Show the contents in tables student, book, and trans
- **3.** Find the name and branch of all students
- 4. Find the name and roll no of all students who stay in hostel
- 5. Find all distinct branches of students
- **6.** Delete the record of the student whose roll no is 204001
- 7. Delete all records of student table
- **8.** Delete all records of students whose section starts with capital A.
- 9. Find the student names which have 'lk' in any position
- 10. Find the student's name where 'R' is in the second position
- 11. Find the name of student whose name starts with 'V' and ends with 'A'
- 12. Change the State of all students to 'BOMBAY'
- 13. Change the state of student 'Vandana' to 'Goa'
- 14. Apply arithmetic operators on cost column of book table for the book which has book id = 1101

7. Queries with Constraints

- 1. Create the book table with Primary Key Constraint
- 2. Create trans table with foreign key Constraint
- 3. Create an Employee table with UNIQUE Constraint
- 4. Create Employee Table with Check Constraints
- 5. Create Supplier table with Default Constraint

8. Queries on TCL

- 1. Create Save points
- 2. Rollback to Save Points
- 3. Use Commit to save on

9. Aggregate Functions:

- 1. Find the minimum, maximum, average and sum of costs of books
- 2. Count the total number of books present
- 3. Retrieve the average cost of all books authored by 'navathe'

10. String, Math and Advanced Functions

Implement the Following Functions:

- ASCII()
- CHAR LENGTH()
- CONCAT()
- LCASE()
- LOWER()



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- REPEAT()
- REVERSE()
- STRCMP()
- ABS(X)
- MOD(X,Y)
- SIGN(X)
- POWER(X,Y)
- ROUND(X)
- SQRT(X)
- BIN()
- COALESCE()
- IF()
- LTRIM
- RTRIM
- LPAD
- RPAD
- INITCAP

11. Queries on GROUP BY, HAVING AND ORDER BY Clauses

- 1. Display total costs of books by each author
- 2. Find the branch and the number of students in that branch for branches which have more than 1 student
- 3. Find all books sorted by title in ascending order and cost in descending order
- 4. Find the branch and the number of students in that branch

12. Queries on Operators

- 1. Find the title, author and cost of books which have cost equal to or greater than 200 and less than or equal to 600.
- 2. Find the name, rollno and branch of students who are in 'CSE' branch or 'IT' branch
- 3. Find the title, author, and cost of book for which cost is between 200 and 600
- 4. Find the title and author of book, which has the word 'NET' anywhere in its title.
- 5. Find the bookid and title of books with title either 'OS' or 'DBMS'
- 6. List the students who issued books on '1st may2000', '12 JAN 2021','17 dec 2000','10 Jan 2021'
- 7. Display all books which have cost more than the cost of all books authored by 'Yash'
- 8. Find all the distinct costs of books

13. Join Operators

- 1. Perform Inner join on two tables
- 2. Perform Natural Join on two tables
- 3. Perform Left Outer Join on tables
- 4. Perform Right Outer join on tables
- 5. Perform Full Outer Join on tables

14. Set Theory Operators

- 1. Show the use of UNION operator with union compatibility
- 2. Show the use of intersect operator with union compatibility



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- 3. Show the use of minus operator with union compatibility
- 4. Find the cartesian product of two tables

15. Oueries on Set Theory Operators

- 1. List all books except 'Navathe' and 'Tannenbaum' in ascending order of costs
- 2. Display all books that have not been issued so far
- 3. To display the students name who have been issued DBMS book by NAVATHE and OS book by TANNENBAUM.
- 4. To display the students name who have been issued DBMS book by NAVATHE OR OS book by TANNENBAUM

16. Complex Oueries

- 1. Display all books that have been issued so far
- 2. To display all the students of CSE IN year 2021 who are staying in the hostel.
- 3. To display students name who have issued OS book by Tannenbaum
- 4. To display the names of students who have not issued any book so far
- 5. To display the names of students who have issued at least one book so far.
- 6. To display students, name along with the book issued to them
- 7. Find the names of students who have paid fine Rs1000 for the book 'OS in Depth'.
- 8. Retrieve the name of students who have issued the book which has the maximum cost.
- 9. Retrieve the names of students who have issued all books written by 'Korth'

17. Queries on Views

- 1. Create a view of student table
- 2. Find roll no and name from the created view where hostel is 'YES'
- 3. Create a view selecting roll no, name, branch, year and section from student table
- 4. Insert a row in the created view
- 5. Find all data in the created view
- 6. Update the created view by changing the name to 'GOGUL' for student whose roll no is 101
- 7. Compare the data of created view and the original table student
- 8. Delete the record of student whose roll no is '101' from the created view
- 9. Remove the view from database

18. Queries on Sequence, Index

- 1. Set the column to ROWNUM of a table
- 2. Create a sequence and set a column of a table to the created sequence.
- 3. Create an Index on the customer table

19. PL/SQL Programs

- 1. Write a PL/SQL Code to add two numbers
- 2. Write a PL/SQL code for Fibonacci series
- 3. Write a PL/SQL Code for greatest of 3 numbers
- 4. Write a PL/SQL code for area and circumference of a circle

20. PL/SQL Programs on Cursors

- 1. Write a Program using CURSOR to display ssn and salary of 1st record of employee
- 2. Write a program using cursors to display the ssn and salary of all employees and then print the count of employees



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21. PL/SQL Programs on Triggers, Procedures and Functions

- 1. Write a Program using TRIGGER on UPDATE
- 2. Write a command to See the effect of trigger
- 3. Write a Program using PROCEDURE to increase the salary by Rs.1000 for Employee whose ssn is passed as an argument.
- 4. Write a procedure to update the address of an employee whose ssn and address are passed as arguments and the procedure returns the name of employee whose address is updated.
- 5. Write a function to return the total number of employees
- 6. Write a function to return the department number for which the department name is passed
- 7. Write a function to find the total sum of salaries of all employees.
- 8. Write a procedure to insert record in the department table
- 9. Write a code using EXCEPTION

22. PL/SQL Programs on Implicit Cursors

- 1. Insert a record using %ROWTYPE
- 2. Write a code using %NOTFOUND, %FOUND, %ROWCOUNT
- 3. Write a code using %TYPE

23. Mongo DB Queries

- 1. Create a collection.
- 2. Insert documents into Created Collection
- 3. Use insertMany() to insert more records
- 4. View the inserted records, raw and formatted
- 5. Select all documents in collection
- 6. Find count of all customers
- 7. Show the records which have age equal to 18
- 8. Find all records which have fees between 2500 and 4500
- 9. retrieve all documents from the cust collection where status equals either "A" or "P"
- 10. Retrieve all documents where grade is equal to 'F' AND (fees is less than 3000 OR name starts with letter 'J')
- 11. Retrieve all documents where grade is equal to F OR fees is less than 4000
- 12. Update record with id 1, incrementing their fees by 50
- 13. Update the record of jack, set address to 'Delhi' and phoneno to '11221122'
- 14. Delete all records which have fees greater than 3000
- 15. Display only the grade and fees.
- 16. Get the grade, fees and custname of all records and sort by custname in ascending order.
- 17. Sort the Customers on their fees by descending order and get only first 2 records only
- 18. Update the postal code of 1st record and view it
- 19. Select from the cust collection all documents where the grade equals "F":
- 20. Retrieve the document with exact value '5'
- 21. Retrieve documents where grade field contains values in given set.
- 22. Retrieve documents where grade field does not contain values in given set.



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- 23. Retrieve all documents where grade is equal to "f" and fees is greater than or equal to 2000 and less than or equal to 4000.
- 24. Retrieve all documents which have grade not "F" nor "P."
- 25. Retrieve all documents where fees are not greater than or equal to 3000
- 26. Retrieve all documents where fees exist and is greater than or equal to 3000
- 27. Retrieve all documents which have fees type double
- 28. Retrieve all documents that have fees of type number
- 29. Retrieve all documents when we divide fees by 200 and remainder is 100
- 30. Retrieve all documents that have regular expression 'o' in the custname field
- 31. Retrieve all documents that have fees 2000 or 4300

24. Connectivity with Database using Java or Python

25. Case Study

Implementation of case Study on different domain

- 1. E-commerce Platform
- 2. Inventory Management
- 3. Railway System
- 4. Hospital Data Management
- 5. Voice-based Transport Enquiry System
- 6. SMS-based Remote Server Monitor system
- 7. Banking System



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LAB Course Code: CMCA0257	LAB Course Name: Workplace Communication Competence 2	L	Т	P	C		
Course Offered in: MCA First Year		0	0	4	2		
Pre-requisite: Comprehension of basic English language. The students should have completed Workplace Communication							

Pre-requisite: Comprehension of basic English language. The students should have completed Workplace Communication Competence course in first semester

Course Objectives: To improve proficiency in Business English to the intermediate level of CEFR (Common

European Framework of Languages), to introduce the key concepts of life skills and train for career enhancement and to impart Business Communication Skills

Course	Bloom's Knowledge Level (KL)	
CO1	Apply key concepts of life-skills and train for career roles	K4
CO2	Enhance effective listening skills	K6
CO3	Acquire fluency and spontaneity while speaking professionally	К3
CO4	Understand and analyze complex written texts	K4
CO5	Compose clear and detailed texts on a variety of topics	K6

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-1 O Mapping (Octate 1. Low, 2. Metalum, 3. High)											
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8			
CO1	2	2	3	-	2	2	2	3			
CO2	-	2	-	-	3	-	-	2			
CO3	-	2	2	-	3	-	-	2			
CO4	2	2	2	-	-	-	-	2			
CO5	2	2	3	-	-	-	-	2			

List of Practical's

- 1. Students will know the course structure and examination pattern. Students will know how to meet, greet, and strike a conversation.
- 2. Students will learn through listening to conversations and understand common vocabulary and expressions in short, clear dialogues.
- 3. Students will learn to speak on personal interest and practice using professional phrases.
- 4. Students will listen to their peers reading aloud, write down the gist, and repeat what is read.
- 5. The students will understand and learn how to draft proper responses to different professional chat messages.
- 6. Students will practice listening to given audio clips and understand the importance of clear communication and active listening.
- 7. Students will demonstrate effective communication, active listening, and adaptability in various scenarios
- 8. Students will practice sample questions and answers for placements offline & online.
- 9. Students will develop and improve their critical thinking and practice analytical writing.
- 10. Students will be provided with workplace situations and practice building their vocabulary by learning to use a variety of words.
- 11. Students will be practicing their active listening by analyzing TED Talks on subjects related to technology/science.



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- 12. Students will engage in meaningful conversations, build connections, and create a positive networking atmosphere13. The students will practice common interview questions.
- 14. Students will learn to write coherent sentences. They will also practice writing sentences using professional adjectives for specific purposes.
- 15. Students will enhance their listening skills, by listening to native speakers and learn to convey information accurately.
- 16. The students will practice professional writing skills through verbal prompts.
- 17. Students will enhance their ability to express their opinions, actively listen to others, and engage in constructive discussions to develop well-rounded perspectives.
- 18. Students will practice and enhance their reading skills, through reading select blog posts on technology and innovative businesses.
- 19. Students will learn to write about their career objectives, qualifications, and key skills in the form of a professional profile
- 20. The students will develop spontaneous thinking, and the ability to express their ideas effectively.
- 21. Students will practice effective communication strategies, develop empathy, and understand, and improve their speaking skills and ability to handle real-life situations through role-playing exercises.
- 22. The students will hone their presentation skills to develop and enhance effective speaking and non-verbal skills.
- 23. The students will learn co-ordination and improve their group presentation skills.
- 24. The students will discuss their key take away from the course.

Required Software and Tools

Software: - British Council English Score Mobile App



Course	Code: CMCA0	211		Cour Anal	rse Name: Fu	ndamentals	s of Digital M	arketing and	l	L	Т	P	C
Course	Offered in: M	CA Firs	t Year	Tiller	ytics					3	0	0	3
	uisite: Students			o think creat	ively.						1		
	Objectives: The												es,
	etrics, and analy						g campaign pl	anning, execu	ition, an	d optir	nizati	on.	
Course	Outcome: Afte	r comple	tion of t	he course, tl	he student wil	l be able to					m's K l (KL	Knowl)	edge
CO1	Develop profi					s in the digi	tal age and pr	ovide fundam	ental	ntal K2			
CO2	Discuss vario	us conce _l	ots of da	nta analytics	pipeline.						K	(2	
CO3	Evaluate the p	productiv	ity of di	gital market	ting channels	for business	success.				K	(3	
CO4	Prepare candi high growth i		global	exposure of	digital marke	eting practice	es to make the	em employabl	e in a		K	X 2	
CO5	Learn basic co	_				nining.					K	3	
CO-PO	Mapping (Scal	le 1: Low	, 2: Me	dium, 3: H	igh)	T	1				1		
со-ро) Mapping	PO1		PO2	PO3	PO4	PO5	PO6	PO7		POS	3	
CO1		3		2	2	2	3	1		1		2	
CO2		3		3	2	3	-	-		-	2		
CO3		2	,	3	3	2	-	2		_		3	
CO4		2		2	3	2	2	2	2	2		3	_
CO5		3		3	2	3	-	-		-		2	
	Contents / Sylla	abus											
Module					Digital marl							3 hou	
Marketin	nental s of Digng, Evolution of sexpectation &	f Digital	Marketi	ing, Digital	Marketing La	andscape, K							
Module	2		Intro	duction to I	Data Analytic	es .					8	8 hou	rs
characte tools, an Data A 1	ection to Data eristics of data, in alysis vs report alytics Lifecyo tion, model plan	ntroducti ing, mod c le: Need	on to B ern data l key ro	ig Data plat analytic to les for succ	form, need of ols, applicatio essful analyti	data analyt ons of data a c projects, v	ics, evolution nalytics. various phases	of analytic so	calability	, anal	ytic p	roces	s and
Module	:3		Prepa	re Data for	Exploration	and Stakel	older				1	3 hou	rs
Prepare commun Datatyp	e Data for Exploication with your open and structure work, data is un	ur team. ı res : Gen	ind Stal	keholder: Data, Collect	Data analysts,	balance need	ds and expecta	redibility, pri	vacy, etl	hics, a	nd ac		
Module	· 4		Orgai	nizing and i	protecting yo	ur data						3 hou	rs
Organiz	zing and protec		r data	Databases:	Where data		ises, access th	em and extra	ct, filter	, and s			
metadata	a and its differen	nt types a	and how	z analysts us	se them								



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Organizing and protecting your data: Organizing data and keeping it secure, analysts use file naming conventions.

Engaging in the data community: How to manage your online presence, benefits of networking with other data analytics professionals.

Module	5 Introduction to	Oata Mining		8 hours	
Preproce		tt is Data Mining, Definition, KDD, Cha sionality Reduction, Feature Subset Selecti issimilarity- Basics.	0		
		•	Total Lecture Hours	40 hours	
Textboo			1		
S. No	Book Title		Author		
1.	Digital Marketing. Oxford University		Vandana, Ahuja		
2.	Strategic Digital Marketing: Top Digit Returns on Your Marketing Investment	al Experts Share the Formula for Tangible t	Eric Greenberg, & Kates, McGraw-Hill Education	Alexander	
3.	E-Commerce: Strategy, Technologies,	and Applications. McGraw-Hill Education	McGraw-Hill Education". David	, Whiteley	
4.	Data Mining: Concepts and Technique	s. Morgan Kaufmann	Han, Jiawei, Pei, Jian, & I Micheline,3rd Edition, 20		
	e Books:		T .		
S. No	Book Title Author				
1.	Basics of Data Analytics		Richa Mishra, Dr. Nirvikar Katiyar, & Apoorv Mishra, Notion Press, 20		
2.	Data Analytics: Become a Master in Data	Analytics	Richard Dorsey, Independ Published, 2020	lently	
3.	Introduction to Data Mining (2nd ed.)		Tan, Pang-Ning, Steinbac Karpatne, Anuj, & Kumar Pearson, 2018.		
NPTEL/	YouTube/ Faculty Video Link:				
Module 1	https://www.youtube.com/watch?v=6 KJTBgp&index=1	BB3N0x3cPI&list=PLbRMhDVUMnge625u	ıLkVoqfS-uK-		
Module 2	https://www.youtube.com/watch?v=3 KJTBgp&index=2	SKFCKLUsI&list=PLbRMhDVUMnge625	uLkVoqfS-uK-		
Module 3	https://www.youtube.com/watch?v=6 KJTBgp&index=8	kVoqfS-uK-			
Module 4	Module 4 https://www.youtube.com/watch?v=fYSvrZD4G38&list=PLbRMhDVUMnge625uLkVoqfS-uK-KJTBgp&index=14				
Module 5	-	S. CLAWELOW, BUILDING BUILDING			



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					School of	Computer A	pplication	ns																
Course	oruse Offered in: MCA First Year rerequisite: Students are expected to be able to inspect any site and know the keyword of any site. Fourse Objectives: Understand how digital and social media have disrupted the way businesses sell to consumers, hele ecognize how marketers use the customer journey model to influence purchase decisions on digital platforms using did tools, identify the benefits and advantages to a business of using social media to engage an audience, Build, manage, in active social media community. Ourse Outcome: After completion of the course, the student will be able to Bloom' Level (OI Describe importance of digital marketing. O2 Reorganize how marketers use Google SEO projects to influence purchasing and selling decisions on digital platforms using digital content and tools. O3 Analyze the benefits of integrating traditional and digital marketing with Google SEO for sells and purchasing marketing strategies. O4 Analyze the benefits of search advertising for a business that uses social media to target an audience. O5 Implement an active social media community by using social media advertising. O6-PO Mapping (Scale 1: Low, 2: Medium, 3: High) C7-PO Mapping (Scale 1: Low, 2: Medium, 3: High) C7-PO Mapping POI PO2 PO3 PO4 PO5 PO6 PO7 CO1 3 2 2 2 2		Т	P	(
Course	Offered in: MC	CA First Year	- F						3	0	0	3												
Pre-req	uisite: Students	are expected to be	able to insp	pect any site a	nd know the	keyword of an	y site.				<u> </u>													
								consum	ners, h	nelp s	tuden	ts t												
and tool	s, identify the be	enefits and advant	•		-				_	_														
			course, the	student will l	be able to							edg												
CO1	Describe impo	ortance of digital n	narketing.							ŀ	Κ2													
CO2	on digital plat	forms using digita	l content an	nd tools.	-					ŀ	ζ1													
CO3	purchasing ma	arketing strategies		_							ζ3													
CO4							get an audier	ice.			Κ3													
CO5					cial media a	dvertising.				ŀ	Κ3													
CO-PO	Mapping (Scal	e 1: Low, 2: Med	um, 3: Hig	h)																				
СО-РС	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	P	O7		PO8													
CO1				2		-	-	-	-		-		-		-		-		-		-		2	
CO2		3	3	3	3	2	-		-		3													
CO3		2	3	3	2	1	-		1		3													
CO4		2	3	3	3	-	2		-		3													
CO5	9 1 19 1		2	3	3	3	2		1		3													
			T	N: - !4 - 1 N /1-	.4 T 1	4-1				- 1	0 1													
							D: : 10		• •		8 hou													
Organiza Marketii	ntion, Business ag, 3i Principles	Growth and Digit , Integrating Trad	al. Digital litional and l	Marketing Pr Digital Marke	inciples: Key eting, Tools f	y Digital Marl	ceting Conc			onal a	and D	igi												
											8 hou													
Marketin Types a Platform	ng, eBook and ' and Primary Use s for Business:	Whitepapers Soci	al Media ar a Platforms arketing Co	nd Business S s, Benefits of	Strategy: Soc Social Med	cial Media Pla lia to Business	tforms, Keys, Role of S	Conce	epts o Media	f Soc , So	cial M cial M	Iedi Med												
Module	3	Social (Content Str	ategy and Pr	omotion						8 hou	rs												
Social C Word of Fundam	ontent Strategy Mouth Market entals: Introduc	: Content Seeding ing, Measuremention to Facebook, ds, Ads Manager,	, Social Me and Track The Value	edia Formats, ing, Content to Marketers,	Content Pro Promotion S Page Manag	strategy, Audie gement, Faceb	ence Segme ook Live, M	ntation	Facel	ncer l	Marke Mark	etin cetin												
Module	4	Instagr	am and Sna	pchat Mark	eting					1 :	8 hou	rs												
Instagra	n and Snapchat ive, Instagram	t - Social Apps: In Posts, Snapchat Minner Developmen	troduction Meanings, S	to Social App Snapchat Stor	ps, Different y, Basic Fea	atures Instagra	m, and Sna	pchat I	Marke	stagra	am: V Insta	'ide gra												

Snapchat Analysis, Campaign Setup, Snapchat Geo filters

Account Overview, Audience Development, Advertising Overview, 3V Advertising, Ads Manager, Snap Ads, Instagram Analysis,



LinkedIn and Social Selling: Social and Functions, LinkedIn Social Plus	Author Tals You Always Vibrant Publishers, 2021.	, Features
S. No. Book Title 1. Digital Marketing Essent Wanted to Know	Author Tals You Always Vibrant Publishers, 2021.	0 hours
S. No. Book Title 1. Digital Marketing Essent Wanted to Know	als You Always Vibrant Publishers, 2021.	
1. Digital Marketing Essent Wanted to Know	als You Always Vibrant Publishers, 2021.	
2. Digital Marketing (3rd Ed	ition) Seema Gupta, McGraw-Hill Education, 2021	
3. Digital Marketing for Beg A Road Map to Successful Marketing		
Reference Books:		
S. Book Title No.	Author	
1 Fundamentals of Digital Marl	Reting Puneet Singh Bhatia. Pearson Education India, 2017	
Digital Marketing: Strategy, 1 Practice (7th Edition)	mplementation and Dave Chaffey & Fiona Ellis-Chadwick, Pearson Education, 2019	
3 Fundamentals of Digital Mark	Reting Philip Kotler & Sarmad Saleem, Redshine Publication, 2021	
4 Digital Marketing for Dummi	es Ryan Deiss & Russ Henneberry, Wiley, 2020	
5 Digital Marketing: Cases from	n India Rajendra Nargundkar & Romi Sainy, Sage Publications India, 2022	
NPTEL/ YouTube/ Faculty Video	Link:	
Module 1 https://www.youtube	.com/watch?v=vlRm8tqAYCs&list=PLNfnAKZ4ZsaoIFGUO3GWTHEI73S QV56rB∈	idex=2
Module 2 https://www.youtube	.com/watch?v=emUpshX-ToI	
Module 3 https://www.youtube	c.com/watch?v=xNz4MmHxf0Y	
Module 4 https://www.youtube	.com/watch?v=8d8sI-3Bcc8	
Module 5 https://www.youtube	e.com/watch?v=KcxD7oFWlvo	



Course	Code: CMCA0	213	Cou	rse Name: (CRM Adminis	tration			L	T	P	С
	Offered in: MO								3	0	0	3
		owledge of Com	•									
		derstand the con				he concepts	of Lightning E	xperien	ce. Fa	miliaı	ize w	/ith
1		. Learn Admin E		0 0	1							
Course	Outcome: Afte	r completion of t	he course, t	the student v	vill be able to					m's K		edge
001	I 5 11 1	11 000 111							Leve	1 (KL	-	
CO1		working of Trailh		1.4. C						K		
CO2		mportance of Sa e validations in I			S					K K		
CO4		mportance of use								K		
CO5		mplement Securi								K		
	•	le 1: Low, 2: Me	•		•							
	O Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7		POS	3	
CO1		2	1	-	2	-	-		-		2	
CO2		3	2	1	2	-	-		-		2	
CO3		3	3	3	3	-	-		1		2	\exists
CO4		2	2	1	2	1	-		2		2	
CO5		3	3	2	3	-	-	,	3		3	
Course	Contents / Sylla	abus	•	•		•	•					
Module	e 1	Intro	duction							8	hou	rs
Experie			P Builder S	alesforce M	obile App Custo	omization, U	ser Engagemer			nd Va	lidatio	on,
Module					p Experience (hou	
		, Accounts and C	Contacts for	Lightning	Experience, Le	ad and Oppo	rtunity for Lig	htning l	Experi	ence,	Prod	uct
	and Contracts, C											
Module			orce Admi								hou	
Experie	nce for Salesfornce, Lightning ex	ning Experience, rce Classic User experience custom	s, Chatter	Administrat	ion for Lightni	ing Experien	ce, Reports a	nd Dash	board	s for	lightr	ning
Module		Light	ning Exper	rience						8	hou	rs
		Org for Users, C			port a New Bus	siness Unit. P	rotect Your Da	ata in Sa	lesfor			
		am, customize a			*					,		
Module	5	Learn	Admin Es	sentials in	Lightning Exp	erience				8	hou	rs
Learn al	bout the custom	object and cust	om field in	Salesforce	Lightning, use	es of Custom	Object and C	Custom	field i	n Lig	hteniı	ng,
		Update Record F					•			_		_
	<u> </u>	-		· · ·		<u>-</u>		Lectur			0 hou	
Textboo	1				T					1		
S. No	Book Title				Author							
1.	Digital Marke	ting for Dummie	es		Ryan Deiss, F	Russ Henneb	erry, John Wil	ey & So	ns, 20	20		
2.	Youtility				Jay Baer, Port	tfolio, 2013						
3.	Epic Content	Marketing			Joe Pulizzi, M	IcGraw-Hill	Education, 20	13				
Referen	nce Books:				•							
S. No Bo	ook Title		Au	thor								_
1 (Customer Relation	onship Managem	nent S. S. 201	•	imalaya Publish	ning House,						
			I		52							



2	Custor	ner Relationship Management	Alok Kumar Rai, Oxford University Press , 2015						
3	Custor	ner Relationship Management	Jagdish N. Sheth & Others, McGraw-Hill, 2002						
4	CRM:	A Strategic Approach	Kumar V., Excel Books, 2014						
5	Custor	ner Relationship Management	Peeru Mohamed & Sagadevan, PHI Learning, 2016						
NPTI	EL/You	Tube/ Faculty Video Link:							
Modu	ile 1	https://www.youtube.com/watch	?v=bxtqhfyoTjY&list=PLaGX30v1lh1BaUKgXa05gqrOP0vUg 6i&index=1						
Modu	ıle 2	https://www.youtube.com/watch	?v=ZkQwm-6lsIw&list=PLaGX- 30v1lh1BaUKgXa05gqrOP0vUg_6i&index=3						
Modu	ıle 3	https://www.youtube.com/watch	?v=iWbVm_o9Z0Q&list=PLaGX30v1lh1BaUKgXa05gqrOP0vUg_6i&index=8						
Modu	ıle 4	https://www.youtube.com/watch	Pv=oG5y-ynaREY&list=PLaGX- 30v1lh1BaUKgXa05gqrOP0vUg_6i&index=11						
Modu	ıle 5	https://www.youtube.com/watch	v=8DefDrWgcJY&list=PL-gW8Fj5TGrqly1oIz8ljs- kHbahm4ydl						



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Course	Code: CMCA02	214	Cours	se Name: Sof	tware Testin	ıg			L	T	P	C																				
	Offered in: MC								3	0	0	3																				
Pre-req	quisite: Basic Kn	owledge of Co	mputer and ab	ole to work in	MS Excel.																											
	Objectives: Giv			•		l objectives o	of testing. Dis	stinguish	n betw	een ei	ror,																					
	and failure. Expla								1																							
Course	Outcome: After	•		e student will	l be able to					m's k el (KL	Knowl L)	ledg																				
CO1	Describe the co	oncepts of softv	ware testing.							ŀ	K 1																					
CO2	Demonstrate h may apply in o			0 1	ctices, and di	fferent const	raints on test	ing,		ŀ	K 2																					
CO3	Apply test management principles for resources, strategies, planning, project control, and risk management.						К3																									
CO4	Apply different testing techniques of software testing.								K3																							
CO5	Discuss how te	esting activities	and work pro	ducts align w	ith project ob	jectives, mea	sures, and tar	gets.	K2																							
CO-PO	Mapping (Scale	e 1: Low, 2: M	edium, 3: Hi	gh)				I				7																				
CO-PO	O Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO	7	P	08																					
CO1		3	2	1	2	1	1	2			2																					
CO2		2	3	2	3	2	1	2		,	2																					
CO3		2	2	3	2	2	3	2		2		2		2		2		2		2		2		2		2		2		,	2	
CO4		3	3	2	3	1	1	1		1		1		1		1		1		. 1		1										
CO5		2	3	3	2	2	2	2		2	2																					
Course Module	Contents / Sylla		RODUCTIO	N						<u> </u>	8 hou																					
Module	-	1 =- 1 = -		•						1 '																						

Developer's Mindsets.

Module 2 TESTING THROUGHOUT THE SOFTWARE DEVELOPMENT LIFE CYCLE | 8 hours

Traceability between the Test Basis and Test Work Products, The Psychology of Testing-Human Psychology and Testing, Tester's, and

Software Development Life Cycle Models, Software Development and Software Testing, Software Development Life Cycle Models in Context, Test Levels— Component Testing, Integration Testing, System Testing, Acceptance Testing, Test Types- Functional Testing, Non- functional Testing, White-box Testing, Change-related Testing.

Module 3 STATIC TESTING 8 hours

Static Testing Basics--Work Products that Can Be Examined by Static Testing, Benefits of Static Testing, Differences between Static and Dynamic Testing, Review Process--Work Product Review Process, Roles and responsibilities in a formal review, Review Types, Applying Review Techniques, Success Factors for Reviews.

Module 4 TEST TECHNIQUES 8 hours

Categories of Test Techniques- Categories of Test Techniques and Their Characteristics, Black-box Test Techniques, Equivalence Partitioning, Boundary Value Analysis, Decision Table Testing, State transition Testing, Use Case Testing, White-box Test Techniques, Statement Testing and Coverage, Decision Testing and Coverage, The Value of Statement and Decision Testing, Checklist-based Testing.

Module 5 TEST MANAGEMENT 8 hours

Test Organization, Independent Testing, Tasks of a Test Manager and Tester, Test Planning and Estimation, Purpose and Content of a Test Plan, Test Strategy and Test Approach, Test Execution Schedule, Factors Influencing the Test Effort, Test Estimation Techniques, Test Monitoring and Control, Metrics Used in Testing, Configuration Management, Risks and Testing, Defect Management, Tool Support for Testing



					Total Lecture Hours	40 hours		
Textb	ook:					•		
S. No	Book	x Title		Author				
1.	Softv Appr	ware Engineering: A Practit	ioner's	Roger S. Pressman, McGraw-Hill, 2014				
2.	Softv Pract	ware Testing: Principles and ices	l	Srinivasan Desikan, Pearson, 2006				
3.		ctive Software Testing: A eloper's Guide		Maurício Aniche, Addison-Wesley, 2019				
Referei	nce Boo	ks:						
S. No	Book '	Title	Author	r				
1	Software Testing: Principles and Practices Srinivasan Desikan, Gopalaswamy Ramesh, Pears 2006							
2	Foundations of Software Testing Dorothy Graham, Erik van Veene Rex Black, Cengage Learning, 20			Graham, Erik van Veenendaal, Isabel Evans, ck, Cengage Learning, 2008				
3	Softwa	are Testing	Yogesh	Singh, Cambridge University Press, 2011				
4	Introdu	uction to Software Testing	Paul An Press, 20	nmann, Jeff Offutt, Cambridge University				
5	Softwa Assura	are Testing and Quality	Kshirasa	agar Naik, Priyadarshi Tripathy, Wiley, 2011				
NPTE	L/ You	Tube/ Faculty Video Link	:					
Modul	le 1	https://www.youtube.com	/watch?v	z=sbW4RThXNL8				
Modul	le 2	https://www.youtube.com	/watch?v	z=T0TynxN77oY&t=46s				
Modul	le 3	https://www.youtube.com/	=Qc-a0tBpdQQ					
Modul	le 4	https://www.youtube.com						
Modul	le 5	https://www.youtube.com/watch?v=NiDe8lj-wGs						



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LAB Co	ourse Code: CMCA0211P	LAB Course Name: Fundamentals of Digital Marketing and Analytics Lab	L	T	P	С
Course	Offered in: MCA First Year		0	0	2	1
Pre-req	uisite: Basic Knowledge of Compute	r Science	•			
		perience in applying digital marketing strategies and using analytics and implement digital marketing techniques for practical scenarios.	tools.	Stud	ents v	vill
Course	Outcome: After completion of the co	ourse, the student will be able to.	Bloo	m's K 1 (KL		ledge
CO1	Prepare spreadsheet for data manipulation, formula creation, and advanced functions like CONCATENATE, VLOOKUP, HLOOKUP, MATCH, and COUNTIF.					
CO2	Develop skills in sorting, filtering, interpret data for marketing insigh	text-to-columns, and data validation to effectively analyze and ts.		K	5	
CO3	support decision-making in digital	<u> </u>	K5			
CO4	Utilize PivotTables for summariz customization, manipulation, and i	ring, analyzing, and presenting complex data sets, including ntegration with Pivot Charts.		K	[4	
CO5	Prepare spreadsheets for navigation	n, sheet protection, macro recording,		K	3	

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

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

List of Practical's (Indicative & Not Limited To)

- 1. Creating Formulas: Using Formulas, Formula Functions Sum, Average, if, Count, max, min, Proper, Upper, 1er, Using AutoSum
- 2. Columns & Rows: Selecting Columns & Rows, Changing Column Width & Row Height, Autofitting Columns & Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell Format, value, formula, Use of paste and paste special
- 3. Functionality Using Ranges: Using Ranges, Selecting Ranges, Entering Information into a Range, Using AutoFill
- 4. Concatenate, VLOOKUP, H lookup, Match, Count if, Text, Trim
- 5. Spreadsheet Charts: Creating Charts, Different types of charts, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table
- 6. Data Analysis: Sorting, Filter, Text to Column, Data Validation
- 7. PivotTables: Creating PivotTables, manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, displaying a PivotChart, Setting PivotTable Options, Adding Subtotals to PivotTables
- 8. Spreadsheet Tools: Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting Spreadsheets Renaming Spreadsheets, Splitting the Screen, Freezing Panes, Copying and Pasting Data between Spreadsheets, Hiding, Protecting worksheets
- 9. Making Macros: Recording Macros, Running Macros, Deleting Macros



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LAB Co	ourse Code: CMCA0212P	LAB Course Name: Fundamentals of Digital Marketing and Optimization Lab	L	T	P	С
Course	Offered in: MCA First Year	· ·	0	0	2	1
		le to inspect any site and know the keyword of any site.				
Course evaluate	Objectives: Develop a basic display the best possible choice for your car	campaign and allocate ad dollars for success. Examine the pricing rapaign.	nodels	for d	isplay	and and
Course	Outcome: After completion of the co	ourse, the student will be able to.	Bloo	m's K	nowl	edge
			Leve	l (KL)	
CO1	Identify the role that social marketi	ng plays in the digital landscape and marketing mix.	K2			
CO2	Explain the differences between, an	nd the convergence of, paid, earned, and owned media.		K	2	
СОЗ	Identify and incorporate individual	social and mobile platforms into a digital marketing strategy.		[1		
CO4	Apply On Page SEO for upgrading	ranking.		K	3	
CO5	Apply Technical SEO for upgradin	g ranking.		K	3	

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	2	-	-	-	2
CO2	3	3	2	2	-	-	-	2
CO3	3	3	3	3	2	-	-	3
CO4	3	3	3	3	-	-	-	3
CO5	3	3	3	3	-	-	-	3

List of Practical's (Indicative & Not Limited To)

- 1. Basic Explanation and Setups:
 - a. Name servers, theme & plugins setup
 - b. Basic SEO, How Search Engine Works?
 - c. Crawling, Indexing, Ranking
 - d. GSC, Google Analytics, GTM, Google Alerts
- 2. Content Frameworks:
 - a. Keyword (Explanation, Research, Ranking factor)
 - b. Keyword Classification, Finding Right Keyword
 - c. Competitive Keyword Research Content framework
- 3. On Page:
 - a. Element Explanation
 - b. Title Tag, Header Tags
 - c. Meta Description, The Body
 - d. URL Structure, Images
- 4. Technical SEO Part I
 - a. Elements Explanation
 - b. Site Architecture, Website Structure
 - c. Understand Google Crawlability
 - d. Robots.txt, Sitemaps, Mobile SEO, AMP



- 5. Technical SEO Part –II
 - a. WordPress Speed Optimization
 - b. CDN
 - c. Structured Data
 - d. Security



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LAB Course Code: CMCA0213P	LAB Course Name: CRM Administration Lab	L	T	P	С
Course Offered in: MCA First Year		0	0	2	1

Pre-requisite: Creative thinking and which is being used by the creative talent in your business areas.

Course Objectives:

To make the students understand the organizational need, benefits and process of creating long-term value for individual customers. To disseminate knowledge regarding the concept of e-CRM and e- CRM technologies. To enable the students, understand the technological and human issues relating to implementation of Customer Relationship Management in the organizations.

Course	Outcome: After completion of the course, the student will be able to.	Bloom's Knowledge
		Level (KL)
CO1	Describe the working of Trailhead.	K2
CO2	Describe the importance of Salesforce and its features.	K2
CO3	Implement the validations in Data modelling.	К3
CO4	Describe the importance of user management.	K2
CO5	Identify and implement Security concepts in Industry.	К3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

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

List of Practical's (Indicative & Not Limited To)

- 1. Quick Start: Lightning App Builder
- 2. Prepare Your Salesforce Org for Users
- 3. Customize an Org to Support a New Business Unit
- 4. Protect Your Data in Salesforce
- 5. Customize a Sales Path for Your Team
- 6. Setup the service Console
- 7. Build a discount approval process
- 8. Quick start process builder
- 9. Build a simple f1
- 10. Build a battle station App
- 11. Customize a Salesforce Object
- 12. Create Reports and Dashboards for Sales and Marketing Managers
- 13. Improve Data Quality for Your Sales and Support Teams
- 14. Create a Process for Managing Support Cases



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LAB Course Code: BMCA0214P	LAB Course Name: Software Testing Lab	L	T	P	С
Course Offered in: MCA First Year		0	0	2	1

Pre-requisite: Basic Knowledge of Computer and able to work in MS Excel.

Course Objectives:

To equip students with practical skills in testing methodologies, tools, and techniques, to develop expertise in test case design, execution, automation, defect tracking, and performance testing for robust software development.

Course	Course Outcome: After completion of the course, the student will be able to.			
CO1	Apply effective test cases for various programming constructs and application functionalities.	К3		
CO2	Identify and document potential causes of failures in software applications, such as matrix multiplication.	K1		
CO3	Prepare testing based on user interfaces and performance metrics for web applications, particularly focusing on registration and login pages.	К3		
CO4	Apply security testing techniques to ensure the robustness of web applications against potential vulnerabilities.	К3		
CO5	Write detailed system specifications, identify bugs, and create test cases for complex systems like ATM and banking applications.	К3		

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

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

List of Practical's (Indicative & Not Limited To)

- 1. Write the Test cases for programs in any language which demonstrate the working of the folling constructs i) do. While ii) while iii) if...else iv) switch v) for.
- 2. Write down the possible reasons for failure of Matrix multiplication.
- 3. Write the Test cases based on UI of Registration Page in Online Banking System.
- 4. Write the Test cases based on Terms and Conditions field of Registration Page.
- 5. Write the Test cases based on Performance in Registration Page.
- 6. Write the Test cases for Functionality in Registration Page.
- 7. Write the Test cases based on Security in Registration Page.
- 8. Write the Test cases for Functionality in Login Page.
- 9. Write the Test cases based on UI in Login Page.
- 10. Write the Test cases based on Performance in Login Page.
- 11. Write the Test cases based on Security in Login Page.



- 12. Write system specifications for ATM and make report on various bugs.
- 13. Write the test cases for banking application in respect of Registration Page and Login Page.