

### RV Educational Institutions <sup>®</sup> RV College of Engineering <sup>®</sup>

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi Approved by AICTE, New Delhi



## Scheme & Syllabus of I to IV Semester

## **2022 SCHEME**

## MASTER OF COMPUTER APPLICATIONS 2-Year Program

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

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### **VISION**

Leadership in Quality Technical Education, Interdisciplinary Research & Innovation, with a Focus on Sustainable and Inclusive Technology

## **MISSION**

- 1. To deliver outcome based Quality education, emphasizing on experiential learning with the state of the art infrastructure.
- 2. To create a conducive environment for interdisciplinary research and innovation.
- 3. To develop professionals through holistic education focusing on individual growth, discipline, integrity, ethics and social sensitivity.
- 4. To nurture industry-institution collaboration leading to competency enhancement and entrepreneurship.
- 5. To focus on technologies that are sustainable and inclusive, benefiting all sections of the society.

## **QUALITY POLICY**

Achieving Excellence in Technical Education, Research and Consulting through an Outcome Based Curriculum focusing on Continuous Improvement and Innovation by Benchmarking against the Global Best Practices.

## **CORE VALUES**

Professionalism, Commitment, Integrity, Team Work, Innovation

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## **RV COLLEGE OF ENGINEERING<sup>®</sup>**

(Autonomous Institution Affiliated to VTU, Belagavi) R.V. Vidyaniketan Post, Mysore Road Bengaluru – 560 059



## Scheme & Syllabus of I to IV Semester

## **2022 SCHEME**

## **MASTER OF COMPUTER APPLICATIONS**





## MASTER OF COMPUTER APPLICATIONS

### **DEPARTMENT VISION**

Pioneering in ICT Enabled Quality Education and Research with a focus on Sustainable and Inclusive Applications

### **DEPARTMENT MISSION**

- 1. To adapt novel methodologies for quality education through experiential learning.
- 2. To empower students with continuous, holistic education, emphasizing on discipline, ethics and social commitment.
- 3. To become a vibrant knowledge center for research and software development.
- 4. To continuously build capacity steering towards industry- institute collaborative research and entrepreneurial competencies.
- 5. To utilize and develop free and open source software tools for sustainable and inclusive growth.

### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

- **PEO1** Practice software engineering principles and standards to develop software to meet customer requirements across verticals
- **PEO2** Contribute to build sustainable and inclusive applications using mathematical, simulation and meta heuristic models
- **PEO3** Demonstrate entrepreneurial qualities through individual competence and team work
- **PEO4** Achieve successful professional career with integrity and societal commitments leading to lifelong learning

### **PROGRAM SPECIFIC OUTCOMES (PSOs)**

- **PSO1** Solve real world computing system problems of various industries by understanding and applying the principles of mathematics, computing techniques and business concepts
- **PSO2** Design, test, develop and maintain desktop, web, mobile and cross platform software applications using modern tools and technologies

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### **GLOSSARY OF ABBREVIATIONS**

1.	AS	Aerospace Engineering						
2.	BS	Basic Sciences						
3.	BT	Biotechnology						
4.	СН	Chemical Engineering						
5.	CHY	Chemistry						
6.	CIE	Continuous Internal Evaluation						
7.	CS	Computer Science & Engineering						
8.	CV	Civil Engineering						
9.	EC	Electronics & Communication Engineering						
10.	EE	Electrical & Electronics Engineering						
11.	EI	Electronics & Instrumentation Engineering						
12.	ET	Electronics & Telecommunication Engineering						
13.	GE	Global Elective						
14.	HSS	Humanities and Social Sciences						
15.	IM	Industrial Engineering & Management						
16.	IS	Information Science & Engineering						
17.	L	Laboratory						
18.	MA	Mathematics						
19.	MBT	M. Tech in Biotechnology						
20.	MCE	M. Tech. in Computer Science & Engineering						
21.	MCN	M. Tech. in Computer Network Engineering						
22.	MCS	M. Tech. in Communication Systems						
23.	MDC	M. Tech. in Digital Communication						
24.	ME	Mechanical Engineering						
25.	MHT	M. Tech. in Highway Technology						
26.	MIT	M. Tech. in Information Technology						
27.	MMD	M. Tech. in Machine Design						
28.	MPD	M. Tech in Product Design & Manufacturing						
29.	MPE	M. Tech. in Power Electronics						
30.	MSE	M. Tech. in Software Engineering						
31.	MST	M. Tech. in Structural Engineering						
32.	MVE	M. Tech. in VLSI Design & Embedded Systems						
33.	Ν	Internship						
34.	Р	Projects (Minor / Major)						
35.	PHY	Physics						
36.	SDA	Skill Development Activity						
37.	SEE	Semester End Examination						
38.	Т	Theory						
39.	Ι	Theory Integrated with Laboratory						
40.	VTU	Visvesvaraya Technological University						

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Sl. No	Core Department	Program	Code
1.	ВТ	M. Tech in Biotechnology	MBT
2.	CS	M. Tech in Computer Science & Engineering	MCE
3.	CS	M. Tech in Computer Network Engineering	MCN
4.	CV	M. Tech in Structural Engineering	MST
5.	CV	M. Tech in Highway Technology	MHT
6.	EC	M. Tech in VLSI Design & Embedded Systems	MVE
7.	EC	M. Tech in Communication Systems	MCS
8.	EE	M. Tech in Power Electronics	MPE
9.	ET	M. Tech in Digital Communication	MDC
10.	IS	M. Tech in Software Engineering	MSE
11.	IS	M. Tech in Information Technology	MIT
12.	ME	M. Tech in Product Design & Manufacturing	MPD
13.	ME	M. Tech in Machine Design	MMD
14.	MCA	Master of Computer Applications	MCA

#### POST GRADUATE PROGRAMS

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### INDEX

	SEMESTER: I								
Sl. No.	Sl. No. Course Code Course Title								
1.	MMA205T	Mathematical Foundation for Computer Science	01						
2.	MCA101T	Linux Shell Scripting	03						
3.	MCA102I	Computer Networks	06						
4.	MCA103I	Object Oriented Programming	09						
5.	MCA104I	Web Application Programming	12						
6.	MHS101L	Ability Enhancement Course-I	15						
7.	MCA001T	Basics of Programming	17						

SEMESTER: II							
Sl. No.	Course Code	Course Title	Page No.				
1.	MCA431T	Research Methodology and IPR	19				
2.	MCA131T	Design and Analysis of Algorithms	21				
3.	MCA132I	Data Modeling	23				
4.	MCA231I	Cloud Native Full Stack Application Development-I	27				
5.	MCA232AX	Integrated Professional Elective- I	30				
6.	MCA233BX	Professional Elective-II	45				
7.	MCA432L	Design Thinking	53				
	INT	EGRATED PROFESSIONAL ELECTIVE- I					
1.	MCA232A1	Internet of Things	30				
2.	MCA232A2	Data Science-I	34				
3.	MCA232A3	Software Testing and Practices	38				
4.	MCA232A4	2D and 3D Modeling	42				
		PROFESSIONAL ELECTIVE-II					
1.	MCA233B1	DevOps	45				
2.	MCA233B2	Advanced Computer Networks	47				
3.	MCA233B3	Cryptography and Network Security	49				
4.	MCA233B4 Digital Marketing 5						

	SEMESTER: III								
Sl. No.	Sl. No. Course Code Course Title								
1.	MCA161T	Software Engineering	55						
2.	MCA261I	Modern Application Development	57						
3.	MCA361I	Cloud Native Full Stack Application Development-II	60						
4.	MCA262CX	Professional Elective-III	63						
5.	MCA263DX	Professional Elective - IV	71						
6.	MCA461P	Minor Project	79						
7.	MCA462N	Internship*	80						
		PROFESSIONAL ELECTIVE- III							
5.	MCA262C1	Data Science-II	63						
6.	MCA262C2	Augmented Reality and Virtual Reality	65						
7.	MCA262C3	Principles of UI/UX Design	67						
8.	MCA262C4	Cyber Security and Blockchain	69						



	PROFESSIONAL ELECTIVE-IV						
1.	MCA263D1	AI and Product Management	71				
2.	MCA263D2	Data Visualization	73				
3.	MCA263D3	Digital Transformation	75				
4.	MCA263D4	Web of Things	77				

SEMESTER: IV									
Sl. No. Course Code Course Title									
1.	MCA491P	Major Project	81						
2.	MCA492L	Technical Seminar	83						
3.	MHS102T	Ability Enhancement Course-II	84						



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	I SEMESTER MCA											
			(	Credi	t Allo	ocation						
						Total			CIE	Max	SEE	Max
SL No	Course Code	Course Title	L	Т	Р	Crodite	BoS	Category	Duration	Marks	Duration	Marks
						Creuits			<b>(H)</b>	CIE	<b>(H)</b>	SEE
1.	MMA205T	Mathematical Foundation for	4	1	0	5	MAT	Theory	1.5	100	3	100
		Computer Science										
2.	MCA101T	Linux Shell Scripting	3	1	0	4	MCA	Theory	1.5	100	3	100
3.	MCA102I	Computer Networks	4	0	1	5	MCA	Theory + Lab	1.5 + 3	150	3+3	150
4.	MCA103I	Object Oriented Programming	4	0	1	5	MCA	Theory + Lab	1.5 + 3	150	3+3	150
5.	MCA104I	Web Application Programming	4	0	1	5	MCA	Theory + Lab	1.5 + 3	150	3 + 3	150
6.	MHS101L	Ability Enhancement Course-I*	0	0	2	2	HSS	Lab	1.5	50	2	50
7.	MCA001T	Basics of Programming**	2	0	0	0	MCA	Theory	1.5	50	-	-
						26						

\*Identified External Agency will conduct the classes and evaluate both CIE and SEE

*Note:* Students are mandatorily required to get One MOOC certification courses as recommended by HSS BoS, within I-IV Semester MCA and this is considered for the evaluation in course code MHS102T. This is included in the HSS board.

**\*\*Bridge Course:** The Basics of Programming with course code MCA001T is a non-credit course offered to Non-Computer Science background students only.





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### MASTER OF COMPUTER APPLICATIONS

	II SEMESTER MCA											
			(	Credi	t Allo	ocation						
SL No	Course Code	Course Title	L	Т	Р	Total Credits	BoS	Category	CIE Duration (H)	Max Marks CIE	SEE Duration (H)	Max Marks SEE
1.	MCA431T	Research Methodology and IPR	2	0	0	2	MCA	Theory	1.0	50	2	50
2.	MCA131T	Design and Analysis of Algorithms	3	1	0	4	MCA	Theory	1.5	100	3	100
3.	MCA132I	Data Modeling	4	0	1	5	MCA	Theory + Lab	1.5 + 3	150	3 + 3	150
4.	MCA231I	Cloud Native Fullstack Application Development-I	3	0	1	4	MCA	Theory + Lab	1.5 + 3	150	3 + 3	150
5.	MCA232AX	Integrated Professional Elective- I	4	0	1	5	MCA	Theory + Lab	1.5 + 3	150	3 + 3	150
6.	MCA233BX	Professional Elective-II	3	1	0	4	MCA	Theory	1.5	100	3	100
7.	MCA432L	Design Thinking <sup>*</sup>	0	0	2	2	MCA	Lab	1.0	50	2	50
						26						

\* Societal Project - Design thinking course will be based on Sustainable Development Goals (SDGs)

#### List of Electives: II Semester

SL No	<b>Course Code</b>	Elective- I	SL No	Course Code	Elective-II
1.	MCA232A1	Internet of Things	1.	MCA233B1	DevOps
2.	MCA232A2	Data Science-I	2.	MCA233B2	Advanced Computer Networks
3.	MCA232A3	Software Testing and Practices	3.	MCA233B3	Cryptography and Network Security
4.	MCA232A4	2D and 3D Modeling	4.	MCA233B4	Digital Marketing



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### MASTER OF COMPUTER APPLICATIONS

	III SEMESTER MCA											
			C	Credi	t Alle	ocation						
SL No	Course Code	Course Title	L	Т	Р	Total Credits	BoS	Category	CIE Duration (H)	Max Marks CIE	SEE Duration (H)	Max Marks SEE
1.	MCA161T	Software Engineering	3	0	0	3	MCA	Theory	1.5	100	3	100
2.	MCA261I	Modern Application Development	4	0	1	5	MCA	Theory + Lab	1.5 + 3	150	3 + 3	150
3.	MCA361I	Cloud Native Fullstack Application Development-II	3	0	1	4	MCA	Theory + Lab	1.5 + 3	150	3 + 3	150
4.	MCA262CX	Professional Elective-III	3	1	0	4	MCA	Theory	1.5	100	3	100
5.	MCA263DX	Professional Elective-IV	3	0	0	3	MCA	Theory	1.5	100	3	100
6.	MCA461P	Minor Project	0	0	4	4	MCA	Lab	3	100	3	100
7.	MCA462N	Internship <sup>*</sup>	0	0	6	6	MCA	Lab	3	100	3	100
						29						

\*Six Weeks Internship to be completed during the intervening Vacation of II and III semesters

#### List of Electives: III Semester

SL No	Course Code	Elective- III	SL No	Course Code	Elective-IV
1.	MCA262C1	Data Science-II	1.	MCA263D1	AI and Product Management
2.	MCA262C2	Augmented Reality and Virtual Reality	2.	MCA263D2	Data Visualization
3.	MCA262C3	Principles of UI/UX Design	3.	MCA263D3	Digital Transformation
4.	MCA262C4	Cyber Security and Blockchain	4.	MCA263D4	Web of Things



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### MASTER OF COMPUTER APPLICATIONS

	IV SEMESTER MCA											
			C	redit	: Allo	ocation						
SL No	Course Code	Course Title	L	Т	Р	Total Credits	BoS	Category	CIE Duration	Max Marks	SEE Duration	Max Marks
						Creats			<b>(H</b> )	CIE	<b>(H</b> )	SEE
1.	MCA491P	Major Project	0	0	15	15	MCA	Lab	1.5	100	3	100
2.	MCA492L	Technical Seminar	0	0	2	2	MCA	Lab	1.5	50	2	50
3.	MHS102T	Ability Enhancement Course-II	0	0	2	2	MCA	Lab	-	50	ONLINE	50
						19						



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#### Credit Distribution for MCA 2022 Scheme

		SEM-I	SEM-II	SEM-III	SEM-IV	TOTAL
						CREDITS
SL No	Course Type		Cre	edits		Credits
1.	Basic Science Course (BSC)	05				05
2.	Professional Core Course (PCC)	04	02	03		09
3.	Integrated Professional Core Course (IPCC)	15	14	09		38
4.	Professional Elective Course (PCE)		08	07		15
5.	Audit Course/ Ability Enhancement Course (AUD/AEC)	02			02	04
6.	Project / Internship		02	10	15	27
7.	Seminar				02	02
	Total	26	26	29	19	100

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		SEMESTER: I						
MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE (Theory)								
Course Code	:	MMA205T	CIE	:	100 Marks			
Credits: L:T:P	:	4:1:0	SEE	:	100 Marks			
Total Hours	:	52L+26T	SEE Duration	:	3.00 Hours			
UNIT-I 10 Hrs								
Sets, Relations and Fu	inc	tions: Basics of set theory, Cartesian pr	oduct of sets. Relation	ons	, Properties of			
relations, Zero-one ma	tric	es and directed graphs, Hasse diagram,	Equivalence relation	ns	and partitions.			
Functions- types of fun	ncti	ions, ceil function and the floor function	on, Function compos	itic	on and Inverse			
function.								
		UNIT-II			10 Hrs			
Logic: Basic connect	ivi	ty and Truth table, Logical equivalenc	e, logical implicatio	ns,	Quantifiers –			
Predicates: Predicative	e lo	gic, Free and Bound variables, Rules	of inference, Consis	ster	ncy. Proofs of			
theorems-direct, indire	ct,	and proof by contradiction.			2			
		UNIT-III			11 Hrs			
Engineering Optimiz	ati	on: Introduction to Operations Resea	arch, Linear Program	nm	ning Problem-			
Formation, Classical	op	timization techniques-Simplex method	d. Transportation M	lod	lel-North-west			
corner rule, Vogel's a	ppı	oximation method, Optimum solution	using modified dist	rib	ution method.			
Assignment Model-Hu	nga	arian method.			11 11			
Statistics and Duchah		UNIT-IV	itting of our					
exponential power fun	onnu etii	y: Curve fitting by method of least square Correlation and linear regression and	uares, mung of curv	es	– porynomiai,			
Basic concents of prob	ahi	lity conditional probability Bayes' the	urysis. orem					
	uoi	LINIT_V			10Hrs			
Probability Distribut	ion	s: Pandom variables discrete and co	ntinuous probabilit	vr	nass function			
probability density fu	iun	tion and cumulative density function	on Binomial distr	y 1 ihu	tion Doisson			
probability density function, and cumulative density function. Binomial distribution, Poisson								
distribution, Exponentia	11 U	Istribution, and Normal distribution.						
<b>Course Outcomes:</b>								
After going through this	s co	ourse, the student will be able to						

CO1	Understand fundamental concepts of sets, relations, functions, logic, statistics and probability.
	theory.
CO2	Apply fundamental concepts of functions, reasoning, statistics and probability theory for
	different domains in data science and machine learning
CO3	Analyze mathematical concepts like relational algebra, statistics, and probability.
	theory to optimize the solutions of engineering problem.
<b>CO4</b>	Implement overall mathematical knowledge gained to demonstrate and analyze the problems.
	arising in practical situations.

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#### **Reference Books**

Ralph P Grimaldi, B.V. Ramana, Discrete and Combinatorial Mathematics, An applied Introduction, Pearson Education, 5 <sup>th</sup> Edition, 2019, ISBN: 9789353433055, 9353433053.
Kenneth H Rosen, Discrete Mathematics & its applications, McGraw-Hill, 8 <sup>th</sup> Edition, 2021, ISBN: 9390727359 · 9789390727353.
Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying E. Ye, "Probability and Statistics for Engineers and Scientists", Pearson, 9 <sup>th</sup> Edition, 2021, ISBN-13: 9780136860969.
Wayne L Winston, Operations Research: Applications and Algorithms, Thomson Learning, 4 <sup>th</sup> Edition, 2004, ISBN 0-534-38058-1

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

Rubric for CIE & SEE Theory courses									
	<b>RUBRIC</b> for CIE			RUBRIC for SEE					
SL.NO	Contents	Marks	Q.NO	Contents	Marks				
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks each. Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]						
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20				
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20				
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20				
			7 & 8	Unit 4: Question 7 or 8	20				
			9 & 10	Unit 5: Question 9 or 10	20				
				Total Marks	100				

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SEMESTER: I							
LINUX SHELL SCRIPTING							
(Theory)							
:	MCA101T	CIE	:	100 Marks			
:	3:1:0	SEE	:	100 Marks			
:	39L+26T	SEE Duration	:	3.00 Hours			
	:	SEMESTER: I           LINUX SHELL SCRIPT (Theory)           :         MCA101T           :         3:1:0           :         39L+26T	SEMESTER: ILINUX SHELL SCRIPTING (Theory):MCA101TCIE:3:1:0SEE:39L+26TSEE Duration	SEMESTER: ILINUX SHELL SCRIPTING (Theory):MCA101TCIE::3:1:0SEE::39L+26TSEE Duration:			

UNIT–I	07 Hrs					
The Unix/Unix Like Operating System architecture and commands: Unix Archite	cture, Features					
of UNIX, General purpose utility commands, Basic and advanced file attributes, File system.						
Introduction to version control system: git and its usage for managing code repositories.						
Introduction to Shell Script: Shell scripts, read, command line arguments, exit, variables, wildcards,						
escape characters logical operators and conditional operators						
UNIT–II	08 Hrs					
Programming through Shell Script: if conditional, case conditional, expr computat	ions and string					
handling, while looping, for looping, set and shift, trap interrupting a program, debuggi	ng shell scripts					
with set command, validation and data entry scripts, function: introduction, scope of	variable, return					
codes.						
Scripting Standards: Scripts and naming convention, Script File Permission, Shell	Script Format,					
Sequence of Script execution.						
UNIT-III	08 Hrs					
Introduction to filters: pr: paginating files, head: Displaying the beginning of a file,	tail: displaying					
the end of the file, cut: slitting a file vertically, paste: pasting files, sort: ordering	a file, uniq, tr:					
translating characters.						
Filters and regular expression: grep: Searching for a pattern, Basic Regular Expression:	sion, Extended					
Regular Expression and egrep, types of grep. sed: stream editor, Line addressing, Cont	ext addressing,					
Text editing, Substitution. <b>awk</b> : Simple awk filtering, splitting a line into fields, printf,	redirecting and					
expression, comparison, begin and end, built-in variables and arrays.						
UNIT-IV	08 Hrs					
User Management: Adding a group, adding a user, user profiles, modifying and remov	ing users.					
Process Management: Process status, system processes, mechanism of process creation	on, Internal and					
External commands, process states and Zombies, killing processes with signals.						
Job scheduling: Scheduling jobs with at and crontab. Log Management: Run	ning script in					
background for tracking various log messages, tail with egrep and echo, Central logging	g (rsyslog)					
UNIT–V	08 Hrs					
Database Administration and Backup: Backing up each database to a separate file	, backing up a					
single database, Backup all databases to a single file, schedule a backup to automatic	single database, Backup all databases to a single file, schedule a backup to automatically back up a					
web portal or website data.						
Real Time Practice: Shell scripting to execute different commands on different remote servers,						
Automatic email alert generation about hardware resources, automate installation of required git						
version using shell script, Shell script to backup file system.						
Introduction to Docker and Curl: Brief introduction about docker and its usage wh	nile automating					
infrastructure management.						
Introduction to Curl: Automating user communication to and from servers using Curl						



Cours	Course Outcomes:							
After g	going through this course, the student will be able to							
CO1	Understand how to write shell scripts from basic to advanced level							
CO2	Analyze and identify high-level steps such as verifying user input to automate repetitive tasks							
CO3	Apply shell scripting techniques and standards using filters for pattern matching on plain text							
	data and variety of system log files							
CO4	Develop effective and interactive scripts using functional blocks, operating system and							
	networking utilities to manage complex and repetitive tasks in real time scenarios							

#### **Reference Books**

1.	Sumitabha Das, Unix Concepts and Applications, McGraw Hill, 4 <sup>th</sup> Edition, 2012, ISBN:978-0-07-063546-3
2.	Ganesh Naik, Learning Linux Shell Scripting, Packt Publishing, 2 <sup>nd</sup> Edition, May 2018, ISBN:978-1788993197
3.	Narendra Kumar Reddy, Complete Bash Shell Scripting, Polu Packt Publishing, April 2020, ISBN: 9781800209695 https://www.packtpub.com/in/cloud-networking/complete-bash-shell-scripting-video
4.	Mokhtar Ebrahim, Andrew Mallett, Mastering Linux shell scripting, Packt Publishing, 2 <sup>nd</sup> Edition, 2018, ISBN 9781788990554
5.	Imran Afzal, A Complete Course on Linux bash shell scripting with real life examples, Packt Publishing, July 2019, ISBN:9781838984083

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit...



Rubric for CIE & SEE Theory courses									
	<b>RUBRIC</b> for CIE			RUBRIC for SEE					
SL.NO	SL.NO Contents Marks			Contents	Marks				
1	QUIZZES – Q1 & Q2	20	Every unit c Answer FIVI [unit 1 to 5]	onsists of TWO questions of 20 Mar E full questions selecting ONE from e	ks each. each unit				
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20				
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20				
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20				
			7 & 8	Unit 4: Question 7 or 8	20				
			9 & 10	Unit 5: Question 9 or 10	20				
				Total Marks	100				

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SEMESTER: I							
COMPUTER NETWORKS							
		(Theory & Practice	e)				
Course Code	:	MCA102I	CIE	:	100+50 Marks		
Credits: L:T:P	:	4:0:1	SEE	:	100+50 Marks		
<b>Total Hours</b>	:	52L+26P	SEE Duration	:	3.00 Hours		
Introductions Int		UNIT-I	Nataroals Houderoas				
Introduction: Int	rou	Luction, Uses of Computer Networks,	Network Hardware	, N	etwork Software:		
Protocol Hierarchie	es, .	Design Issues for the Layers, Reference	e Models: The OSI R	lefe	erence Model, The		
TCP/IP Reference	Mc	del, A Comparison of the OSI and TCF	P/IP Reference Mode	ls			
Physical Layer-Gu	ide	d Transmission Media, Digital Modulat	tion and Multiplexin	g			
		UNIT-II			10 Hrs		
Data Link Layer:	D	ata link Layer Design issues, Error De	tection codes, Slidin	ıg V	Window Protocols		
(Stop and Wait, Go	o-B	ack-N (GBN) and Selective Repetitive	(SR))				
Medium Access C	on	trol: The Channel Allocation Problem,	Multiple Access Pro	otoc	cols, Ethernet		
		UNIT–III			12 Hrs		
The Network Lay	ver	Network Layer Design issues, Routi	ng algorithms- The	Op	timality Principal,		
Shortest Path Alg	ori	thm, Flooding, Distance Vector Rou	iting, Link State R	lou	ting, Hierarchical		
routing, Congestion	n C	ontrol Algorithms, Quality of Service,	Internetworking				
		UNIT–IV			10 Hrs		
The Network Lay	ver	in the Internet: The Network Layer	in the internet- IP v	ers	ion 4 Protocol, IP		
version 6 protocol	: T	he Main IPv6 Header, Extension Heat	aders, Internet Contr	rol	Protocols: ICMP,		
ARP, DHCP							
UNIT-V 10 Hrs							
The Transport Layer: The Transport Service: Services Provided to the Upper Layers, Berkeley							
Sockets, Elements of Transport Protocols, Internet transport protocols- TCP: Introduction to TCP, The							
Service Model, Protocol, Segment Header, UDP							
The Application	L٤	yer: The Domain Name System, E	Electronic Mail, Th	e V	World-Wide-Web,		
Streaming Audio and Video							



	LABORATORY
1.	Create a LAN with three or more nodes implementing star topology and demonstrate classful
	addressing
2.	Create a LAN using physical networks/virtual machine and install FTP server to demonstrate
	file transfer
3.	Demonstrate secured file transfer and computing over wired network and wireless network with
	SCP and SSH key based computing
4.	Demonstrate to calculate IP addresses using ipcalc
5.	Build DHCP server using dns-masq with and without MAC binding with IPV4 and IPV6
6.	Build DNS server for resolving the names and IP addresses
7.	Build a Firewall to Restrict Network Access using Firewall
8.	Demonstrate basic trouble shooting using ping, traceroute, ifconfig, nslookup, netstat and
	route
9.	Demonstrate multiple client server communication on different ports using netcat
10.	Demonstrate Proxy - Server setup for a web server and SSH port forwarding

#### **Course Outcomes:**

After going through this course, the student will be able to

<b>CO1</b>	Understand th	e fundamentals	of computer	networking and	the concept of	layered approach
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CO2 Identify the design issues, services, interfaces and protocols for data now in computer networks
--

**CO3** Demonstrate the protocols and services designed for the layered approach

**CO4** Analyze and evaluate the principles and protocols of computer networks

#### **Reference Books**

1.	Andrew S. Tanenbaum, David J Wetherall, "Computer Networks", Pearson Education, Pearson
	Publication, 5th Edition, 2012, ISBN-1978-81-317-8757-1
2.	Behrouz A Forouzan, Firouz Mosharraf, "Computer Networks A Top-Down Approach", Tata
	McGraw-Hill Education Pvt. Ltd, 2011, ISBN 13: 9781259001567
3.	Peterson, Larry L., and Bruce S. Davie. Computer networks: a systems approach. Elsevier,
	2012, 5th Edition, ISBN-13: 978-0-12-385059-1
4.	Stallings, William. Data and computer communications. Pearson Education India, 2007, 8th
	Edition, ISBN: 0-13-243310-9.

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#### Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

QUIZZES: Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

EXPERIENTIAL LEARNING: Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding up to 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks:

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The breakup for conduction of practical examination is (i) Procedure and Write up: 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

Rubric for CIE & SEE for Integrated Theory Courses with Laboratory							
	<b>RUBRIC</b> for CIE		RUBRIC for SEE				
SL.NO	Contents	Marks	Q.NO Contents Mark				
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks ea Answer FIVE full questions selecting ONE from ea unit [unit 1 to 5]				
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20		
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20		
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Theory Exam Marks	100		
				Laboratory Exam Marks	50		
				Total Marks	150		



SEMESTER: I							
OBJECT ORIENTED PROGRAMMING							
(Theory & Practice)							
Course Code	:	MCA103I	CIE	:	100 + 50 Marks		
Credits: L:T:P	:	4:0:1	SEE	:	100 + 50 Marks		
Total Hours	:	52L+26P	SEE Duration	:	3.00 Hours		

UNIT–I	11 Hrs				
Object Oriented Programming: Introductions, OOP, classes, class attributes, instances, instance					
attributes, Constructor and Destructor, Encapsulation					
Introduction to Python Programming Language: Introduction to python, program	output, input,				
comments, operators, variables and assignment, numbers, if statement, while loop, for	r loop, and the				
range ()					
UNIT–II	11 Hrs				
<b>Data Types:</b> Operations and methods on strings, tuples, lists, sets and dictionaries.					
Functions: Built-in Functions: Lambda, MAP, Filters and User defined Functions					
Magic Methods: Magic method syntax, available methods					
UNIT–III	10 Hrs				
Basics of Polymorphism and Inheritance: Operator and function overloading, I	Introduction to				
Inheritance, types of Inheritance, sub classing and scope, overriding methods					
Modules and Packages: What are modules, modules and packages, creation of packa	iges, importing				
modules, importing packages.					
Introduction to Numpy module: numpy basics, numpy data types, creation of ndarray, nested					
sequences, numpy array iteration, concatenation					
UNIT–IV	10 Hrs				
Reading and Writing Files: Introduction to File operation, opening a File, Technique	es for Reading				
Files, Writing Files.					
Context Managers: Context manager syntax, when you should write context managers.					
Error and Exceptions: Introduction to exceptions in python, detecting and handli	ng exceptions,				
exceptions as strings, raising exceptions, assertions, standard exceptions					
UNIT–V	10 Hrs				
Decorators: Understanding Decorators, Decorator Syntax, Decorators Functions, Decorator classes.					
Generators: Understanding Generators, Generator syntax, Generator Examples					
OOP for Database Programming: Introduction, Architecture, Steps for Connecting Database, Basic					
Operations with Examples					

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#### LABORATORY

# Students should implement using Python Language. Apply Unit testing and integration testing (As per problem definition). Develop various test cases, execute them and analyze the test results

1.	Implement 10 operations on string and Tuple
2.	Implement 10 operations on sets and lists
3.	Demonstrate dictionary concepts for a given scenario
4.	Implement importing of user defined modules using Magic Methods
5.	Implement any two types of Inheritance
6.	Implement overloading concept
7.	Implement overriding concept
8.	Demonstrate any five-exception handling mechanism using files
9.	Write a python program to Insert, Search, and Retrieve data into Employee Database
10.	Write a program to create Fibonacci series using generators and stack the same with a decorator
	$(-f_{in})$ $(f_{in})$

#### Course Outcomes: After going through this course, the student will be able to

001	TT 1 / 1/1	1 .	C 1 .	• , 1	•
COL	Understand the	basic concept	s of object-o	oriented pro	ogramming
~~~	e noviet dans dans	caste eoneept		strene or pro	

**CO2** Identify and apply relevant object-oriented concepts in any real-world scenario.

**CO3** Utilize object-oriented concepts to solve any real-world problem

**CO4** Analyze solutions using OOPs concepts for real world applications

#### **Reference Books**

1.	Hetland, Magnus Lie, Beginning Python: from novice to Professional, Apress, 3 <sup>rd</sup> Edition,
	2017, ISBN 978-1-4842-0029-2.
2.	Sneeringer, Luke, Professional Python, John Wiley & Sons, 2016, ISBN -978-1-119-07085-6
3.	Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming, SHROFF Publishers
	and Distributors Pvt, 3 <sup>rd</sup> Edition, 2018, ISBN: 13:978935213681-0.
4.	Wesley J Chun, Core Python Programming, Pearson Education, 3 <sup>rd</sup> Edition, 2012, ISBN 13:
	978-0-13-267820-9.

#### Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding upto 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

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#### Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks:

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The break up for conduction of practical examination is (i) Procedure and Write up : 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

	Rubric for CIE & SEE for Integrated Theory Courses with Laboratory							
	<b>RUBRIC</b> for CIE		RUBRIC for SEE					
SL.NO	Contents	Marks	Q.NO Contents Mark					
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks eac Answer FIVE full questions selecting ONE from eac unit [unit 1 to 5]					
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20			
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20			
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20			
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20			
			9 & 10	Unit 5: Question 9 or 10	20			
				Theory Exam Marks	100			
				Laboratory Exam Marks	50			
				Total Marks	150			

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SEMESTER: I							
WEB APPLICATION PROGRAMMING							
(Theory & Practice)							
Course Code	:	MCA104I	CIE	:	100 + 50 Marks		
Credits: L:T:P	:	4:0:1	SEE	:	100 + 50 Marks		
Total Hours	:	52L+26P	SEE Duration	:	3.00 Hours		

UNIT-I	10 Hrs					
Introduction to Web Technologies: Internet, WWW, Web Browsers, Web Servers, U	JRLs, MIME,					
HTTP, Security, the Web Programmers Toolbox. WAMP, LAMP, ZAMP, Client-Side Scripting						
versus Server-Side Scripting						
Mark-up Language: HTML5 tags- Formatting, Commenting, Code, Anchors,	Backgrounds,					
Images, Hyper-links, Lists, Tables, Semantic Elements in HTML, Multimedia, Forms						
UNIT–II	12 Hrs					
Front End Design: Cascading Style Sheet (CSS): Introduction to CSS – Basic syntax	and structure,					
In-line Styles, Embedding Style Sheets, Linking External Style Sheets, Backgrounds,	manipulating					
text, Margins and Padding, Positioning using CSS.						
Bootstrap: Getting Started with Bootstrap- Mobile-irst design, Why Bootstrap, Includin	ng Bootstrap in					
your HTML file, The Bootstrap CDN, overriding with custom CSS, Using the Bootstrap	o customizer,					
Deep customization of Bootstrap						
Using the Base CSS: Implementing the Bootstrap Base CSS, Headings, Body copy	, Typographic					
elements, Emphasis inline elements, Alignment classes, Emphasis classes, Addresses,	Blockquotes,					
Abbreviations, Lists, Tables, Basic styling, Buttons, Forms, Inline forms, Horizontal	forms, Code,					
Images, Font families						
Doing More with Components: Jumbotron, Badges, Progress bar, Button groups						
UNIT–III	08 Hrs					
Basics of JavaScript: Overview of JavaScript, Object orientation and JavaScr	ipt, Syntactic					
characteristics, Primitives, operations, and expressions, Screen output and keyboard	input, Control					
statements, Object creation and modification, Arrays, Functions, Constructors, Patt	tern matching					
using regular expressions						
UNIT-IV	11 Hrs					
XML: Introduction, syntax, Document structure, Document Type Definitions, Name	spaces, XML					
schema, displaying raw XML documents						
JSON: Introduction-JSON Is a Data Interchange Format, JSON Is Programming Language						
Independent, JSON Syntax -JSON Is Based on JavaScript Object Literals, Name-Value Pairs,						
Proper JSON Syntax, Syntax Validation, JSON as a Document, The JSON Media Type, JSON Data						
Types -Quick Look at Data Types, The JSON Data Types, The JSON Object Data Type, JSON						
Schema -Contracts with Validation Magic, Introduction to JSON Schema	Γ					
UNIT-V	11 Hrs					
Document Object Model: The JavaScript Execution Environment, The Document (						
Elements Access in Java Script, Events and Event Handling, The DOM2 Event Model, DOM Tree						
Elements Access in Java Script, Events and Event Handling, The DOM2 Event Mode	Object Model, el, DOM Tree					
Elements Access in Java Script, Events and Event Handling, The DOM2 Event Mode Traversal and Modification	Dbject Model, el, DOM Tree					
<ul><li>Elements Access in Java Script, Events and Event Handling, The DOM2 Event Mode Traversal and Modification</li><li>Data Visualization: Getting Started with D3.JS, Using SVG to Create Images Using C</li></ul>	Object Model, el, DOM Tree Code, Base tag,					

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	LABORATORY						
1.	Design a static web portal using HTML5 semantic elements, style using CSS						
2.	Design a web page to demonstrate, customization of Bootstrap classes using CSS						
3.	Develop an event countdown timer using HTML5, CSS/Bootstrap and JavaScript						
4.	Design a JS program to show the stack implementation using Arrays						
5.	Write a JS program to demonstrate any 4 methods of						
	a. String object						
	b. Date object						
	c. Number Object						
6.	Write a JS program to illustrate the following concepts considering appropriate scenario.						
	a. Different ways of creating objects and nested objects.						
	b. Different kinds of DOM events						
7.	Design a form and validate the fields. Use regular expression to condition the fields						
8.	Compose an XML file to store name, address, Email Id and phone number of three.						
	person and access the data using JavaScript, display the result by applying styles						
9.	Design JSON document to store information about faculty in MCA Department, college						
	affiliated to VTU. Make up sample data for 5 students. Access the values through JavaScript						
	and store them in the table format						
10.	Design a page to display complex shapes using D3.JS						

#### **Course Outcomes:**

After	going through this course, the student will be able to
<b>CO1</b>	Describe the basic constructs of the web concepts
CO2	Determining and comparing the relevant components that can be applied to a given problem
CO3	Apply the concepts to design and implement the web solutions for the given scenario
<b>CO4</b>	Analyze the web components in building an application

1.	Robert W. Sebesta, Programming the World Wide Web, Pearson Education, 10th Edition, 2018,
	ISBN: 9780133775983.
2.	Lindsay Basset, Introduction to JavaScript Object Notation, O'Reilley Media, Inc., August
	2015, 9781491929483.
3.	Aravind Shenoy, Ulrich Sossou, Learning Bootstra, O'Reilly Media, 2020, ISBN 978-1-78216-
	184-4.
4.	Matthew Huntington, D3.js Quick Start Guide, Packt Publishing, 2018, ISBN-13: 978-
	1789342383

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#### Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

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#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding upto 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

Scheme of Semester End Examination (SEE) Theory for 100 marks:

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Rubric for CIE & SEE for Integrated Theory Courses with Laboratory							
	<b>RUBRIC</b> for CIE		RUBRIC for SEE				
SL.NO	Contents	Marks	Q.NO	NO Contents Ma			
1	QUIZZES – Q1 & Q2 20			Every unit consists of TWO questions of 20 Marks each. Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20		
4	Laboratory 50		5&6	Unit 3: Question 5 or 6	20		
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Theory Exam Marks	100		
				Laboratory Exam Marks	50		
				Total Marks	150		

 
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SEMESTER: I						
ABILITY ENHANCEMENT COURSE-I						
(Practice)						
Course Code	:	MHS101L	CIE	:	50 Marks	
Credits: L:T:P	:	0:0:2	SEE	:	50 Marks	
Total Hours	:	26 hrs / Semester	SEE Duration	:	2.00 Hours	
		τινιτή τ			05 Uma	
Communication	Տե	UNII-I tills: Basics Method Means Proce	and Purpose Bas	ice	of Business	
Communication W	Jri	tten & Oral Communication Listening	iss and rupose, Das	ies	of Dusiness	
Communication, w	rit	h Confidence & Clarity: Interaction	with people the need	tha	uses and the	
methods getting ph	•11 •01	netically correct using politically correct	whill people, the need,	vtor	more	
Assortive Commu		inetically concert, using pointically concert	vication Importance on		npore.	
Assertive communi	inn ios	tion Assertive Words being assertive	incation, importance and	يه د	pplicability of	
Assertive commun		UNIT_II			06 Hrs	
Antitude Test Prei	ng	pration: Importance of Aptitude tests K	ev Components Quanti	tati	ve Antitude –	
Problem Solving	P° D:	ata Sufficiency Data Analysis - Num	ber Systems Math Voo	vahi	ilary fraction	
decimals digit pla		s profit and loss time and work time	ber Systems, Wath Voc	.au	lendar clock	
permutations and co	on	abinations probability atc	ne, speed and distance,	Ca	iendar, clock,	
Mental ability: coo	dii	decoding blood relations puzzle test	logical sequence of wo	rde		
	un	UNIT-III	, logical sequence of wo	105	05 Hrs	
Reasoning and Lo	0g	ical Reasoning: logic, statement- arg	ments, assumptions, co	ours	es of actions.	
conclusions, derivi	- e ing	conclusions from passages, logical	puzzles. Analytical Re	aso	ning. Critical	
Reasoning		periode in passages, region	pullies, 11111, 1111			
Presentation Skills	s:	Discussing the basic concepts of pres	entation skills. Articula	tior	Skills, IO &	
GK, how to make e	eff	ective presentations, body language, Ra	port Building			
		UNIT-IV	pport 2 unung		05 Hrs	
Interview Skills: C	Du	estions asked and how to handle them.	Behavioral, technical an	d H	IR Interviews.	
etiquette.			<b>,</b>		· · · · · · · · · · · · · · · · · · ·	
Motivation and St	tre	ess Management: Self-motivation. grou	up motivation, leadershi	ра	bilities. Stress	
clauses and stress b	ous	sters to handle stress and de-stress: Unde	erstanding stress - Conce	ept	of sound body	
and mind. Dealing	g	with anxiety, tension, and relaxation	techniques. Individua	al (	Counseling &	
Guidance. Career O	o )ri	entation. Balancing Personal & Professi	onal Life			
		UNIT –V			05 Hrs	
Professional Practice: Professional Dress Code. Time Sense Respecting People & their Space						
Relevant Behavior at different Hierarchical Levels. Positive Attitude. Self-Analysis and Self-						
Management						
<b>Professional Ethics:</b> values to be practiced, standards and codes to be adopted as professional						
engineers in society for various projects. Balancing Personal & Professional Life						
Course Outcomes:						
After going through this course, the student will be able to						
CO1 Understand and solve problems covering Quantitative, verbal Ability and Logical Reasoning						
CO2 Apply and enhance communication, leadership and interpersonal working skills with						



Refere	ence Books
1.	Arun Sharma, How to prepare for Quantitative Aptitude for CAT, McGraw Hill, 8th Edition,
	2022, ISBN:978-93-53160-18-0
2.	R S Agarwal, Dr. R.S. Aggarwal, S Chand Publishing, 2022, ISBN: 978-9355012326
3.	R S Agarwal, A Modern Approach to Verbal and Non-verbal Reasoning, S Chand Publishing,
	2018, ISBN:978-9352832163
4.	Kerry Patterson, Joseph Grenny, Ron McMillan, Crucial Conversation: Tools for Talking
	When Stakes are High, McGraw-Hill Publication, 3 <sup>rd</sup> Edition, 2021, ISBN: 9780071772204
5.	Aptimithra: Best Aptitude Book, Ethnus, Tata McGraw Hill, 2014 ISBN: 9781259058738

Scheme of Continuous Internal Evaluation Laboratory (CIE): 40 + 10 = 50 Conduction of aptitude, Reasoning, communication skills, analysis and presentation (50 Marks), Test (50 Marks), adding upto 100 marks. Final marks will be reduced to 40 & Experiential Learning (10 Marks) adding up to 50 Marks

**Semester End Evaluation (SEE); Theory (50 Marks)** - **SEE** for 50 marks are executed by means of an examination. The duration of the SEE will be for 2 hours.

Lab Only Course with 50 Marks								
	<b>RUBRIC</b> for CIE		RUBRIC for SEE					
SL.NO	Contents	Marks	Q.NO Contents M					
1	1 Continuous evaluation 50 by the course co- ordinators			The evaluation is individual for the student				
2	Test	50	1.	Aptitude and Reasoning (Problem Solving):	20			
	Marks (Sl No 1+2)	100	2.	Communication Skills (Verbal, Non-Verbal presentation skill analysis)	20			
	Reduced to	40		Viva voce	10			
3	Experiential Learning	10						
Total Marks 50 Total Marks 50								

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SEMESTER: I						
BASICS OF PROGRAMMING						
	(Theory)					
<b>Course Code</b>	:	MCA001T	CIE	:	50 Marks	
L:T:P	:	2*:0:0	SEE	:		
<b>Total Hours</b>	:	26L	SEE Duration	:		

UNIT-I05 HrsC Programming: Decision making, control structures and arrays: C Structure, Data Types, Input-<br/>Output Statements, Decision making with if statement, simple if statement, the if-else statement,<br/>nesting of if-else statements, the else-if ladder, the switch statement, the ?: operator, the goto<br/>statement, the break statement, programming examplesThe while statement, the do...while statement, for statement, nested loops, jumps in loops, the continue

statement, ne do...while statement, for statement, nested loops, julips in loops, the continue statement, programming examples. One dimensional and two-dimensional arrays, declaration and initialization of arrays, reading, writing and manipulation of above types of arrays

UNII-II	05 Hrs
Structures: Defining a structure, declaring structure variables, accessing structure mem	bers, structure
initialization, copying and comparing structure variables, Operations on individual men	bers, array of
structures, structures within structures, structures and functions, Unions, size of structure	S

UNIT-III06 HrsPointers: Pointers in C, Declaring and accessing pointers in C, Pointer arithmetic, Functions, Call by<br/>value, Call by reference, Pointer as function arguments, recursion, passing arrays to functions, passing<br/>strings to functions, Functions returning pointers, Pointers to functions, Programming Examples

UNIT-IV05 HrsDigital Logic: Binary Systems and Combinational Logic Digital Computers and Digital Systems,<br/>Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's<br/>and r-1 complements, Binary Code, Binary Logic, Digital Logic Gates

**Computer Organization:** Basic Operational Concepts, Software, Performance, Multiprocessing and Multi computers, Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Interrupts

 UNIT-V
 05 Hrs

 Operating System: Operating-System Structure, Operating-System Operations, Overview of 

 Process Management, Memory Management, Storage Management, Protection and Security,

 Distributed Systems

 CPU Scheduling: Pasic Concepts of CPU scheduling Scheduling Algorithms ECES SIE Pound

**CPU Scheduling:** Basic Concepts of CPU scheduling, Scheduling Algorithms-FCFS, SJF, Round Robin, Priority Scheduling

\*The Basics of Programming (MCA001T) is a mandatory audit course (**non-credit course**) offered to Non-Computer Science background students only.

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#### **Course Outcomes:**

After g	going through this course, the student will be able to
CO1	Understand the basic concepts of programming, digital logic, organization, and operating system
CO2	Demonstrate the principles of logical programming and operating system management
CO3	Apply and analyse the programming and logical skills to real world problems
CO4	Evaluate and compare the methods, solutions and algorithms of basics of programming

#### **Reference Books**

1.	Herbert Schild, C: The Complete Reference, McGraw Hill Education, 4 <sup>th</sup> Edition, July 2017, ISBN-13: 978-0070411838
2.	Yashwant Kanetkar, Let us C, BPB Publications ,18th Edition, 2021, ISBN-13: 978- 9391392994
3.	M.Morris Mano, Digital Logic and Computer Design" Pearson, 2016, ISBN-13: 978- 9332542525
4.	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, Wiley India Pvt. Limited, 9 <sup>th</sup> Edition, ISBN-BRV: !978-1-118-12938-8

#### Scheme of Continuous Internal Evaluation (CIE) Theory: 10 + 30 + 10 = 50

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks adding up to 20 marks. Final Quiz mark will be reduced to 10 marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 30 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (10), Video based seminar/presentation/demonstration (10) adding upto 20 marks. Final EL marks will be reduced to 10 Marks

	Rubric for CIE & SEE Theory courses of 50 Marks						
	<b>RUBRIC</b> for CIE		RUBRIC for SEE				
SL.NO	Contents	Marks					
1	QUIZZES – Q1 & Q2	10					
2	TESTS – T1 & T2	30	No SEE Examination for this bridge course				
3	Experiential Learning – EL1 & EL2	10	No SEE Examination for this bridge course				
	Total Marks	50					

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SEMESTER: II					
	RESEARCH METHODOLOGY AND IPR				
		(Theory)			
Course Code	:	MCA431T	CIE	:	50 Marks
L:T:P	:	2:0:0	SEE	:	50 Marks
<b>Total Hours</b>	:	26L	SEE Duration	:	2.00 Hours

UNIT-I06 HrsResearch Methodology: Introduction, Meaning of Research, Objectives of Research, Motivation in<br/>Research, Types of Research, Research Approaches, Significance of Research, Research Methods<br/>versus Methodology, Research and Scientific Method, Importance of Knowing how Research is Done,<br/>Research Process, Criteria of Good Research, Research Problem, Selecting the Problem, Technique<br/>Involved in Defining a Problem, Reviewing the literature, bringing clarity and focus to the research<br/>problem, improving research methodology, Developing a theoretical framework, Developing a<br/>conceptual framework, Writing about the literature reviewed

UNIT-II05 HrsResearch Design: Meaning of Research Design, Need for Research Design, Features of a GoodDesign, Important Concepts Relating to Research Design, Different Research Designs, BasicPrinciples of Experimental Designs, Important Experimental Designs. Design of Sample Surveys:Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus CensusSurvey, Types of Sampling Designs

UNIT–III	05 Hrs
Interpretation and Report Writing: Meaning of Interpretation, Technique of	Interpretation,
Precaution in Interpretation, Significance of Report Writing, Different Steps in W	riting Report,
Layout. Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, F	Precautions for
Writing Research Reports	

 UNIT-IV
 05 Hrs

 Intellectual Property: IP law basics, types of Intellectual Property, Agencies responsible for Intellectual property Registrations, foundations of trademark law, international trademark law, subject matter of copyright, international copy right Law, foundations of Patent law- patentability, design patents. International Patent law

 UNIT-V
 05 Hrs

 Protecting Software and Computer: Related Innovations: An overview, Case studies, Software

 Patent vs Copyright, Guideline for computer – related invention in Europe and Japan, Case studies

Cours	e Outcomes:				
After g	going through this course, the student will be able to				
CO1	Identify the suitable research methods and articulate the research steps in a proper				
	sequence for the given problem				
CO2	Conduct literature survey, define the problem statement, and suggest suitable solution for				
	the given problem and present in the format of the research paper like IEEE/ACM/Elsevier or a				
	proof of concept				
CO3	Analyze the problem and formulate the problem to develop methodology to conduct research				
<b>CO4</b>	Apply Copy Right Act /Patent Act /Cyber Law/ Trademark / Plagiarism check to the given case				
	and prepare the technical paper				



Referen	ace Books
1.	C.R. Kothari, Gaurav Garg, "Research Methodology: Methods and Techniques", New Age
	International 4th Edition, 2018. ISBN-13: 978-9386649225
2.	Ranjit Kumar, "Research Methodology- A step-by- step guide for beginners". SAGE Pub 3 <sup>rd</sup>
	Edition, 2011, ISBN: 9781849203005, 9781849203012
3.	Debirag E. Bouchoux, "Intellectual Property", Cengage learning, 4th Edition, ISBN-13: 978-1-
	111- 64857-2
4.	Prabuddha Ganguli, "Intellectual Property Rights", Tata McGraw-Hill Publishing Company
	Limited, ISBN-13:978-0-07-007717-1

#### Scheme of Continuous Internal Evaluation (CIE) Theory: 10+ 20 + 20 = 50

**QUIZ:** Quiz will be conducted in online/offline mode. Two quizzes will be conducted. Each quiz will be evaluated for 10 Marks, adding up to 20 Marks. Final quiz marks will be reduced to 10 Marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analysing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 20 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and plan to carry out research study after literature review. Video based seminar / presentation / (20) adding up to 40 marks. Final EL marks will be reduced to 20 Marks.

**Scheme of Semester End Examination (SEE) Theory for 50 marks:** The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 10 marks. Student will have to answer one full question from each unit.

Rubric for CIE & SEE for Integrated Theory Course with Theory					
	<b>RUBRIC</b> for CIE			<b>RUBRIC</b> for SEE	
SL.NO	Contents	Marks	Q.NO Contents N		
1	QUIZZES–Q1 & Q2	10	Every u each. An each uni	nit consists of TWO questions of 2 nswer FIVE full questions selecting O t [unit 1 to 5]	0 Marks NE from
2	TESTS – T1 & T2	20	1 & 2	Unit 1: Question 1 or 2	10
3	Experiential Learning – EL1 & EL2	20	3 & 4 5 & 6 7 & 8	Unit 2: Question 3 or 4 Unit 3: Question 5 or 6 Unit 4: Question 7 or 8	10 10 10
	Total Marks	50	9 & 10	Unit 5: Question 9 or 10	10
				Total Marks	50

08 Hrs



SEMESTER: II					
	DESIGN AND ANALYSIS OF ALGORITHMS				
		(Theor	y)		
<b>Course Code</b>	:	MCA131T	CIE	:	100 Marks
L:T:P	:	3:1:0	SEE	:	100 Marks
<b>Total Hours</b>	:	39L+26T	SEE Duration	:	3.00 Hours

UNIT-I 08 Hrs Fundamentals of Algorithms and Divide and Conquer technique: Notion of Algorithm, Review of Asymptotic Notations, Recursive functions using stack, Mathematical Analysis of Non-Recursive and **Recursive Algorithms** 

Divide and Conquer: Binary Search, Merge Sort, Quick Sort and its performance.

UNIT-II

#### **Decrease-and-Conquer & Greedy Method**

Decrease and Conquer: Insertion Sort, Topological Sorting, Depth First Search using stack, Breadth First Search using Queue.

Greedy Method: Representation of Graphs, Knapsack Problem, Minimum-Cost Spanning Trees:

Prim's Algorithm, Kruskal's Algorithm; Single Source Shortest Paths	C
UNIT–III	08 Hrs
Space and Time Trade Offs and Limitations of Algorithmic Power	
Space-Time Tradeoffs: Introduction, sorting by Counting, Input Enhancement in String	Matching.
Limitation of Algorithmic Power: Lower-Bound Arguments, Decision Trees, P,	NP, and NP-
Complete Problems, Challenges of Numerical Algorithms.	
UNIT–IV	07 Hrs
Dynamic Programming: Warshall's Algorithm, Floyd's Algorithm for the All-Pairs	Shortest Paths

Problem, 0/1 Knapsack, The Traveling Salesperson problem. **08 Hrs** 

UNIT-V

**Backtracking and Branch - Bound Technique** 

Introduction to trees, tree traversal techniques

Backtracking: n – Queens problem, Hamiltonian Circuit Problem, Subset – Sum Problem Branch and Bound-Assignment Problem, Travelling Salesman Problem

Course	Course Outcomes:		
After g	going through this course, the student will be able to		
CO1	Identify the data structures, paradigms and approaches used in algorithms and its impact in		
	practice		
CO2	Classify different computational models (e.g., divide-and-conquer), order notation and various		
	complexity measures (e.g., running time, disk space) for real world applications		
CO3	Apply relevant data structures and algorithm techniques to design efficient solutions for		
	different applications		
<b>CO4</b>	Analyze and evaluate the algorithms based on the data structures used, order of notation and		
	performance metrics		



Refere	ence Books
1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Person Education, 3 <sup>rd</sup> Edition 2016 ISBN 13: 9780321358288
2	Ellis Herowitz, Songuthavar Daiasakaran Sartai Sahni, "Fundamentala Of Computer
2.	Eins Horowitz, Sangutieval Kajasekaran, Sanaj Sanin, Fundamentais Of Computer
	Algorithms", Galgotia Publications, 2 <sup>nd</sup> Edition, 2004, ISBN 13: 9788175152571
3.	Rod Stephens, "Essential Algorithms A Practical Approach to Computer Algorithms", Wiley,
	2013, ISBN: 978-1-118-61210-1
4.	Rajesh K. Shukla, "Analysis and Design of Algorithms A Beginner's Approach", Wiley
	Edition: 2015, ISBN 13: 9788126554775
	·

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit...

Rubric for CIE & SEE Theory courses									
RUBRIC for CIE			RUBRIC for SEE						
SL.NO	Contents	Marks	Q.NO	Contents	Marks				
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks each. Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]						
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20				
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20				
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20				
			7 & 8	Unit 4: Question 7 or 8	20				
			9 & 10	Unit 5: Question 9 or 10	20				
				Total Marks	100				

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SEMESTER: II									
		DATA MODELING							
(Theory & Practice)									
Course Code	:	MCA132I	CIE	:	100+50 Marks				
L:T:P	:	4:0:1	SEE		100+50 Marks				
<b>Total Hours</b>	:	52L+26P	SEE Duration		3.00 Hours				

#### **UNIT-I Introduction to Databases** Database Languages and Architecture: Introduction to data, information, databases, database management system; Characteristics of database approach, Data models, Schema and instances, Three schema architecture and Data Independence, Database Languages and Interfaces, Database System

Environment, Centralized and Client/ Server Architectures of DBMSs Conceptual Data Modeling: A Sample Database Application, Entity Types, Entity Sets, Attributes, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the Company Database, ER Diagrams, Naming Conventions, and Design Issues

UNIT-II 11 Hrs Relational Model: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas and Keys, Update Operations, Transactions, and Dealing with Constraint Violations, Relational Database Design Using ER-to-Relational Mapping

Structured Query Language: Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL, More Complex SQL Retrieval Queries-Nested Queries, Tuples, and Set/ Multi set Comparisons, exists and unique, join tables and outer joins, aggregate functions, Schema Change Statements in SQL

Normalization: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Cod Normal form

**UNIT-III** 

10 Hrs

10 Hrs

Transaction Concepts: Introduction to Transaction Processing, Transaction and System Concepts, **Desirable Properties of Transactions** 

Semantic Data Modeling: Introduction – Mind the Semantic Gap

Semantic Modeling Elements- General Elements, Common and Standardized Elements

Semantic Model Development: Development Activities, vocabularies, Patterns, and Exemplary Models


UNIT-IV
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11 Hrs

**MongoDB:** SQL and NoSQL evolution, MongoDB key characteristics and use cases, MongoDB configuration and best practices, Reference documentation.

Scheme Design and Data Modeling: Data modeling, MongoDB scheme design, Modeling data for atomic operations Modeling relationships, connecting to MongoDB using Python.

**MongoDB CRUD operations: CRUD using the shell-** Administration, MapReduce in the mongo shell, Aggregation framework, Securing the Shell

UNIT-V

10 Hrs

Advanced Querying: MongoDB CRUD operations: CRUD in Mongoid, CRUD using the Python driver, Comparison operators, Update operators, Smart querying.

Aggregation: Why Aggregation, Aggregation operators, Expression operators, Limitations Indexing: Index types- single field indexes, compound indexes



LABORATORY								
Exercise 1	ccise 1 Design, Create and Implement the relational databases for any one of the Domains like							
	Tourism, Human Resource Management, Debris Management and Others							
	Note: Minimum Six (6) Queries to be executed including nested queries							
Exercise 2	Design, Create and Implement the relational databases for any one of the Domains like							
	Health Care, Energy, Agriculture, Telecom and others							
	Note: Minimum Six (6) Queries to be executed including joins							
Exercise 3	Create and implement CRUD operations using MongoDB for any one of the domains.							
	Telecom, Tourism, Human Resource Management and Others							
	Note: Minimum Six (6) Queries to be executed							
Exercise 4	Create and implement CRUD operations using MongoDB for any one of the domains.							
	Health Care, Energy, Agriculture							
	Note: Minimum Six (6) Queries to be executed							
Exercise 5	Implement an interface to perform CRUD operations in MongoDB using Python							
	Driver for any one of the Domain listed in the exercises							

## **Reference Books**

1.	RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Addison
	Wesley, 6th Edition, 2011, ISBN 13: 978-0-136-08620-8
2.	Raghu Ramakrishnan, Johannes Gehrke, Database Management System, Mc Graw-Hill, 3rd
	Edition, 2014, ISBN-13:978-8131769591
3.	Alex Giamas, Mastering MongoDB 3.x, Packt Publishing, Kindle Edition, 2017 ISBN 978-1-
	78398-260-8
4.	Panos Alexopoulos, Semantic Modeling for Data, O'Reilly Media, Inc.First Edition, 2020,
	ISBN
	9781492054276

#### **Course Outcomes:**

After going through this course, the student will be able to

U	
CO1	Understand the fundamental concepts of structured, unstructured and semantic data models
CO2	Apply suitable data model concept to solve the given problem
CO3	Analyse relational and non-relational data model to check the performance of the data models
	with respect to design and manipulations
CO4	Design and implement suitable data model for any given real time scenarios



## Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analysing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding up to 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks :

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The break up for conduction of practical examination is (i) Procedure and Write up : 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

Rubric for CIE & SEE for Integrated Theory Courses with Laboratory						
	<b>RUBRIC</b> for CIE		RUBRIC for SEE			
SL.NO	Contents	Marks	Q.NO Contents Marks			
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks each. Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20	
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20	
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Theory Exam Marks	100	
			Laboratory Exam Marks	50		
				Total Marks	150	



SEMESTER: II					
CLOUD NATIVE FULLSTACK APPLICATION DEVELOPMENT-I					
(Theory & Practice)					
Course Code	:	MCA231I	CIE	:	100 + 50 Marks
Credits: L:T:P         :         3:0:1         SEE         :         100 + 50 Marks					100 + 50 Marks
Total Hours	:	39L+26P	SEE Duration	:	3.00 Hours

UNIT–I	08 Hrs			
Object Oriented Design: Introduction to Object-Oriented Concepts, How to Think in Terms of				
Objects, The Anatomy of a Class, Class Design Guidelines, Designing with Objects				
Inheritance: Mastering Inheritance and Composition, Designing with Interfaces and Al	ostract Classes,			
Building Objects and Object-Oriented Design, Design Patterns, The SOLID Princip	oles of Object-			
Oriented Design				
UNIT–II	08 Hrs			
Java Fundamental: Applications of Java Programming, Conditional and Control State	ements, Arrays,			
String Handling, Classes, Objects and Methods, Inheritance, super keyword. Interfa	ace, Exception			
Handling				
Threads: The Thread Class and Runnable Interface, Creating Thread, Creating Mu	ltiple Threads,			
Thread Priorities, Synchronization, using Synchronization Methods, Thread Commu	nication using			
notify (), wait () and notify All(), suspending, Resuming and stopping Threads				
UNIT–III 08 Hrs				
Java Advanced Programming: Java Concurrency package, Java Generics: Generics Fundamentals				
Bounded Types, Generic Methods, Generic Constructors, Some Generic, Restriction	s. Collections:			
Collections Overview, The Collection Interfaces, The collection Classes. The Arrays	Class. Lambda			
Expressions, Java Memory Management				
Java Design Patterns: Creational, Behavioral and Structural patterns				
UNIT–IV	07 Hrs			
<b>RESTful API:</b> Java APIs For JSON Processing, Introduction to the Basics of RESTful Architecture				
Design Strategy, Guidelines, Best Practices, Essential RESTful API Patterns				
Design Strategy, Guidelines, Best Practices, Essential RESTful API Patterns	Architecture			
Design Strategy, Guidelines, Best Practices, Essential RESTful API Patterns UNIT–V	08 Hrs			
Design Strategy, Guidelines, Best Practices, Essential RESTful API Patterns UNIT–V Advanced RESTful API: Patterns, Microservice API Gateways, RESTful Services A	08 Hrs PI Testing and			
UNIT-V         Advanced RESTful API: Patterns, Microservice API Gateways, RESTful Services A         Security, RESTful Service Composition for Smart Applications	08 Hrs PI Testing and			

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	LABORATORY
1.	Write a Java program to demonstrate the concepts.
	Encapsulation, Inheritance & Multiple Inheritance
2.	Complete the following:
	1. Create a package named shape.
	2. Create some classes in the package representing some common shapes like Square,
	Triangle, and Circle.
	3. Import and compile these classes in another program.
3.	Write a Java program to demonstrate the concepts.
	i)Abstraction, Run Time Polymorphism
4.	Write a Java programs to demonstrate the concepts of design patterns.
5.	Write a Java program that demonstrated the Thread Life Cycle
6.	Write a Java code to demonstrate producer & consumer problems using thread wait & notify
	methods.
7.	Write a Singleton class which is thread safe and immutable.
8.	Using Java Generics demonstrates below concepts using Java program.
	i) Type wildcards with Java Generics
9.	Build portal RESTful web API to demonstrate to create a web resource which can be accessed
	using REST URI's and demonstrate the concept of GET, POST, PUT & DELETE
10.	Build portal RESTful web API to demonstrate below concepts.
	i) Write a Web API to demonstrate the concepts of security using basic Oauth2

#### **Course Outcomes:**

After going through this course, the student will be able to

**CO1** Understand Object Oriented Design concepts

CO2 Identify the Objects, patterns and services in/ for real-time applications

CO3 Apply the concept of Objects, patterns and services for real-time applications

**CO4** Analyze solutions using OOPs concepts for real world applications

#### **Reference Books**

1.	Matt Weisfeld, Object-Oriented Thought Process, Addison-Wesley Professional, 5th Edition,
	2019, ISBN: 9780135182130
2.	Jeff Friesen, Java Threads and the Concurrency Utilities, Apress, ISBN: 9781484217009
3.	Ian F. Darwin, Java Cookbook, O'Reilly Media, Inc., 4th Edition, ISBN: 9781492072584
4.	Bogu, Mohanram Balachandar, RESTful Java Web Services, Packt Publishing, 3rd Edition,
	2017, ISBN: 9781788294041

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#### Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding upto 60 marks. Final EL marks will be reduced to 30 Marks.

#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding up to 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

#### Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks:

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The breakup for conduction of practical examination is (i) Procedure and Write up: 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

## Rubric for CIE & SEE for Integrated Theory Courses with Laboratory

	<b>RUBRIC</b> for CIE		<b>RUBRIC</b> for SEE			
SL.NO	Contents	Marks	Q.NO	Contents	Marks	
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks each. Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20	
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20	
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Theory Exam Marks	100	
				Laboratory Exam Marks	50	
				Total Marks	150	

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SEMESTER: II					
INTERNET OF THINGS					
		(Theory & Practic	e)		
Course Code	:	MCA232A1	CIE	:	100 + 50 Marks
Credits: L:T:P	:	4:0:1	SEE	:	100 + 50 Marks
<b>Total Hours</b>	:	52L+26P	SEE Duration	:	3.00 Hours

UNIT-I10 HrsIntroduction to Internet of Things: Fundamentals of Electronics and devices for Internet of Things:<br/>Rectification process, Diode characteristics, Digital electronics, Transistor behaviour and Oscillators<br/>Physical and Logical design of IoT Technologies that enable Internet of Things Applications and Use<br/>cases, IoT Deployment Levels. Network and Communication, Standards related to Internet of Things,<br/>Protocols in Internet of thingsUNIT-II10 Hrs

	10 1115
Programming with Arduino: Understanding the eco system of Arduino, Pinout	configuration,
Digital input and output, Analog input and output, working with sensors and actuators.	Arduino serial
communication. Communication interfaces (SPI and I2C) wired and wireless commu	unication with
Arduino using bluetooth modules	
UNIT-III	10 Hrs

**Programming with Raspberry Pi:** Understanding the eco system of Raspberry Pi3/Pi4, Pinout configuration, python modules like Rpi.GPIO and gpiozero. Digital input and output, working with sensors and actuators. Raspberry Pi serial communication. Communication interfaces (SPI and I2C). wired and wireless communication with raspberry Pi. Serial communication from raspberry Pi3 to Arduino and vice versa. Monitoring and controlling between raspberry pi.

UNIT-IV10 HrsProgramming with esp32: Understanding the eco system of esp8266/esp32, pinout configuration,<br/>Digital, Analog input and output, working with sensors and actuators. communication from raspberry<br/>Pi to nodeMCU/esp32, Network and web stack configuration with esp32, wireless communication<br/>using esp32 about the sensor status and controlling actuators remotely.10 Hrs

UNIT-V12 HrsIoT Application Development: Integrating sensors with IoT Dashboards and micro services.IoT Platforms design methodology: Introduction to ten steps design methodologyIntroduction to Flow based IoT Dashboard: Fundamentals of NodeRED, creating basic dashboard.

Introduction to MQTT based IoT Dashboard: rundamentals of NodeKED, creating basic dashboard. Introduction to MQTT based IoT Dashboard: setup and configuration of dashboard like Things board. Introduction to hosted IoT dashboard services like Adafruit io or thing board hosted service. IoT alert integration: alert integration in the form of email, tweets or any social media post. RV Educational Institutions <sup>®</sup> RV College of Engineering <sup>®</sup> Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

## LABORATORY

Pract	Practice Lab: Fundamentals of Electronics using SEELab3 kit and Introduction to variety of						
devices and development boards used to develop IoT Applications							
Full w	vave rectifier using PN junction: Refer Section 3.3 in the SEElab3 kit manual.						
Diode	Diode V-I functional analysis Refer Section 3.13 in the SEElab3 kit manual.						
Logic gates: Refer Section 3.11 in the SEElab3 kit manual.							
PNP &	& NPN transistor nature: Refer Section 3.13 and 3.15 in the SEElab3 kit manual.						
IC555	oscillator: Refer Section 3.6 in the SEElab3 kit manual.						
Identi	fying the IoT Kit elements: sensors, actuators and development boards and other accessories						
Study	about the principle of operations, operating conditions, cost, tolerance and durability study						
1.	Write a program with Arduino UNO board to calculate the distance of a obstacle based on the						
	Ultrasonic sensor inputs. If the distance calculated is less than a certain value turns on a buzzer						
	with an LED in ON state and display the distance in serial monitor						
2.	Write a program with Arduino UNO to indicate the level of temperature using the LEDs						
	indicating the low, medium and high values of temperature (Red, Blue and Green) OR Write a						
2	program with Arduino UNO to implement the interactive traffic signal.						
э.	write a program with Arduino UNO board to control servo motor based on potentiometer						
	HC 05 module for controlling Arduine with Pluetooth using Social Communication						
	integrating any mobile app						
1	Write an interactive python script on Raspherry Pi3 to implement the serial communication						
т.	from Raspherry Pi to Arduino or vice versa with any one sensor and actuator from the						
	following components						
	a) LED b) Buzzer c) Temperature and humidity sensor d) LDR sensor						
5.	Write a python script on Raspberry pi to control servo motor or DC Motor based on the						
	Potentiometer inputs or button switch inputs. OR change the color of RGB LED / Bulb based						
	on the potentiometer inputs						
6.	Develop python script to read water temperature, and water calculate water level in a container						
	using Ultrasonic sensor and control the mini water pump. OR develop a python script to						
7	Write a micropython or orduing program with asp22 based NodeMCU board to calculate the						
7.	distance of an obstacle based on the Illtrasonic sensor inputs. If the distance calculated is less						
	than a certain value turn on LED						
8.	Write an arduino script with esp32 based nodemcu board to operate a 4-channel relay and						
	control evices connected to relay, demonstrating minimal home automation						
9.	Develop a digital scale based on esp32 with Load Cell and HX711 Amplifier						
10.	IoT dashboard setup and configuration						
	Integrate Things Board / node-red IoT dashboard with any two sensor / actuator on PC or Rpi4						
	OR						
	Integrate Adafruit or similar hosted IoT Dashboard with arduino, RaspberryPi and any sensor /						
	actuator.						
	<b>OR</b> Demonstrate publich subscribe communication and delucing con 22 or Dearbour. Discut						
	Demonstrate publish subscribe communication model using esp32 or KaspberryP1 and sensors/actuators						
	Demonstrate alert service integration to any IoT application based on esp32 or RaspberryPi						



Cours	se Outcomes:
After	going through this course, the student will be able to
CO1	Understand the fundamentals of electronics and hardware devices required for IoT including
	deployment levels, Network protocols and standards
CO2	Comprehend various development boards, sensors, actuators, architecture of Arduino,
	Raspberry Pi, esp32 with Arduino IDE or other IDE
CO3	Interact with Arduino, Raspberry Pi, esp32 using python, JavaScript and c/c++ to program the
	devices (sensors and actuators) to develop an integrated system
<b>CO4</b>	Design, Setup, Configure and Develop IoT Applications (Dashboards) and integrate several
	essential micro services like social media notification, email, push notifications including
	visualization of IoT Data

#### **Reference Books**

1.	ArshdeepBahga, Vijay Madisetti, Internet of Things: A Hands-on Approach, Orient Blackswan
	Private Ltd, July 1st, 2015, ISBN: 8173719543
2.	Wizardry, Exploring Arduino: Tools and Techniques for Engineering, WILEY, 1st Edition,
	ISBN-10: 1118549368, ISBN-13: 978-1118549360
3.	Elector, The Official ESP32 Book, ISBN: 978-1-907920-63-9
4.	The Official Raspberry Pi Handbook by The Magpi Magazine, 2023
5.	Maneesh Rao, Internet of Things with Raspberry Pi 3, Pack Publihing, April 2018 ISBN:
	9781788627405
6.	Simon Monk, Programming the Raspberry Pi, McGraw Hill TAB, 3rd Edition, July 2021,
	ISBN-13: 978-1264257355

#### Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analysing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding up to 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.



#### Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks:

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The break up for conduction of practical examination is (i) Procedure and Write up: 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

Rubric for CIE & SEE for Integrated Theory Courses with Laboratory						
	<b>RUBRIC</b> for CIE		RUBRIC for SEE			
SL.NO	Contents	Marks	Q.NO Contents Marks			
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks each Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20	
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20	
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Theory Exam Marks	100	
				Laboratory Exam Marks	50	
				Total Marks	150	



SEMESTER: II							
DATA SCIENCE – I							
(Theory & Practice)							
Course Code	:	MCA232A2	CIE	••	100+50		
Credits: L:T:P	:	4:0:1	SEE	:	100+50		
<b>Total Hours</b>	:	52L+26P	SEE Duration	••	3.00 Hours		

UNIT-I	10 Hrs				
Introduction to Data Science and Exploratory Data Analysis: Data Science, Brief History of					
Data Science, Increasing attention to data science, Fundamental fields of study to data science,					
Data science and Related Terminologies, Types of Analytics, Application of Data Sci	ence, Data				
Science Process Model					
Introduction to Exploratory Data Analysis: Steps in data preprocessing, Understand	ling the data -				
Steps involved in EDA using Python Programming, looking at the data, visualiz	ing the data,				
Treatment of Outliers, Data visualization using Python-Matplotlib Library, Sea	born Library,				
Dimensionality Reduction, Independent and Dependent Variables					
UNIT-II	11 Hrs				
Machine Learning and Supervised Learning Models: Types of Machine learning	algorithms,				
Supervised and Unsupervised Learning Algorithms, Supervised Learning algorithm, Un	supervised				
learning algorithm, Overfitting and under fitting, correctness, The bias-variance traded	off, Feature				
Extraction, and selection.					
Supervised Learning Algorithms: K-Nearest Neighbors, Similarity Based on Distanc	e Function,				
KNN Model Building, Model performance measures.					
Linear Regression, Building linear regression, Interpretation of Linear Regression c	oefficients,				
Validation of Linear regression, Decision Tree, Tree Structure, Criteria for splitting deci	sion node				
UNIT-III 11 Hrs					
Ensemble Methods and Unsupervised Learning: Ensemble methods, Bias Variance Trade off,					
Random Forest as ensemble technique, Control Parameters, out of bag error rate, Tuning the					
Random Forest, Variable Importance Plot, Model Performance Measures					
<b>Unsupervised Learning:</b> Introduction, Association Rule Mining, Clustering, K Means clustering					
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means of	clustering				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means of UNIT-IV	clustering 10 Hrs				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means o UNIT-IV Text Analytics and Artificial Intelligence	elustering 10 Hrs				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means of UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w	elustering <b>10 Hrs</b> eb and social				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means on UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics	elustering <b>10 Hrs</b> eb and social				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means on UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial	elustering <b>10 Hrs</b> eb and social l Intelligence,				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means on UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial Classification of Artificial Intelligence, Difference between AI and Deep Learning	elustering <b>10 Hrs</b> eb and social l Intelligence,				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means on UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial Classification of Artificial Intelligence, Difference between AI and Deep Learning UNIT –V	elustering <b>10 Hrs</b> eb and social l Intelligence, <b>10 Hrs</b>				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means on UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial Classification of Artificial Intelligence, Difference between AI and Deep Learning UNIT –V Deep Learning: Neural Networks- Perceptron, Feed Forward Neural networks, Back	elustering <b>10 Hrs</b> eb and social l Intelligence, <b>10 Hrs</b> c Propagation,				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means on UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial Classification of Artificial Intelligence, Difference between AI and Deep Learning UNIT –V Deep Learning: Neural Networks- Perceptron, Feed Forward Neural networks, Back Tensor, Layer Abstraction, Linear Layer, NN as sequence of layers, Loss and optim	elustering <b>10 Hrs</b> eb and social l Intelligence, <b>10 Hrs</b> c Propagation, ization, Other				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means on UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial Classification of Artificial Intelligence, Difference between AI and Deep Learning UNIT –V Deep Learning: Neural Networks- Perceptron, Feed Forward Neural networks, Back Tensor, Layer Abstraction, Linear Layer, NN as sequence of layers, Loss and optimi activation functions, SoftMax and Cross entropy, Dropout, Working of Deep Learning,	elustering <b>10 Hrs</b> eb and social l Intelligence, <b>10 Hrs</b> c Propagation, ization, Other Convolutional				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means of UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial Classification of Artificial Intelligence, Difference between AI and Deep Learning UNIT –V Deep Learning: Neural Networks- Perceptron, Feed Forward Neural networks, Back Tensor, Layer Abstraction, Linear Layer, NN as sequence of layers, Loss and optim activation functions, SoftMax and Cross entropy, Dropout, Working of Deep Learning, Neural Networks	IO Hrs         10 Hrs         eb and social         1 Intelligence,         10 Hrs         c Propagation,         ization, Other         Convolutional				
Unsupervised Learning: Introduction, Association Rule Mining, Clustering, K Means of UNIT-IV Text Analytics and Artificial Intelligence Text Analytics: Introduction, Unstructured data, word cloud, sentiment analysis, w media analytics Artificial Intelligence and Deep Learning: Introduction, Application of Artificial Classification of Artificial Intelligence, Difference between AI and Deep Learning UNIT –V Deep Learning: Neural Networks- Perceptron, Feed Forward Neural networks, Back Tensor, Layer Abstraction, Linear Layer, NN as sequence of layers, Loss and optim activation functions, SoftMax and Cross entropy, Dropout, Working of Deep Learning, Neural Networks Artificial Neural Networks: Application of ANN, ANN model building, Steps in	elustering <b>10 Hrs</b> eb and social l Intelligence, <b>10 Hrs</b> c Propagation, ization, Other Convolutional ANN model				

## Go, change the world



	LABORATORY						
1.	Consider the automobile dataset and perform exploratory data analysis.						
	a. Identify the dimension, structure, and summary of the data set.						
	b. Preprocess the dataset and treat them (like missing values, 'na', '). Justify the treatment.						
	d Draw a violin plot do describe the distribution of a numerical variable to analyse the						
	data.						
	e. Recognize the outliers using box plot (Display the box plot before and after outlier treatment)						
	f. Display a heat map to display the relationship among the attributes.						
	g. Standardize the continuous variable (if any)						
2.	For the data set in Q1,						
	a. Show the distribution of continuous variables using histogram.						
	Identify the relationship between two continuous variables using scatter plot.						
	c. Find and display the frequency of the categorical values using count plot.						
	a. Apply point plots to display one continuous and one categorical variable. $\mu$ = #Ouestion 1b has to be performed before 2a						
3	Consider the health care dataset that consists of several imaging details from patients that had						
5.	a biopsy to test for breast cancer. The variable diagnosis classifies the biopsied tissue as $M =$						
	malignant or $B =$ benign. Describe and pre-process the dataset. Use KNN supervised learning						
	model to predict Diagnosis using texture_mean and radius_mean. Analyze the model using						
	different k values and display the performance of the model						
4.	Consider the student_performance dataset. Predict the student performance as "Pass" or						
	"Fail" by implementing a decision tree. Perform data preprocessing and visualize the data.						
	Identify the important features affecting the student performance and analyze the efficiency of						
	the decision tree using different metrics. Plot the decision tree.						
5.	For the dataset in Q4, apply random forest algorithm to predict the student performance.						
	a. Plot the important variables using seaborn.						
	b. Tune the random forest for training and test data based on best parameters and implement it						
	c Analyze the model performance and display the output						
6.	For the market basket dataset apply apriori algorithm and identify the best rules based on						
	support and confidence values.						
7.	For the Mall-Customers dataset Implement k-means clustering algorithm and visualize the						
	clusters.						
8.	Consider the given text dataset. Implement different text processing techniques and identify						
	the most important keywords from the text. Display a word cloud from the same.						
9.	Consider the iris dataset and apply the Multilayer perceptron to classify the type of the flower.						
	Analyze the performance of the perceptron and display the output.						
10.	Consider the MNIST data set and implement CNN architecture to identify the handwritten						
	images. Optimize the model and display the output.						

Note: Students will be given with different case studies and scenario's during examination.



Course	Course Outcomes:				
After g	After going through this course, the student will be able to				
CO1	Understand the need and fundamental concepts of data science in real world applications				
CO2	Identify and apply the relevant data science concept for given scenario				
CO3	Demonstrate the different data science concepts for various domains like education,				
	business, healthcare etc.				
CO4	Evaluate and analyze the performance of the models for real world applications				

#### **Reference Books**

1.	B Uma Maheswari, R Sujatha, Introduction to Data Science Practical Approach with R
	and Python, Wiley Publications, ISBN-: 9789354640506, ISBN-13: 9789354640513
	(EBook)
2.	Joel Grus, Data Science from Scratch, First principles with Python, O'Reilly, 2 <sup>nd</sup> Edition,
	ISBN: 9789352138326
3.	Laura Igual, Santi Seguí, Springer Publications, Introduction to Data Science- A Python
	Approach to Concepts, Techniques and Applications, ISSN: 1863-7310 ISSN 2197-1781
	(electronic)
4.	Sayan Mukhopadhyay, Advanced Data Analytics Using Python, Apress, ISBN-13 (pbk): 978-1-
	4842-3449-5 ISBN-13 (electronic): 978-1-4842-3450-1

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2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20		
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20		
	Total Marks	150	7 & 8	Unit 4: Question 7 or 8	20		
	L		9 & 10	Unit 5: Question 9 or 10	20		
				Theory Exam Marks	100		
				Laboratory Exam Marks	50		
				Total Marks	150		



SEMESTER: II						
SOFTWARE TESTING AND PRACTICES						
		(Theory a	and Practice)			
Course Code	:	MCA232A3	CIE	:	100 + 50 Marks	
L:T:P	:	4:0:1	SEE	:	100 + 50 Marks	
Total Hours	:	52L+26P	SEE Duration	:	3.00 Hours	

UNIT–I	10 Hrs				
Introduction to software testing -Definitions, Test Cases, Test case design techniques, Preparing a					
Test Plan, Levels of Testing, Software testing life cycle, Software testing methodolog	jies: Waterfall				
testing, Agile Testing, Iterative testing, QA, QC & Testing					
Case study- Develop test cases for any real-world application using test case description	template				
UNIT–II	10 Hrs				
Test Automation- Need of Automation Testing, Refactoring, Continuous Improvement	nt, Difference				
between Manual and Automation testing, Choosing right tools, Test Automation Archit	ecture (SUT),				
Automation Frameworks					
UNIT –III	12 Hrs				
Introduction to JMeter- Why JMeter, Configuring JMeter					
Components of JMeter - Test Plan, Thread Groups, Controllers, Samplers (FTP, H	ITTP/HTTPS,				
JDBC), Listeners, Timers, Assertions, Configuration Elements, Pre-Processors and Po	st-Processors,				
Collectors					
UNIT –IV	10Hrs				
Submitting Forms and Managing Sessions- Capturing simple forms (Check boxes, Radio buttons,					
File uploads/File Downloads, Posting and Reading JSON data, Managing sessions with cookies and					
URL rewriting					
UNIT –V	10Hrs				
Types of Testing using JMeter- Performance Testing (Load/Stress testing), Distributed Testing,					
Database Testing, API Testing, Security Testing, Test Execution and Reporting					

Master of Computer Applications

# Go, change the world



	LABORATORY					
Note: S	Note: Students are required to create a Test plan, configure test scenarios, Run the test, Analyze the					
results a	results and Generate reports for the following Lab programs. Based on the result analysis Iterate and					
optimiz	optimize the testing process.					
1.	Demonstrate the concept of Single and Multiple threads simulating concurrent user actions					
	such as logging in, browsing pages and submitting forms. Analyze response times, throughput					
	and error rates under different load levels					
2.	Demonstrate Assertions by sending parameter values to the database and assert the response					
	code for both successful and failure cases					
3.	Demonstrate pre-processor and post processor concept in the following Scenario.					
	a. Add data to Sampler using Pre-processor for an HTTP request.					
	b. Validate all the status codes generated from Sampler page using RegEx (Regular					
	Expression Extractor) of Post-processor					
4.	Demonstrate the use of Simple and Modular Controllers and Listeners for the following					
	scenario.					
	a. A sampler to store the sampler request whose data can be extended outside to other					
	samplers.					
	b. A container that provides values to all the sampler within the thread group					
5.	Perform database load testing to measure the performance under database load. Configure					
	JMeter to send SQL queries to the database server and monitor the response times. Analyze					
	the query execution times, throughput, and resource utilization to identify any performance					
-	issues in the database layer.					
6.	Consider a web application and perform load testing under the following conditions - Normal					
-	and peak load conditions.					
7.	7. Set up a distributed testing environment using JMeter to distribute the load across multiple					
	machines. Configure a master-slave setup where the master controls and coordinates the load					
8	Demonstrate response codes validations (Eg:200, 300, 400, 500) for different API calls					
0.	Demonstrate response codes valuations (Eg.200, 300, 400, 500) for different Al reals					
У.	which all the API calls are the input to the other call (Eq. GET method's regression value					
	should be input for the POST method)					
10.	Demonstrate multipart request with file upload feature for various file type extensions					
100	(ndf vlsv csv ison)					
	(.pui,.risr,. esv,.json)					

#### 



#### **Course Outcomes:**

After going through this course, the student will be able to

CO1	Understand the basic concepts of Automation testing
CO2	Identify and apply relevant automation testing techniques suitable for a real-world scenario
<b>CO3</b>	Demonstrate various types of testing using JMeter
CO4	Analyze the test result and automation process for real world applications

#### **Reference Books**

1	Paul C. Jorgensen, "Software Testing, A Craftsman's Approach", Auerbach Publications, 4th
	Edition, First Indian Reprint, 2014, ISBN-13:9781466560680
2	Bayo Erinle, Performance Test with JMeter, PACKT Publishing, Copyright © 2013, ISBN
	978-1-78216-584-2
3	Arnon Axelrod, Complete Guide to Test Automation, Apress, Copyright © 2018, ISBN-13
	(pbk): 978-1-4842-3831-8, ISBN-13 (electronic): 978-1-4842-3832-5
4	Antonio Gomes Rodrigues, Bruno Demion (Milamber), Master Apache JMeter - From Load
	Testing to DevOps: Master performance testing with JMeter ,PACKT publishing, 1st
	Edition,2019, ISBN-13:978-1839217647

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	Total Marks	150	7&8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Theory Exam Marks	100	
				Laboratory Exam Marks	50	
				Total Marks	150	



SEMESTER: II					
	2D & 3D MODELING				
	(Theory and Practice)				
Course Code	:	MCA232A4	CIE	:	100 + 50 Marks
L:T:P	:	4:0:1	SEE	:	100 + 50 Marks
<b>Total Hours</b>	:	52L+26P	SEE Duration	:	3.00 Hours

UNIT–I	10 Hrs		
Conventions and Standards: Standard sizes of drawing sheets, Lines, Dimensioning terms and			
notations, general rule for dimensioning, Scales, conventions for materials, simple	e geometrical		
constructions (Regular Polygons), perspective projection, orthographic projection, bill of	materials		
Unit–II	10 Hrs		
Orthographic reading and conversion of views: Conversion of pictorial views into	orthographic		
view, screws and threads, riveted joints and welding joints.			
Computer aided modeling and drafting (Solidworks): Terminology, User Inter	rface, Design		
Process, Design Method, Sketches, Part modeling, Assembly: Assembly Design Methods, Mates,			
Drawings: Drawing documents			
UNIT –III 12 Hrs			
<b>Understanding the interface:</b> Interacting with interface, Editors - Workspaces – Themes, Objects in			
3D view editor, editing objects, Editing tools			
Modifiers: Editing with generate modifiers, editing with deform modifiers			
Editing Techniques: Examples, The Outliners and collections, 3D text, Viewport shading, Scene			
lighting and cameras Examples, The Outliners and collections, 3D text, Viewport shading, Scene			
lighting and cameras			
UNIT –IV	10 Hrs		
Materials textures nodes, Textures, Rendering, Animation, Constraints			
UNIT –V	10 Hrs		
Physics and simulation, Particle system, Armature and character rigging, Installing Add-Ons,			

Making a movie, Cycles and workbench render

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	LABORATORY			
1.	Practice lab- General Interface introduction and playing with shapes			
2.	Custom 3D object Creation			
3.	Color shading/Texturing the object			
4.	Custom logo			
5.	Develop Animating logo			
6.	Explosive product animation			
7.	Record explosive product animation from different angles using "Render Animation"			
8.	Terrain for natural forest with camp			
9.	Baking rain animation and fire camp animation			
10.	Rigging an armature to human character with dancing animation			

#### **Course Outcomes:**

After going through this course, the student will be able to

**CO1** Understand the basic concept of 2D and 3D modeling

**CO2** Outline the components of models using basic geometric principle

**CO3** Apply the constructs to easily modify models and implement design changes

**CO4** Analyze the design constraints and the design intent of the model

#### **Reference Books**

1.	N D Bhatt, Engineering drawing, fiftieth edition, Charotar Publishing House, 2011, ISBN 978-
	80358-17-8
2.	Dassault Systèmes, Introducing Solidworks, Dassault Systèmes S.A. company, 175 Wyman
	Street, Waltham, Mass. 02451 USA. All Rights Reserved. 1995-2014
3.	John M. Blain, The Complete Guide to Blender Graphics Computer Modeling & Animation,7th
	Edition, 2022, ISBN 9781003226420, A K Peters/CRC Press
4.	Romain Caudron, Pierre-Armand Nicq, Enrico Valenza, Blender 3D: Designing Objects, 2016,
	Packt Publishing Ltd, ISBN 978-1-78712-719-7

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#### Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding upto 60 marks. Final EL marks will be reduced to 30 Marks.

#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding upto 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

#### Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks:

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The break up for conduction of practical examination is (i) Procedure and Write up: 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

## Rubric for CIE & SEE for Integrated Theory Courses with Laboratory

			8			
	RUBRIC for CIE		<b>RUBRIC</b> for SEE			
SL.NO	Contents	Marks	Q.NO	Contents	Marks	
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks eac Answer FIVE full questions selecting ONE from eac unit [unit 1 to 5]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20	
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20	
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Theory Exam Marks	100	
				Laboratory Exam Marks	50	
				Total Marks	150	

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SEMESTER: II					
	DEVOPS				
	(Theory)				
Course Code	:	MCA233B1	CIE	••	100 Marks
Credits: L:T:P:3:1:0SEE:100 Marks			100 Marks		
Total Hours	:	39L+ 26T	SEE Duration	:	3.00 Hours

UNIT–I	08 Hrs			
Docker Fundamentals: Discovering Docker, What and why of Docker, Building a Docker				
application. Understanding Docker - Docker's architecture, The Docker daemon, The	Docker client,			
Docker registries, The Docker Hub				
UNIT–II	08 Hrs			
<b>Docker and Development:</b> Using Docker as a lightweight virtual machine - From VI	M to container,			
Saving and restoring your work, Environments as processes, building images, Running containers				
UNIT–III	08 Hrs			
Docker and DevOps: Continuous integration - Docker Hub automated builds, Containerizing your				
CI process. Continuous delivery - Interacting with other teams in the CD pipeline				
UNIT-IV	07 Hrs			
First steps with Docker and Kubernetes: Creating, running, and sharing a container image, setting				
up a Kubernetes cluster, Running the first app on Kubernetes				
UNIT-V	08 Hrs			
Pods: Introducing Pods, creating pods from YAML or JSON descriptors, organizing pods with labels,				
Listing subsets of pods through label selectors, Annotating pods, Using namespaces to group				
resources, Stopping and removing pods				

Cours	Course Outcomes:				
After	After going through this course, the student will be able to				
<b>CO1</b>	Understand of Docker basics, installation and learn to work with containers				
CO2	Use containers and move applications across environments with continuous integration and				
	delivery				
CO3	Leverage Docker to perform automated builds and make Kubernetes to work on container.				
	images				
<b>CO4</b>	Explore the Kubernetes architecture to set up and use entire lifecycle-based clusters and pods				

#### **Reference Books**

1.	Ian Miell, Aidan Hobson Sayers, "Docker in Practice", Manning Publications, 2 <sup>nd</sup> Edition,
	2019, ISBN-9781617294808
2.	Marko Lukša, "Kubernetes in Action", Manning Publications, 2 <sup>nd</sup> Edition, 2018, ISBN-
	9781617293726
3.	James Turnbull, "The Docker Book", Turnbull Press, 2nd Edition, 2017, ISBN–9780988820203
4.	Brendan Burns, Joe Beda, and Kelsey Hightower, "Kubernetes: Up and Running", 2 <sup>nd</sup> Edition,
	2019, ISBN-978-1-492-04653-0

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#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit...

	Rubric for CIE & SEE Theory courses					
	<b>RUBRIC</b> for CIE			RUBRIC for SEE		
SL.NO	Contents	Marks	Q.NO	Contents	Marks	
1	QUIZZES – Q1 & Q2	20	Every unit Answer FIV 1 to 5]	consists of TWO questions of 20 M E full questions selecting ONE from eac	arks each. h unit [unit	
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20	
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20	
			7 & 8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Total Marks	100	

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		SEMESTER: I	I		
ADVANCED COMPUTER NETWORKS					
Course Code	•	(Incory)	CIF	•	100 Marks
Course Coue	•	NICA255B2		•	100 Warks
Crealls: L:1:P	:	3:1:0 201 - 26T	SEE SEE Duration	:	100 Marks
Total Hours	:	39L+ 201	SEE Duration	:	<b>5.00 Hours</b>
		UNIT-I			08 Hrs
Introduction to Inte	erne	et Protocol and Classless and Subnet.	Address Extension (C	ID	R)
Wireless LANS a	nd	PANS: Fundamentals of WLAN's,	, 802.11 Standards, I	HIF	PERLAN Standard,
Bluetooth specific	atio	ons, Transport Protocol group, Zi	gBee Specification	Wi	reless WANS and
MANS – The Cellu	ılaı	Concept and Cellular Architecture-	Capacity enhancement	nt.	Channel Allocation
Algorithms		-			
_		UNIT–II			08 Hrs
Mobile IP : Introd	uct	ion, Mobility, Routing and Addressi	ng, Mobile IP Charac	eter	istics, Overview of
Mobile IP Operati	on	s, Mobile Addressing Details, Fore	ign Agent Discovery	, A	Agent Registration,
registration messa	ge	format, communication with a for	oreign agent, datagr	am	transmission and
reception, two- cros	ssii	ng problem, communication with con	nputers on the home n	etv	vork Private
		UNIT–III			07 Hrs
Parallel and Distributed Systems: Level of Parallel Computing, challenges in handling					
concurrency, Distr	ibu	ted Systems, characteristics, prope	erties, design goals,	Ту	pes of distributed
systems.					
Virtualization: Int	tro	luction, Hardware virtualization, Hy	pervisors, Network f	uno	ction virtualization,
Implementation:	In	stalling the virtualization package	es, Creating virtual	n	nachines, Network
configuration					
		UNIT–IV			08 Hrs
SDN: Introduction	ı, C	entralized and Distributed Control and	nd Data Planes- Introc	luc	tion, Control plane,
Data plane, Movi	ng	Information Between Planes, Dis	stributed Control Pla	ane	s, IP and MPLS,
Convergence Time	, L	bad Balancing, High Availability			
		UNIT–V			08 Hrs
Cloud computing	: Ir	troduction, Characteristics of Cloud	Computing, Cloud M	Лос	lels, Cloud Service
Examples, Load Balancing, Scalability & Elasticity, Deployment, Replication, Monitoring,					
Cloud Application Design: Design characteristics for cloud application, Reference architecture for					
cloud application, O	Clo	ud application design methodologies			
<b>Course Outcomes</b>	:				
After going through	h th	is course, the student will be able to			
CO1 Understand	the	advanced networking concepts			
CO2 Identify the	var	ious advances in networking	•		
<b>CO3</b> Analyse the	vai	ious approaches in networking doma	in		

CO4 Apply the advanced networking concepts



#### **Reference Books**

1.	C. Siva Ram Murthy, B. S. Manoj, Ad Hoc Wireless Networks Architecture and Protocols,
	Pearson Publication, 2011, ISBN 978-81-317-5905-9
2.	Douglas E Comer, Internetworking with TCP/IP, Pearson Education India, 6th Edition, 2015,
	ISBN: 978-9332550100
3.	Maarten van Steen and Andrew S. Tanenbaum, Distributed systems, Pearson Education, 3 <sup>rd</sup>
	Edition, 2017, ISBN: 978-90-815406-2-9
4.	Arshadeep Bahga, Vijay Madisetti, Cloud Computing A Hands-On Approach, University
	Press, 2014, ISBN: 9788173719233

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

Rubric for CIE & SEE Theory courses					
	RUBRIC for CIE			RUBRIC for SEE	
SL.NO	Contents	Marks	Q.NO	Contents	Marks
1	QUIZZES – Q1 & Q2	20	Every unit c Answer FIVI [unit 1 to 5]	onsists of TWO questions of 20 Mar E full questions selecting ONE from e	ks each. ach unit
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20
3	Experiential Learning – EL1 & El2	30	3 & 4	Unit 2: Question 3 or 4	20
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20
	·		7 & 8	Unit 4: Question 7 or 8	20
			9 & 10	Unit 5: Question 9 or 10	20
				Total Marks	100



SEMESTER: II					
CRYPTOGRAPHY AND NETWORK SECURITY (Theory)					
Course Code	:	MCA233B3	CIE	:	100 Marks
Credits: L:T:P	:	3:1:0	SEE	••	100 Marks
Total Hours	:	39L+ 26T	SEE Duration	:	3.00 Hours

UNIT-I	08 Hrs			
Introduction: Computer Security Concepts, OSI Security Architecture, Secu	urity Attacks,			
Security Services, Security Mechanisms, A Model for Network Security. Case stu	dy			
Classic Encryption Technique- Symmetric Cipher Model, Substitution Techniques	, Transposition			
Techniques, Rotor Machines, Steganography.				
UNIT–II	07 Hrs			
Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Struc	ture, The Data			
Encryption Standard, A DES Example, The Strength of DES, Block Cipher Design Prin	ciples			
Tools: NMAP, Wire shark				
UNIT–III	08 Hrs			
Advanced Encryption Standard: Finite Field Arithmetic, AES Structure, AES '	Transformation			
Functions. Public-Key Cryptography and RSA: Principles of Public-Key Cryptosyst	tems, The RSA			
Algorithm, Diffie-Hellman Key Exchange, Message Authentication				
Tools: OWASP				
UNIT–IV	08 Hrs			
Cryptographic Hash Functions: Applications, Two Simple hash Functions, Req	juirements and			
Security. Digital Signatures, Elliptic Curve Digital Signatures Algorithm.				
Network Security: Email, PGP, S/MIME, SSL architecture, handshake protocol, change cipher spec				
protocol.				
UNIT–V	08 Hrs			
Network Security: Transport layer security. IPSecurity, security policy, Internet key ex	change			
Wireless Security, Mobile Device security				
Contemporary Issues and Trends: Case Study				

#### **Course Outcomes:**

After going through this course, the student will be able to

- **CO1** Understand the basics of Cryptography and Network Security standards.
- **CO2** Understand public-key cryptography, RSA and other public-key cryptosystems
- **CO3** Analyse and design algorithms and digital signatures
- **CO4** Build for the key management, distribution schemes and design

## Reference Books

1.	William Stallings, "Cryptography and Network Security-Principles and Practice" Pearson, 7th
	Global Edition, 2017, ISBN 13: 978-1-292-15858-7.
2.	Behrouz A. Forouzan "Introduction to Cryptography and Network Security", McGraw-Hill
	Forouzan Networking Series, 2008, ISBN 978-0-07-287022-0
3.	Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols",
	Wiley Publications, 2003, ISBN 0-470-85285-2 2.
4.	Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, 2 <sup>nd</sup> Edition, Private
	Communication in Public World", PHI, 2002, ISBN-13: 978-0130460196



## Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

	Rubric for CIE & SEE Theory courses					
	<b>RUBRIC</b> for CIE			<b>RUBRIC</b> for SEE		
SL.NO	Contents	Marks	Q.NO	Contents	Marks	
1	QUIZZES – Q1 & Q2	20	Every unit c	onsists of TWO questions of 20 Mar	ks each.	
			Answer FIVE	E full questions selecting ONE from e	ach unit	
			[unit 1 to 5]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning -	30	3 & 4	Unit 2: Question 3 or 4	20	
	EL1 & EL2					
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20	
			7&8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Total Marks	100	

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		SEM	ESTER: II		
		DIGITAL	MARKETING		
		[]	Гheory)		
Course Code	:	MCA233B4	CIE	:	100 Marks
Credits: L:T:P	:	3:1:0	SEE	:	100 Marks
<b>Total Hours</b>	:	39L+ 26T	SEE Duration	:	3.00 Hours
UNIT–I 07 Hrs					
Introduction to Digital Marketing: Evolution of Digital Marketing from traditional to modern era,					
Role of Internet;	Role of Internet; Current trends, Info graphics, implications for business & society; Emergence of				

 Role of Internet; Current trends, Info graphics, implications for business & society; Emergence of digital marketing as a tool; Drivers of the new marketing environment; Digital marketing strategy; Paid, Owned, Earned Media framework, Digital landscape, Digital marketing plan, Digital marketing models. Careers in Digital Marketing, Case studies

 UNIT–II

 07 Hrs

Internet Marketing and Digital Marketing Mix: Internet Marketing, opportunities, and challenges; Digital marketing framework; Digital Marketing mix, Impact of digital channels on IMC; Search Engine Advertising- Pay for Search Advertisements, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation Display marketing- Types of Display Ads - Buying Models - Programmable Digital Marketing - Analytical Tools - YouTube marketing. Case studies

UNIT-III10 HrsSocial Media Marketing: Role of Influencer Marketing, Tools & Plan– Introduction to social media<br/>platforms, penetration & characteristics; Building a successful social media marketing strategy<br/>Facebook Marketing: - Business through Facebook Marketing: Creating Advertising Campaigns,<br/>Adverts, Facebook Marketing Tools LinkedIn Marketing: Introduction and Importance of LinkedIn<br/>Marketing, Framing LinkedIn Strategy, Lead Generation through LinkedIn, Content Strategy,<br/>Analytics and Targeting and Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing,<br/>Features, Mobile Campaign Development, Mobile Advertising Analytics Introduction to social media<br/>metrics. Case studies

UNIT–IV	08 Hrs			
Search Engine Optimization (SEO): Web Analytics, Mobile Marketing, Tren	ids in Digital			
Advertising–Introduction and need for SEO, how to use Internet & search engines; search engine and				
its working pattern, On-page and off-page optimization, SEO Tactics - SEM Web Analytics - Google				
Analytics and Google Ad Words; data collection for web analytics, multichannel attribution, Universal				
analytics, Tracking code Trends in digital advertising. Case studies				
UNIT-V	07 Hrs			

**Social Media Strategy:** Introduction, Key terms, and concepts. Using social media to solve business challenges. Step-by-step guide to creating a social media strategy. Documents and processes. Dealing with opportunities and threats. Step-by-step guide for recovering from an online brand attack. Social media risks and challenges. Case studies

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#### **Course Outcomes:**

After	going through this course, the student will be able to
CO1	Understand Digital marketing theories and practices
CO2	Foster Analytical and critical thinking abilities for decision making
CO3	Build global and economical communication strategies for E-marketing
CO4	Analyse, communicate global, economic aspects of E-marketing

#### **Reference Books**

1.	Seema Gupta "Digital Marketing" Mc-Graw Hill ISBN:978-9355320407 1st Edition, 2022
2.	Nitin C. Kamat, Chinmay Nitin Kamat," Digital Social Media Marketing", Himalaya
	Publishing House Pvt. Ltd. Latest Edition
3.	Ian Dodson, "The Art of Digital Marketing" Wiley Latest Edition
4.	Damian Rayan, "Marketing Strategies for Engaging the Digital Generation", Brilliance Audio
	4 <sup>th</sup> Edition,2016978-0749453893.

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

Rubric for CIE & SEE Theory courses						
	<b>RUBRIC</b> for CIE			RUBRIC for SEE		
SL.NO	Contents	Marks	Q.NO	Contents	Marks	
1	QUIZZES – Q1 & Q2	20	Every unit c	consists of TWO questions of 20 Mar	ks each.	
			Answer FIVE full questions selecting ONE from each [unit 1 to 5]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20	
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20	
			7 & 8	Unit 4: Question 7 or 8	20	
			9 & 10	Unit 5: Question 9 or 10	20	
				Total Marks	100	



		SEMESTED. II			
		DESIGN THINKING			
		(Practice)			
Course Code	:	MCA432L	CIE	:	50 Marks
Credits: L:T:P	:	0:0:2	SEE	:	50 Marks
Total Hours	:	52P (26 contact hrs+ 26 non-contact hrs)	SEE Duration	:	3.00 Hours
		STAGE–I			•
Empathy: The E	mp	pathy phases of the process are focused on unde	erstanding the exp	erie	ences, emotions
and motivations of	of	others. Designers use specific empathy metho	ds to learn more a	abo	ut the needs of
the users for whom	m 1	they are designing.			
Methods: Intervi	ew	ving Probes and Observations.			
		STAGE–II			
Define: The Defi	ne	phase of the process is focused on developin	g a point of view	ab	out the need of
your user. During	th	is stage of process, designers narrow from lots	of information to	a s	tatement that is
inspiring and spec	cifi	ic.			
Methods: Empat	hy	Mapping, Point of View.			
		STAGE-III			
Ideate: The Idea	te	phase of the process is focused on generating	as many solution	is t	o a problem as
possible. Once n	nar	ny solutions have been generated, students w	vill select one to	m	ove forward to
prototyping.					
Methods: Brainst	or	ming and Selection			
		STAGE-IV			
Prototype: The I	Pro	ototype phase is where designers construct rep	resentation of the	r s	olutions. These
representations ar	e i	intended to elicit feedback and answer specific	questions about a	coi	ncept.
Methods: Improv	/e,	Rapid and Experiential Prototyping			
		STAGE–V			
Test: The Test p	ha	se of the process is focused on getting spec	ific feedback abo	ut	how ideas can
improve. It is imp	201	rtant to remember during this phase that proto	types are imperfe	ct,	but feedback is
gift.					
Methods: Testing	5				
<u> </u>					
Course Outcome	es:				
CO1 Learn to	gn	e different modes of thinking to understart	nd the problem	inc	tend of finding
answers/sol	us Vt	ions for questions/problems	ia me problem	1115	icau of illium
CO2 Acquire ad	du	ictive reasoning to find new problems			
CO3 Sow the se	ed	of creativity to look for innovative solutions for	or a problem		
CO4 Adopt hum	nar	1 centric approaches while developing new solu	tions, products or	sei	rvices.



Guidelines for	Design	Thinking Lab:	
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1.	The Design Thinking Lab (DTL) is to be carried out by a team of two-three students.
2.	Each student in a team must contribute equally in the tasks mentioned below
3.	Each group has to select a theme that will provide solutions to the challenges of societal
	concern. The topics should be in line with the Sustainable Development Goals (SDG)
4.	The above five stages specified will be evaluated in three phases
5.	For every Phase of evaluation, the committee constituted by the department along with the coordinators would evaluate for CIE. The committee shall consist of respective coordinator & two senior faculty members as examiners. The evaluation will be done for each student separately.
6.	The team should prepare a Digital Poster and a report should be submitted after incorporation
	of any modifications suggested by the evaluation committee.

#### Scheme of Continuous Internal Examination (CIE)

The evaluation of the work will be done by the committee appointed by the director, Dept of MCA. The student should submit a report on the Case Study.

Evaluation will be carried out in THREE Phases.

Phase	Activity	Marks			
Ι	Phase I	10			
II	Phase II	15			
III	Phase III	25			
Selence for Sementer Ford Former (SFF)					

#### Scheme for Semester End Examination (SEE)

The evaluation will be done by Internal and External examiners. The following weightage would be given for the examination.

1	Written presentation of synopsis: Write up	05 Marks.
2	Presentation / Demonstration of the project Idea / Solution	15 Marks
3	Demonstration of the Prototype	20 Marks
4	Viva- Voce	05 Marks
5	Report	05 Marks

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	SEMEST	TER: III		
	SOFTWARE EI (The	NGINEERING ory)		
Course Code	: MCA161T	CIE	:	100 Marks
Credits: L:T:P	: 3:0:0	SEE	:	100 Marks
Total Hours	: 39L	SEE Duration	:	3.00 Hours
	UNIT-I			07 Hrs
Software Process & Sof Professional Software De Requirements Specificat driven and Agile Dev	<b>Etware Development Method</b> evelopment, IEEE/ ACM cod ion, Structure of SRS (IEEE velopment, Extreme Progr	<b>ds</b> le of software engineering ethics, E format); Software Developmer ramming, Scrum; DevOps, De	Pro nt N evO	cess activities, Iethods -Plan- ps Vs Agile
Development				1
	UNIT-II			08 Hrs
Architectural Design: Ar Interaction Modeling: Us Structural modeling: Clas Behavioral Modeling: St	chitectural design decisions, se case models, Sequence dia ss diagrams. ate diagrams: Functional mod	Architectural patterns. grams, Activity diagrams. deling: Data flow diagrams		
Benaviorar Wodering. St	UNIT-III			08 Hrs
Spring planning, Implem bask logs	nentation and review, Scrum	artifacts, Creating, Managing an	d re	fining product
	UNIT-IV			09 Hrs
Planning and Estimatin journey with a product re a Scrum Board, Defects control model for contin testing methods for Scrum	g with Scrum: Estimation oadmap; Sprint Journey: Ref in Sprint; Facets of Scrum: s uous integration, Continuous m, Applying Scrum to remote	Scale, Bucket method, Envision ining the Product Backlog, Track software development practices for s delivery and continuous deploy e teams	oning ting for S men	g the product progress with Scrum, Source nt, Leveraging
	UNIT-V			07 Hrs
Project Management Project Management: Pr Project Budgeting, Sched	roject planning, Risk manag duling and Resource Allocation	gement, Plan-driven developmen on	t, A	gile planning
Commo Orthermore				
After going through this				
CO1 Understand the b	s course, the student will be a	ble to		
	s course, the student will be a basic concepts associated with	ble to h software Engineering		
CO2 Describe various	s course, the student will be a basic concepts associated with system design and models to	ble to h software Engineering o apply them in real world applic	atio	ns

**CO4** Analyze software development practices for real world problems



Refere	ence Books
1.	Ian Summerville, Software Engineering, Pearson Education Ltd, 10 <sup>th</sup> Edition, 2015, ISBN: 9780133943030
2.	Michael Blaha and James Rumbaugh, Object Oriented Modeling and Design with UML ,2 <sup>nd</sup> Edition, Pearson India, ISBN-13: 978-0130159205
3.	Fred Heath, The Professional Scrum Master (PSM I) Guide, 1 <sup>st</sup> Edition, Packt Publishing, Copyright © 2021, ISBN: 9781800200494
4.	Ken Schwaber: Agile Project Management with Scrum, Microsoft Press @ 2004, ISBN:073561993x

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

Rubric for CIE & SEE Theory courses						
RUBRIC for CIE     RUBRIC for SEE						
SL.NO	Contents	Marks	Q.NO	Contents	Marks	
1	QUIZZES – Q1 & Q2	20	Every unit con Answer FIVE [unit 1 to 5]	nsists of TWO questions of 20 Marks eac a full questions selecting ONE from each	h. unit	
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20	
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20	
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20	
			7 & 8	Unit 4: Question 7 or 8	20	
		9 & 10	Unit 5: Question 9 or 10	20		
				Total Marks	100	



SEMESTER: III						
	MODERN APPLICATION DEVELOPMENT					
		(Theory & Pr	actice)			
<b>Course Code</b>	:	MCA261I	CIE	:	100+50 Marks	
Credits: L:T:P	:	4:0:1	SEE	:	100+50 Marks	
Total Hours	:	52L+26P	SEE Duration	:	3.00 Hours	
Course Code Credits: L:T:P Total Hours	:	MCA2611 4:0:1 52L+26P	SEE Duration	:	100+50 M 100+50 M 3.00 Hour	

UNIT-I	10 Hrs			
Hybrid Mobile Apps: Comparing Mobile Solutions.				
Android: Android Overview, Android Studio & Project Basics: History, Operating S	system, Setup,			
Configuring Android Studio, Project Basics, Create an AVD, The IDE, Main Editor, E	diting Layout			
Files, TODO Items, Project Tool Window				
Android Application Overview & Activities and Layouts: What Makes Up an An	droid Project,			
Application Entry Point, Activities, Intents, Activity, Layout File, View and ViewG	roup Objects,			
Containers, Activity Class				
UNIT-II	11 Hrs			
Mobile Design: Mobile-Only Interactions, Interactions that are not possible on Mobile.				
Event Handling & Intents: Intro to Event Handling, Handling Long Clicks, What In	ntents are for,			
Implicit Intents				
Fragments: Introduction to Fragments Running in the Background: Basic Concepts, T	he UI Thread,			
Threads and Runnables				
UNIT-III	10 Hrs			
Debugging & Testing: Types of Errors, Debugger, Types of Testing, Unit Testing,	Instrumented			
Testing, Data Storage: Storing simple data, Read and write a text file to internal storage	e and external			
storage, Creating and using an SQLite database Location and Using Geofencing: H	ow to get the			
device location, Creating and monitoring a Geofence				
UNIT–IV	10 Hrs			
Intro to PWAs and Tooling: Intro. to Progressive Web Apps, Tools to Measure Pro	gressive Web			
Apps.				
PWA Features: Service Workers: Promises, Fetch, Service Worker, Register the Service Worker, Register t	rvice Worker,			
Updating Service Worker.				
Caching and Offline Functionality with Service Workers: The Fetch API, Cache API, going				
Offline, Different Caching Strategies.				
UNIT–V	11 Hrs			
Features to Use: Adding your App to the Home Screen with Web App Manifest, Tu	<b>irning</b> a Real			
App into a PWA				
Notifications: Web Notifications: Requesting Permission to Notify, sending a Notification	tion, Tagging			
Notifications, Web Notifications with Service Workers. Push Notifications: Subscrib	ing a User to			
Push Notifications, Saving the PushSubscription Object, Triggering the Push Notificat	tion, Catching			

Push Events in the Service Worker

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## LABORATORY

1.	Devise a Mobile App to showcase graphics on button states and add a widget at run time
2.	Develop an app to display a Progress Bar and show a message with Alert Dialog
3.	Create an app to navigate from one activity to another using an intent object and passing data
4.	Demonstrate adding and removing fragments at run time.
5.	Implement an application that will create a database with a table of user credentials and create a
	Login portal system
6.	Develop an application to send SMS to a particular contact from the Phonebook
7.	Build a simple web page using PWA by adding a Service Worker
8.	Create a login page to authenticate a user using PWA with Manifest file
9.	Demonstrate online and offline web page load using PWA, Service Worker and Caching
10.	Build an application to do a stock display using PWA using a raw JSON file

#### **Course Outcomes:**

After going through this course, the student will be able to

CO1 Understand Android applications work, Life cycle, Manifest, Intents, and using external resources

CO2 Demonstrate Activities, Layouts, Views, Widgets, Menus and Notifications

CO3 Identify communication abilities including SMS, network management with Data Storage

**CO4** Design and develop innovative applications with enhanced features

#### **Reference Books**

	Publishing, 2 <sup>nd</sup> Edition, 2020, ISBN: 9781484259368
1.	Ted Hagos, Learn Android Studio 4: Efficient Java-Based Android Apps Development, Apress

- 2. Rick Boyer, Android 9 Development Cookbook, Packt Publishing, 3<sup>rd</sup> Edition, 2018, ISBN 13: 9781788622967
- Cameron Banga and Josh Weinhold, Essential Mobile Interaction Design: Perfecting Interface Design in Mobile Apps (Usability), Addison-Wesley Professional, 1<sup>st</sup> Edition, 2014, ISBN-13: 978-0321961570
- **4.** Dennis Sheppard, Beginning Progressive Web App Development: Creating a Native App Experience on the Web, Apress Publishing, 2017, ISBN: 9781484230909

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#### Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analysing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding up to 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

#### Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks:

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The breakup for conduction of practical examination is (i) Procedure and Write up: 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

Rubric for CIE & SEE for Integrated Theory Courses with Laboratory								
	<b>RUBRIC</b> for CIE		RUBRIC for SEE					
SL.NO	Contents	Marks	Q.NO	Contents	Marks			
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks each.					
			Answer	FIVE full questions selecting ONE f	rom each			
			unit [un	it 1 to 5]				
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20			
3	Experiential Learning –	30	3 & 4	Unit 2: Question 3 or 4	20			
	EL1 & EL2							
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20			
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20			
			9 & 10	Unit 5: Question 9 or 10	20			
				Theory Exam Marks	100			
				Laboratory Exam Marks	50			
				Total Marks	150			
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SEMESTER: III							
CLO	CLOUD NATIVE FULL STACK APPLICATION DEVELOPMENT-II						
		(Theory & Practi	ice)				
Course Code	:	MCA361I	CIE	:	100 + 50 Marks		
Credits: L:T:P	:	3:0:1	SEE	:	100 + 50 Marks		
<b>Total Hours</b>	:	39L+26P	SEE Duration	:	3.00 Hours		
UNIT-I 08 Hrs							
Spring Boot: What is Spring Boot - Creating a Project with Spring Boot Initializer, Wire beans							
together in the Spring container using Inversion of Control, Configure the Spring container for							

together in the Spring container using Inversion of Control, Configure the Spring container for Dependency Injection, Define Spring Beans using the Component annotation, perform auto-scanning of Spring beans to minimize configuration, Automatically wire beans together using Auto wired annotation, Apply all Java configuration to Spring Beans (no xml)

	00 1113
Spring Boot RestAPI: Writing RESTful controllers, Consuming REST services; Spri	ng Boot REST
API Validation: Validation with Spring Boot - Overview, Validate Create Post and Upd	late Post REST
API Request, Customizing Validation Response, Validate Create Comment and Up	date Comment
REST API Request: Spring Boot Security: Secure your REST APIs and web application	ons with Spring
Boot Security, Set up your Maven pom.xml file with Spring Boot Security starter, De	efine users and
roles for authentication, Restrict access to URLs based on user role JWT	

UNIT–III					08 Hrs
<b>Boot</b> Hibernate/IPA	Understanding	Object/Relational	Persistence	what	is persistence?

**Spring Boot Hibernate/JPA:** Understanding Object/Relational Persistence, what is persistence? Relational database, Using SQL in Java, persistence in object-oriented applications; Persistence layers and alternatives, layered architecture; object/relational mapping-what is ORM? Generic ORM problems, Why ORM? Introduction and integrating hibernate; mapping persistent classes- the caveat emptor application, implementing the domain model; Working with persistence object.

**Persisting data with Spring Data JPA:** Adding Spring Data JPA to the project, Annotating the domain as entities, Declaring JPA repositories, Customizing JPA repositories

 UNIT-IV
 08 Hrs

 Containerization with Docker: Virtualization Concepts, Docker Overview, Manipulating Containers with Docker, Docker Compose an Overview.

**Dockering Spring Boot Application:** Create Spring Boot Project and Build Simple REST API, Create Dockerfile to Build Docker Image, Build Docker Image from Dockerfile, Run Docker Image in a Docker Container.

**Kubernetes: Getting Started with Kubernetes** Using Kubectl with Multiple Clusters, - Setting Up a Multi-Node Cluster, Learning to Use the Kubernetes Client, Creating and Modifying Fundamental Workloads, Handling Traffic with Ingress Controllers, Managing Specialized Workloads, Volumes And Configuration Data, Deploy & Orchestrate Spring Boot Application on Kubernetes

ind configuration Data, Deploy & orefestuae opining Door Application on Raberhetes								
UNIT–V								
Microservices with Spring Boot: What's a microservice? What is Spring and why is it relevant to								
microservices? Building a microservice with Spring Boot, Why change the v	way we build							
applications?, What exactly is the cloud?, Why the cloud and microservices?.								
Microservices are more than writing the code: Core microservice develop	oment pattern,							

Microservices are more than writing the code: Core incroservice development pattern, Microservice routing patterns, Microservice client resiliency patterns, Microservice security patterns, Microservice logging and tracing patterns, Microservice build/deployment patterns, Using Spring Cloud in building your microservices, microservices with Spring Boot



	LABORATORY
1.	Demonstrate Dependency Injection using annotation based using Spring boot-
2.	Demonstrate Dependency Injection using constructor based using Spring boot
3.	Create a Spring Boot Application using Maven Plugin
	- Write a sample REST Controller API using Spring Annotations
	- Using Postman invoke the REST Controller to demonstrate end to end working
4.	Write a sample REST App to demonstrate below Concepts with a use-case of your choice.
	- GET, PUT, POST, DELETE
5.	Write a sample REST App to Validate the REST API POST & PUT request.
	-Design a custom response with appropriate validation errors to the caller
6.	Write a Java application using Hibernate to insert data into Student DATABASE and retrieve
	info based on particular queries (For example update, delete, search etc)
7.	Demonstrate Spring Data JPA integration in a Spring Boot application using Hibernate
8.	Demonstrate using Spring Boot: Complete the docker setup on your Sandbox.
	- Download a docker image from Docker Hub and deploy the same on your docker server
	- Build a sample custom image for any of the App of your choice and run the app image as a
	container
9.	Using a docker compose file, deploy multiple apps/containers (eg: MySql,SpringBoot) onto the
	docker server
10.	Demonstrate with Spring Boot: Setup a Kubernetes development Env on your Sandbox (use
	Docker Desktop or Minicube)

#### **Course Outcomes:**

After going through this course, the student will be able to

- CO1 Understand the core principles and concepts of cloud-native application development
- **CO2** Identify effective strategies for designing and architecting cloud-native applications
- **CO3** Design scalable and resilient cloud-native applications using Spring Boot, RESTful APIs, Hibernate, Docker, Kubernetes and microservices
- **CO4** Build and deploy a cloud-native application using Spring Boot, Hibernate, REST API, Docker, Kubernetes, and microservices

### **Reference Books**

1.	K. Siva Prasad Reddy, Sai Upadhyayula, Beginning Spring Boot 3: Build Dynamic Cloud-
	Native Java Applications and Microservices, Apress Publications, November 2022, ISBN:
	9781484287927
2.	Bauer, Christian, and Gavin King, Hibernate in action, Manning, Vol. 1, 2018. ISBN:
	9781932394153
3.	Carnell, John, and Illary Huaylupo Sánchez, Spring micro services in action, Manning, 2021,
	ISBN: 9781617296956
4.	Jeffrey Nickoloff, Stephen Kuenzli, Docker in Action, Manning Publications, 2 <sup>nd</sup> Edition,
	November 2019, ISBN: 9781617294761
5.	Marko Luksa, Kubernetes in Action, Manning Publications, January 2018, ISBN:
	9781617293726
6.	Craig, and Ryan Breidenbach, Spring in action, Dreamtech Press, 6th Edition, 2020, ISBN -
	9781617297571

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# Scheme of Continuous Internal Evaluation (CIE) Theory: 20 + 50 + 30 = 100

QUIZZES: Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analysing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

EXPERIENTIAL LEARNING: Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

# Laboratory (CIE): 40 + 10 = 50

Conduction of laboratory exercises, Lab report & observation & analysis (50 Marks), Lab Test (50 Marks), adding up to 100 marks. Final marks will be reduced to 40 & Innovative Experiment/Concept Design & Implementation (10 Marks) adding up to 50 Marks.

Scheme of Semester End Examination (SEE) Theory for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit. Scheme of Semester End Examination (SEE) Laboratory for 50 marks:

SEE for practical will be jointly conducted and evaluated by two examiners. The duration of practical examination is 3 hours and is evaluated for 50 marks. The breakup for conduction of practical examination is (i) Procedure and Write up: 20% of max marks, (ii) Conducting the practical: 60% of max marks, (iii) Viva Voce: 20% of max marks

Rubric for CIE & SEE for Integrated Theory Courses with Laboratory							
	<b>RUBRIC</b> for CIE		RUBRIC for SEE				
SL.NO	Contents	Marks	Q.NO	Contents	Marks		
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Mar Answer FIVE full questions selecting ONE fro unit [unit 1 to 5]				
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20		
4	Laboratory	50	5&6	Unit 3: Question 5 or 6	20		
	Total Marks	150	7&8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Theory Exam Marks	100		
				Laboratory Exam Marks	50		
				Total Marks	150		



SEMESTER: III						
DATA SCIENCE – II						
		(Theory)				
Course Code	:	MCA262C1	CIE	:	100 Marks	
Credits: L:T:P	:	3:1:0	SEE	:	100 Marks	
Total Hours	:	39L+26T	SEE Duration	:	3.00 Hours	

UNIT–I	08 Hrs			
Business Intelligence and its Architecture: BI by other names, How BI provides bus	siness value,			
BI Market, Battle Scars, The Research, Best Practices for successful Intelligence.				
Components of BI Architecture: Operational and Source Systems, Data Transfer - fro	om Operational			
to Data Warehouse, Data Warehouse, DW tables, Technology platform				
UNIT–II	08 Hrs			
Big Data: Types of Digital Data, Big Data Analytics: Digital Data, characterist	ics of data,			
evolution of data, definition and challenges with big data, why big data, traditional BI V	's Big Data			
What is Big Data Analytics, Classification of Analytics, Why is Big data analytics in	nportant, Data			
Science, Terminologies used in Big Data				
UNIT–III	08 Hrs			
Hadoop Architecture: Hadoop, Distributed computing challenges, Hadoop Overview, use case of				
Hadoop, HDFS, Processing data with Hadoop, Managing Resources and applications with Hadoop				
YARN, interacting with Hadoop Eco System, Map Reduce Programming				
UNIT–IV	08 Hrs			
PIG Architecture: Anatomy of PIG, use case of PIG ETL processing, Pig Latin overvi	ew, Data types			
in PIG, Running and Execution modes of PIG, Execution Modes of Pig, Relational C	Operators, Eval			
Functions, Complex Data Types, Parameterized substitution, word count example using PIG.				
UNIT-V	07 Hrs			
Spark and Big Data Analytics: Introduction to Data Analysis with Spark-Spark SQL, Python for				
Spark, Data Analysis Operations, Data ETL, Analytics, Reporting and Visualization				
Course Outcomes:				

Cours	se Outcomes:
After	going through this course, the student will be able to
<b>CO1</b>	Understand the need and fundamental concepts of Business Intelligence, Big data and
	visualization in real world applications
<b>CO2</b>	Identify and apply big data analytics frameworks and visualization techniques for decision
	making
<b>CO3</b>	Apply data science concepts to real world applications
<b>CO4</b>	Analyze the use of big data analytics and visualization for business applications

Refer	ence Books
1.	Cindi Howson, Successful Business Intelligence, McGraw-Hill Publications, E-ISSN: 0-07-
	149851-6
2.	Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley Publications, 1st
	Edition, 2015, ISBN:978-81-265-5478-2
3.	Raj Kamal, Preethi Saxena, Big Data Analytics, Introduction to Hadoop, Spark and Machine
	Learning, McGraw hill Education, ISBN:978-93-5316-496-6
4.	Matthew Ward, Georges Grinstein, Daniel Keim, Interactive Data Visualization: Foundation,
	Techniques and Applications, CRC Press, Taylor and Francis Group, ISBN: 978-1-4398-6554-
	5

Go, change the world

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# Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

Rubric for CIE & SEE Theory courses							
	<b>RUBRIC</b> for CIE		RUBRIC for SEE				
SL.NO	SL.NO Contents Marks			Contents	Marks		
1	QUIZZES – Q1 & Q2	20	Every unit con Answer FIVE [unit 1 to 5]	nsists of TWO questions of 20 Marks eac a full questions selecting ONE from each	h. unit		
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20		
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20		
			7 & 8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Total Marks	100		



SEMESTER: III					
AUGMENTED REALITY AND VIRTUAL REALITY					
		(Theory)			
Course Code	:	MCA262C2	CIE	:	100 Marks
Credits: L:T:P	:	3:1:0	SEE	:	100 Marks
<b>Total Hours</b>	:	39L+26T	SEE Duration	:	3.00 Hours

UNIT-I	08 Hrs
Introduction to Virtual Reality: Defining Virtual Reality, Four Key Elements of V	virtual Reality
Experience, A History of VR.	
VR The Medium: Communicating Through a Medium, Common Issues of Human Co	ommunication
Media, Narrative, Immobile Versus Interactive.	
The Difference between Virtual reality and Augmented Reality, Applications versus G	ame, Type of
VR Experiences.	
UNIT-II	08 Hrs
Content, Objects, Scale: Getting started with Unity, Creating Simple Diorama, Measu	rement Tools.
Build and Run- Meta Oculus, Android, PC, Menu and UI, Material and Textures, Prefab	s, First Person
Controller and Third Person Controller, Asset Store, Animation and Animator, Object	Fracking- Ray
Tracing, Effects.	
UNIT-III	<b>08 Hrs</b>
Augmented Reality: Terminology, Simple Augmented Reality, Marker-based tra	cking-Marker
detection, Marker pose.	
Marker types and identification: Template markers, Template matching, Impercep	tible markers,
Build and Run-Vuforia.	
UNIT-IV	08 Hrs
Marker less Tracking with AR Foundation: Project Setup, architecture, Features, X	R Simulation,
AR Foundation Debug menu, implement a provider, Build and Run	
UNIT –V	07 Hrs
Mixed Reality: Introduction to mixed reality, MRTK, Project Setup, Configure Unity	for Windows
Mixed Reality. Interaction Model- Hands and Motion Controllers model, Hands-free mo	del, Gaze and
Commit.	
WebXR using Unity: Introduction to WebXR, set up the environment, Plugin	

# **Course Outcomes:**

After going through this course, the student will be able toCO1Understand the concepts of eXtended Reality (XR- VR/AR/MR) and its applicationsCO2Apply the XR concepts to story board the application requirementsCO3Design the application with the appropriate setups to experience the XR ContentCO4Analyze and interpret the appropriate XR technology for Application under consideration



Refere	ence Books
1.	Jesse Glover and Jonathan Linowes, Complete Virtual Reality and Augmented Reality
	Development with Unity, Packt Publishing, 17 April 2019, ISBN:9781838644864,
	1838644865.
2.	Sanni Siltanen, Theory and applications of marker-based augmented reality, Julkaisija -
	Utgivare – publisher, ISBN 978-951-38-7449-0 (soft back ed.), ISSN 2242-119X
	(soft backed).
3.	Zeynep Tacgin, Virtual and Augmented Reality: An Educational HandBook, Cambridge
	Scholars 2020, ISBN(13): 98-1-5275-4813-8,
4.	Erin Pangilinan, Steve Lukes and Vasanth Mohan, Creating Augmented and Virtual
	Realities, O'Relly Media Inc., 2019, ISBN: 978-1-492-04419-2

#### Other material resource

#### https://docs.unity3d.com/Manual/index.html

https://learn.microsoft.com/en-us/training/modules/learn-mrtk-tutorials/1-3-exercise-configure-unityfor-windows-mixed-reality

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

## Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

	Rubric for CIE & SEE Theory courses				
RUBRIC for CIE				RUBRIC for SEE	
SL.NO	Contents	Marks	Q.NO Contents		
1	QUIZZES – Q1 & Q2	20	Every unit con Answer FIVE [unit 1 to 5]	nsists of TWO questions of 20 Marks eac full questions selecting ONE from each	h. unit
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20
			7 & 8	Unit 4: Question 7 or 8	20
			9 & 10	Unit 5: Question 9 or 10	20
				Total Marks	100



Γ		CEMECTED.			
		SEMESTER:			
		PRINCIPLES OF UI /	JX DESIGN		
		(Theory)			
<b>Course Code</b>	:	MCA262C3	CIE	:	100 Marks
L:T:P	:	3:1:0	SEE	:	100 Marks
<b>Total Hours</b>	:	39L+26T	SEE Duration	:	3.00 Hours
		UNIT–I			07 Hrs
Elements of UX	Desi	gn-I			
Introduction, from	om p	product design to user experience	e design, designing for a	exp	erience, User
experience and t	ne we	b, Building from bottom to top.			
<b>Strategy Plane:</b>	Prod	uct Objectives, Business goals, Bra	nd Identity, Success Metrics	s an	d User Needs,
User Segmentati	on, U	sability and User Research, Creatin	g Personas		
Scope Plane: De	efinin	g the Scope, Functional specification	ns, Content requirements.		
		UNIT-II			08 Hrs
Elements of UX	Desi	gn -II			
Structure Plane	: Inte	raction Design, Conceptual Models	, Error Handling, Informatio	on A	Architecture
<b>Skeleton Plane:</b>	Inter	face Design, Navigation Design, Int	formation Design, Wirefram	es	
Surface Plane:	Sense	bry Design, Making Sense of the S	enses, Contrast and Uniform	nitv	y, Internal and
External Consist	ency.	Color Palettes and Typography, De	sign Comps and Style Guid	es.	
UNIT-III 08 Hrs					
UI Design Proc	ess			-	
Usability of Int	eract	ive Systems: Introduction. Usabilit	y Goals and Measures. Usal	bili	ty Motivation.
Universal Usabil	ity, C	Buideline, principles, and theories			J
Managing Desi	gn P	rocesses: Introduction, Organization	onal Design to support Usa	abil	lity, The Four

 Wanaging Design Processes: Introduction, Organizational Design to support Osability, The Four

 Pillars of Design, Development methodologies, Ethnographic Observation, Participatory Design,

 Scenario Development

 UNIT-IV
 08 Hrs

#### UNIT-IV User Interface Evaluation and Interacting Styles

**Evaluating Interface Design:** Introduction, Expert Reviews, Usability Testing and Laboratories, Survey Instruments, Acceptance tests, Evaluation during Active Use, Controlled Psychologically Oriented Experiments.

**Menu Selection, Form Filling and Dialog Boxes:** Introduction, Task-Related Menu Organization, Single Menus, Combination of Multiple Menus, Content Organization, Fast Movement Through Menus, Data Entry with Menus, Form Filling, Dialog Boxes and Alternatives, Audio Menus and Menus for Small Displays

UNIT-V

Patterns For Effective Interaction Design

Using social media: The Patterns-Editorial Mix, Personal Voices, Repost and Comment, Inverted Nano-pyramid, Sharing Widget, Content Leaderboard.

**Going Mobile:** Patterns-Vertical Stack, Touch Tools, Bottom Navigation, Thumbnail-and-Text List, Loading Indicators, Richly Connected Apps.

Visual Style and Aesthetics: Visual Design for Desktop applications, The Patterns Deep Background, Few Hues Many Values, Contrasting Font Weights Skins and Themes

Case Study: To explore the UI/UX using Wire framing /Prototyping tools

**08 Hrs** 



Course	e Outcomes:
After g	oing through this course, the student will be able to
CO1	Understand the theoretical foundations and awareness of User Interface and User Experience
	design
<b>CO2</b>	Explore the knowledge of features, approach, and patterns for designing UI and UX for cross
	platform applications
CO3	Identify and Apply various Design Skills in UI and UX for real world Applications
CO4	Evaluate UI/UX design Process/ artifacts for building products

Refer	ence Books
1.	Jesse James, The Elements of User Experience: User-Centred Design for the Web, New
	Riders Publishers ,2 <sup>nd</sup> Edition, 2011, ISBN-10: 0321683684 ISBN-13: 978-0321683687
2	Ben Shneiderman, Plaisant, Cohen, Jacobs, Designing the User Interface, Pearson Education,
4.	5 <sup>th</sup> Edition, 2014, ISBN-10: 9332518734 ISBN-13: 978-9332518735
3.	Bill Buxton, Sketching User Experiences: Getting the Design Right and the Right Design,
	Morgan Kaufmann,2007, ISBN-10: 0123740371 ISBN-13: 978-0123740373
4	Jenifer Tidwell, Designing Interfaces- Patterns for Effective Interaction Design, O'Reilly®, 2 <sup>nd</sup>
4.	Edition, ISBN 978-1-449-37970-4

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

# Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

	Rubric for CIE & SEE Theory courses						
RUBRIC for CIE				RUBRIC for SEE			
SL.NO	Contents	Marks	Q.NO	Q.NO Contents M			
1	QUIZZES – Q1 & Q2	20	Every unit con Answer FIVE [unit 1 to 5]	nsists of TWO questions of 20 Marks eac a full questions selecting ONE from each	h. unit		
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20		
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20		
			7 & 8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Total Marks	100		

RV Educational Institutions RV College of Engineering Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

SEMESTER: III					
	CYBER SECURITY AND BLOCKCHAIN				
		(Theory)			
Course Code	:	MCA262C4	CIE	:	100 Marks
L:T:P	:	3:1:0	SEE	:	100 Marks
<b>Total Hours</b>	:	39L+26T	<b>SEE Duration</b>	:	3.00 Hours

UNIT–I	08 Hrs
Introduction: Defining Cyberspace and Cyber security, Standard of Good Practice for	r Information
Security, NIST Cyber security Framework.	
System Access: System Access Concepts, User Authentication, Password-Based A	uthentication,
Possession-Based Authentication, Biometric Authentication, Risk Assessmen	t for User
Authentication, Access Control, Customer Access	
UNIT-II	07 Hrs
Phishing: Introduction, Phishing – Methods of Phishing, Phishing Techniques, Spear Ph	ishing, Types
of Phishing scams, Phishing Toolkits and Spy Phishing, Phishing Countermeasures.	
Identity Theft-Personally Identifiable Information (PII), Types of Identity Theft, Tech	nniques of ID
theft, Countermeasures, how to efface your online identity.	
UNIT–III	08 Hrs
Tools and Methods used in Cybercrime: Introduction, Proxy Server and	Anonymizers,
Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attacks on	wireless and
mobile networks, mobile devices	
UNIT–IV	08 Hrs
Blockchain: History, types of blockchain, Consensus, Decentralization using blockchai	n, methods of
decentralization, roots of decentralization, blockchain and full ecosystem decentrali	zation, Smart
contracts, decentralized organizations, Plot forms for decentralization	
UNIT-V	08 Hrs
Bitcoin: Digital keys and address; private and public keys, transactions; life cy	cle, types of
transactions, blockchain; structure, header, mining; tasks, algorithm	
Course Outcomes:	
After going through this course, the student will be able to	

CO1	Understand the basic concepts and need of Cyber security and Blockchain Technology
CO2	Identify methods in Cybersecurity and Blockchain Technology
CO3	Apply Cyber security methods and Blockchain Technology for real time needs
<b>CO4</b>	Analyze Cybersecurity and Blockchain techniques for various scenarios

# **Reference Books**

1.	William Stallings, Effective Cybersecurity: A Guide to Using Best Practices and Standards,
	Addison-Wesley Professional, 2018, ISBN-13: 978-0134772806
2.	Nina Godbole Sunit Belapure, Cyber Security, Wiley India, 2012, ISBN: 9788126521791
3.	Imran Bashir, "mastering Blockchain", Packet Publishing Ltd., 2 <sup>nd</sup> Edition, 2018, ISBN:978-1-
	78883-904-4
4.	Mike Shema, Anti-Hacker Tool Kit (Indian Edition), McGraw Hill, 4 <sup>th</sup> Edition, ISBN:
	9789339212155

Go, change the world

RV Educational Institutions \* RV College of Engineering \* Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

# Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30 marks), Video based seminar/presentation/demonstration (30 marks) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

	Rubric for CIE & SEE Theory courses						
	<b>RUBRIC</b> for CIE			<b>RUBRIC</b> for SEE			
SL.NO	Contents	Marks	Q.NO	2.NO Contents			
1	QUIZZES – Q1 & Q2	20	Every unit con Answer FIVE [unit 1 to 5]	nsists of TWO questions of 20 Marks eac a full questions selecting ONE from each	h. unit		
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20		
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20		
			7 & 8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Total Marks	100		



	SEMESTER: III							
	AI AND PRODUCT MANAGEMENT							
		(The	eory)					
Course Code	:	MCA263D1	CIE	:	100 Marks			
L:T:P	:	3:0:0	SEE	:	100 Marks			
<b>Total Hours</b>	:	39L	SEE Duration	:	3.00 Hours			

UNIT–I	07 Hrs			
Introduction to Product Management, Product Management Lifecycle, Concept validation to				
Go to Market cycle.				
Understanding the Infrastructure and Tools for Building AI Products: Under	erstanding the			
difference AI, ML, DL, Learning Types in ML, Order of Optimal Process Flow,	, Deployment			
Strategies, Model Development and Maintenance for AI Products				
UNIT-II	08 Hrs			
Building an AI-Native Product: Stages of AI product development, AI/ML product	t dream team,			
Productizing AI-powered outputs, how AI product management is different, AI of	customization;			
Customization for Verticals, Customers, and Peer Groups, Benchmarking Perform	ance, Growth			
Hacking, and Cost				
UNIT–III 08 Hrs				
Integrating AI into Existing Non-AI Products: The Rising Tide of AI, Trends in AI adoption-				
Embedded AI, Ethical AI, Creative AI, Autonomous AI, Evolving Products into AI Products				
UNIT-IV	08 Hrs			
AI Product Strategy: Product Vision, Strategy, Roadmap, understanding customer needs, Product				
prioritization, Collaborators and Tools for Need Discovery, Translating Needs to 1	Requirements,			
Requirement categorization, Case study	_			
UNIT-V	08 Hrs			
Human Centered AI Developer Experience Design: AI Products for Developers, AI as a Service,				
AI as an Engine, AI Platform as a Service, Principles of AI DX Design				
Case Studies - Deep dives into Successful and Unsuccessful AI Product Launches, Lessons Learned				
and Best Practices				

Course	Course Outcomes:					
After g	After going through this course, the student will be able to					
CO1	Understand the basic concepts of AI and Product Management					
CO2	2 Identify relevant Product Management concepts, AI infrastructure and tools for building AI					
	products					
<b>CO3</b>	Apply relevant AI and Product Management concepts in any real-world scenario					
<b>CO4</b>	Analyze solutions using AI Product Strategies for real world applications					



Refere	ence Books
1.	Irene Bratsis, The AI Product Manager's Handbook, Packt Publisher, 1 <sup>st</sup> Edition, February 2023, ISBN 9781804612934.
2.	Adhiguna Mahendra, AI Startup Strategy: A Blueprint to Building Successful Artificial
	Intelligence Products from Inception to Exit, Apress, 2023, ISBN-13 (pbk): 978-1-4842-9501-4
	ISBN-13 (electronic): 978-1-4842-9502-1, https://doi.org/10.1007/978-1-4842-9502-1
3.	Justin Norman, Peter Skomoroch, Mike Loukides, Product Management for AI, O'Reilly Media,
	Inc, February 2021, ISBN: 9781098104191.
4.	Thomas Winkle, Product Development within Artificial Intelligence, Ethics and Legal Risk
	Exemplary for Safe Autonomous Vehicles, Open Access, Springer Vieweg, ISBN 978-3-658-
	34292-0 ISBN 978-3-658-34293-7 (eBook), https://doi.org/10.1007/978-3-658-34293-7
5.	Marty Cagan, Inspired: How to Create Tech Products Customers Love, (Silicon Valley Product
	Group), John Wiley & Sons, 2 <sup>nd</sup> Edition, 2018, ISBN-13: 978-1119387503

#### Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

#### Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit...

Rubric for CIE & SEE Theory courses							
	<b>RUBRIC</b> for CIE			RUBRIC for SEE			
SL.NO	Contents	Marks	Q.NO	Contents	Marks		
1	QUIZZES – Q1 & Q2	20	Every unit	consists of TWO questions of 20 M	larks each.		
			Answer FIVE full questions selecting ONE from each unit				
			[unit 1 to 5	]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning -	30	3 & 4	Unit 2: Question 3 or 4	20		
	EL1 & EL2						
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20		
			7&8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Total Marks	100		



SEMESTER: III							
DATA VISUALIZATION							
		(Theory)					
Course Code	:	MCA263D2	CIE	:	100 Marks		
Credits: L:T:P	:	3:0:0	SEE	:	100 Marks		
Total Hours	:	39L	SEE Duration	:	3.00 Hours		

07 Hrs					
Defining Data Visualization: - The Components of Understanding - The Importance of Conviction					
ols for Data					
08 Hrs					
- Statistical					
ata Sources					
08 Hrs					
Factors and					
Considerations - Visualization using Graphs, Plots, Charts and Geospatial Maps using Power BI					
08 Hrs					
Interactivity: Features of Interactivity: Data Adjustments and Presentation Adjustments - Influencing					
entation using					
08 Hrs					
Visualization Literacy - Viewing: Learning to See - Creating: The Capabilities of the Visualizer					
Creating Reports and Publishing Reports – Design Dashboards and Publishing using Gateways					

Course	e Outcomes:
After g	oing through this course, the student will be able to
CO1	Understand the process and principles of data visualization and apply the techniques for
	different data types
CO2	Identify the relevant visual encoding techniques like chart, graph, plot etc for real time example
	and demonstrate it using visualization tools
CO3	Perform data analysis, graphical representation, and interpretation to various phenomena in real
	life applications
<b>CO4</b>	Design, customize and publish interactive reports / dashboards using various visualization
	techniques



#### **Reference Books**

1.	Andy Kirk, Data Visualization, A Handbook for Data Driven Design, SAGE Publications India
	Pvt Ltd, ISBN 978-1-4739-1213-7, ISBN 978-1-4739-1214-4 (pbk)
2.	Suren Machiraju, Suraj Gaurav, Power BI Data Analysis and Visualization, De/G PRESS,
	ISBN 978-1-5474-1678-3, e-ISBN (PDF) 978-1-5474-0072-0, e-ISBN (EPUB) 978-1-5474-
	0074-4
3.	Jonathon Schwabish, Better data visualizations: a guide for scholars, researchers, and wonks,
	Columbia University Press: LCCN 2020017814 (print)   LCCN 2020017815 (ebook)   ISBN
	9780231193108 (hardback)   ISBN 9780231193115 (trade paperback)   ISBN 9780231550154
	(eBook)
4.	Alberto Ferrari and Marco Russo, Introducing Microsoft Power BI, Microsoft Press, ISBN:
	978-1-5093-0228-4

## Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

## Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit...

Rubric for CIE & SEE Theory courses							
RUBRIC for CIE				RUBRIC for SEE			
SL.NO	Contents	Marks	Q.NO	Contents	Marks		
1	QUIZZES – Q1 & Q2	20	Every unit	consists of TWO questions of 20 M	arks each.		
			Answer FI	VE full questions selecting ONE from	each unit		
			[unit 1 to 5	]			
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20		
3	Experiential Learning -	30	3 & 4	Unit 2: Question 3 or 4	20		
	EL1 & EL2						
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20		
			7 & 8	Unit 4: Question 7 or 8	20		
			9 & 10	Unit 5: Question 9 or 10	20		
				Total Marks	100		



SEMESTER: III							
DIGITAL TRANSFORMATION							
	-	(Theory)					
Course Code	:	MCA263D3	CIE	:	100 Marks		
Credits: L:T:P	:	3:0:0	SEE	:	100 Marks		
Total Hours	:	39L	SEE Duration	:	3.00 Hours		

	UNIT–I	07 Hrs			
Digitalize or Drown: Digitizat	tion: Drivers, Objects, and Impacts, Digitalization: Dig	ital Innovation			
and Transformation	and Transformation				
The Business Consequences o	f a Digitally Transformed Economy: Modern Drivers	of Change,			
Hyper Connectivity					
	UNIT–II	08 Hrs			
Supercomputing as Foundation	on for a 'Digitized Core': Leveraging Capabilities of a	Digitized Core:			
The Business Impact					
Cloud Computing & Smar	ter World: Cloud Delivery Models: Cloud Comp	uting and the			
Subscription Economy, Key Inr	novations for Smarter World				
Cyber Security: Four Cyber S	ecurity Elements, Impact of Cyber Security				
	UNIT-III	08 Hrs			
Challenges of Introducing	Artificial Intelligence (AI) in Industrial Settings:	Strategy and			
Organization, Technology – Da	ata, Testing and Validation, Technology Risks, People	and Process -			
People, Process, Decision-Maki	ng, Type of Problem, Make/Buy, Advice for Implement	ation			
Case studies: Digital Transform	ation on Higher education, other sectors				
	UNIT-IV	08 Hrs			
Blockchain-based Circular-Secure Encryption: Password Vulnerability, Password-Cracking					
Attacks, Common Causes of K	nowledge Cracks, Preventive Steps for Violations of Da	ta, Blockchain			
Structure, Hash Functions in B	lockchain, Hashing in Password Security, Blockchain-	Based Circular			
Fused Encryption, Wedges Alge	orithm for Adding Salt				
	UNIT-V	08 Hrs			
Digital Supply Chain Manage	ement Agenda for the Automotive Supplier Industry	: Supply Chain			
Challenges and Trends, Digita	l Supply Chain Management, Dimensions of a Digital	Supply Chain			
Management, Technological Int	novations Relevant for Supply Chain Management				
Digital Supply Chain Manage	ement Use Cases: Digital Customers, Digital Logistics	and Inventory,			
Digital Production Systems, Digital Supplier, Digital IT and Technology, Digital Performance					
Measurement, Digital Supply Chain Management Agenda, Learnings					
Course Outcomes:					
After going through this course, the student will be able to					
CO1 Understand the elements	<b>CO1</b> Understand the elements and examples of digital economy.				
<b>CO2</b> Explore the transformati	ve potential of disruptive technologies like Cloud Comp	outing, Big Data,			

and many more.



#### **Reference Books**

1.	Gerhard Oswald & Michael Kleinemeier, Shaping the Digital Enterprise, Trends and Use Cases
	in Digital Innovation and Transformation, Springer, ISBN 978-3-319-40966-5 ISBN 978-3-
	319-40967-2 (eBook), DOI 10.1007/978-3-319-40967-2.
2.	Peter Augustine, Pethuru Raj, and Sathyan Munirathinam, Enterprise Digital Transformation
	Technology, Tools, and Use Cases, CRC Press, 1st Edition 2022, ISBN: 978-1-003-11978-4
	(ebk), DOI: 10.1201/9781003119784.
3.	Bruno Daniotti, Marco Gianinetto, Stefano Della Torre, Milan Italy, Digital Transformation of

- Bruno Daniotti, Marco Gianinetto, Stefano Della Torre, Milan Italy, Digital Transformation of the Design, Construction and Management Processes of the Built Environment, Springer
- **4.** Venkatesh Upadrista, Formula 4.0 for Digital Transformation, A Framework using Digital Enablers from Industry 4.0, Routledge publishers, 1st Edition, 2021, ISBN: 978-0-367-74686-5 (hbk), ISBN: 978-0-367-74684-1 (pbk), ISBN: 978-1-003-15907-0 (ebk).

# Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

## Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit...

Rubric for CIE & SEE Theory courses					
RUBRIC for CIE RUBRIC for SEE					
SL.NO	Contents	Marks	Q.NO	Contents	Marks
1	QUIZZES – Q1 & Q2	20	<ul> <li>Every unit consists of TWO questions of 20 Marks each.</li> <li>Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]</li> </ul>		
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20
			7 & 8	Unit 4: Question 7 or 8	20
			9 & 10	Unit 5: Question 9 or 10	20
				Total Marks	100



SEMESTER: III						
WEB OF THINGS						
		(Ineory)				
Course Code	:	MCA263D4	CIE	:	100 Marks	
Credits: L:T:P	:	3:0:0	SEE	:	100 Marks	
<b>Total Hours</b>	:	39L	SEE Duration	:	3.00 Hours	

UNIT–I	08 Hrs			
Basics Of the Iot and The WoT: From the Internet of Things to the Web of Things, He	llo World Wide			
Web of Things, Node.js for the Web of Things.				
Getting started with embedded systems and Building networks of Things				
UNIT–II	08 Hrs			
Building The WoT: Access: web APIs for things: devices, resources, and web things.				
Beyond Rest: The Real-Time Web of Things, The WoT needs events! Publish/subscrib	be, Webhooks -			
HTTP callbacks,				
<b>Comet</b> : hacking HTTP for a real-time web WebSocket's The future from HTTP/1.1 to I	HTTP/2			
Implementing web of things				
Connecting devices to the web Direct integration pattern—REST on devices				
<b>Creating a Wol server</b> : Resource design - Representation design - Interface des	ign, - Pub/sub			
Interface via websocket s. Cotoway integration pattern: $CoAP$ asymptotic running of $CoAP$ server. Proving	COAP via a			
gateway	g COAF via a			
<b>Cloud integration nattern</b> : MOTT over EVRYTHNG set up your EVRYTHNG accou	nt Create your			
MOTT client application	int, create your			
Use actions to control the power plug. Create a simple web control application				
UNIT-III	08 Hrs			
Find: Describe And Discover Web Things: The find-ability problem, Discovering The	nings, Network			
discovery, Resource discovery on the web	0			
Describing web Things: Introducing the Web Thing Model, - Metadata - Properti	es - Actions -			
Things, Implementing the Web Thing Model on the Pi				
The Semantic Web of Things, Linked data and RDF - Agreed-upon semantics: Schema.	org - JSON-LD			
UNIT-IV 08 Hrs				
Share: Securing And Sharing Web Things: Securing Things, - Encryption - Web secu	urity with TLS:			
the S of HTTPS! – Enabling HTTPS and WSS with TLS on your Pi				
Authentication and access control: Access control with REST and API tokens -	OAuth: a web			
authorization framework				
The Social Web of Things: A Social Web of Things authentication proxy - Implementing a Social				
WoT authentication proxy				
UNIT-V 07 Hrs				
Compose: Physical Mashups, Building a simple app automated UI generation, - A universal user				
interface for web Things, Physical mashups				
<b>Boxes and wires mashups for the Physical Web:</b> Node-RED, using wizards for physical mashups:				

IFTTT, pushing intruder alert tweets to a Google spreadsheet, sending requests to a Thing with the Maker Channel, Pushing intruder alert tweets to a Google spreadsheet



#### **Course Outcomes:**

After g	After going through this course, the student will be able to					
CO1	Understand the fundamentals concepts of Web of Things and related stadards					
CO2	Differentiate the challenges in IoT and WoT solutions					
CO3	Integrate network of devices and secure with api through access, find and share stages of WoT					
<b>CO4</b>	Develop Physical mashup for implementing Web of Things					

#### **Reference Books**

1.	Dominique D Guinard, Vlad M Trifa, Building the Web of Things With Examples in Node.js
	and Raspberry Pi, MANNING, 2017, ISBN: 9781617292682
2.	Taiji Hagino, Practical Node Red Programming, Packt publishing, 2021, ISBN-13: 978-
	1800201590
3.	Bogu, Mohanram Balachandar, RESTful Java Web Services, Packt Publishing, 3rd Edition,
	2017, ISBN: 9781788294041

# Scheme of Continuous Internal Evaluation (CIE): 20 + 50 + 30 = 100

**QUIZZES:** Quizzes will be conducted in online/offline mode. Two quizzes will be conducted & Each Quiz will be evaluated for 10 Marks. The sum of two quizzes will be the Final Quiz marks.

**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). Two tests will be conducted. Each test will be evaluated for 50 Marks, adding up to 100 Marks. Final test marks will be reduced to 50 Marks.

**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning and Program specific requirements (30), Video based seminar/presentation/demonstration (30) adding up to 60 marks. Final EL marks will be reduced to 30 Marks.

## Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE full questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit...

Rubric for CIE & SEE Theory courses					
RUBRIC for CIE RUBRIC for SEE				<b>RUBRIC</b> for SEE	
SL.NO	Contents	Marks	Q.NO	Contents	Marks
1	QUIZZES – Q1 & Q2	20	Every unit consists of TWO questions of 20 Marks each Answer FIVE full questions selecting ONE from each unit [unit 1 to 5]		
2	TESTS – T1 & T2	50	1 & 2	Unit 1: Question 1 or 2	20
3	Experiential Learning – EL1 & EL2	30	3 & 4	Unit 2: Question 3 or 4	20
	Total Marks	100	5&6	Unit 3: Question 5 or 6	20
			7 & 8	Unit 4: Question 7 or 8	20
			9 & 10	Unit 5: Question 9 or 10	20
				Total Marks	100



SEMESTER: III						
MINOR PROJECT						
		(Practice)				
Course Code	:	MCA461P	CIE	:	100 marks	
Credits: L:T:P	:	0:0:4	SEE	:	100 marks	
<b>Total Hours</b>	:	52P	SEE Duration	:	3.00 Hours	

#### GUIDELINES

- 1. Each project group will consist of a maximum of two students. The student shall undertake minor project depending on the electives / Research based / Industry Oriented Each student / group has to select a contemporary topic that will use the technical knowledge of their program of study after intensive literature survey.
- 2. Allocation of the guides preferably in accordance with the expertise of the faculty
- 3. The number of projects that a faculty can guide would be limited to six to eight.
- 4. The minor project would be performed in-house.
- 5. The implementation of the project must preferably be carried out using the resources available in the department/college.
- 6. Students are required to publish project findings in reputed journals/ conferences

#### **Course Outcomes:**

After going through this course, the student will be able to

- **CO1** Conceptualize, design and implement solutions for specific problems
- **CO2** Communicate the solutions through presentations and technical reports
- CO3 Apply project and resource management skills, professional ethics and societal concerns
- **CO4** Synthesize self-learning, teamwork and ethics

## Scheme of Continuous Internal Evaluation (CIE)

Evaluation of the project work will be done by the committee appointed by the Director, Dept of MCA. Evaluation will be carried out in THREE Phases.

Phase	Activity	Weightage				
Ι	Synopsis submission, Preliminary seminar for the approval of selected	20%				
	topic and Objectives formulation					
II	Mid-term seminar to review the progress of the work and documentation.					
	• Design and Simulation/Algorithm development Experimental	20%				
	Setup	20%				
	Conducting experiments / Implementation / Testing					
III	Oral presentation	10%				
	Demonstration	10%				
	Project report& Paper publication	20%				
Scheme for Semester End Examination (SEE)						
The evaluation will be done by Internal and External examiners. The following weightage would be						
given for	given for the examination. Evaluation will be done in batches of 10 students					

	en for the examination. Evaluation will be done in batelies of fo students.					
1.	Project work	40%				
2.	Presentation	30%				
3.	Viva-voce	30%				



SEMESTER: III						
INTERNSHIP						
		(Practice)				
Course Code	:	MCA462N	CIE	:	100 marks	
Credits: L:T:P	:	0:0:6	SEE	:	100 marks	
<b>Total Hours</b>	:	78P	SEE Duration	:	<b>3.00 Hours</b>	

## GUIDELINES

- 1) The duration of the internship shall be for a period of 6 weeks on full time basis after II semesterfinal exams and before the commencement of III semester.
- 2) The student can take up internship individually or as a team of TWO.

A. **At Industry or Research Organizations** Students can opt for interning at the industry or research organizations like BEL, DRDO, ISRO, BHEL, etc.. However, the institute/industry should provide the letter of acceptance through hard copy/email with clear mention of the title of the work assigned along with the duration and the name of the student.

B. At RVCE Center of Excellence/Competence RVCE hosts around 16 CENTER OF EXCELLENCE in various domains and around 05 CENTER OF COMPETENCE.

The details of these could be obtained by visiting the website.

https://rvce.edu.in/rvce-center-excellence

C. Within the respective department at RVCE (In house) Departments may offer internship opportunities to the students based on societal concern/ research/consultancy works.

- 3) The student must submit letters from the industry/ CoE/CoC clearly specifying his / her name and the duration of the internship on the company letter head with authorized signature.
- 4) Students undergoing internship training are required to submit periodic progress reports to their respective guides and a final report at the end of the internship.

#### **Course Outcomes:**

After g	After going through this course, the student will be able to		
CO1	Understand appropriate operational principles and practices in the real-world scenarios.		
CO2	Analyze real-time problems and suggest solutions.		
CO3	Communicate effectively and work in teams		
<b>CO4</b>	Imbibe the practice of professional ethics and need for lifelong learning.		

#### Scheme of Continuous Internal Evaluation (CIE):

The evaluation committee shall consist of a Guide, Professor/Associate Professor and Assistant Professor. The committee shall assess the presentation and the progress reports in two reviews.

Reviews	Activity	Weightage
Review I	Presentation of the operational principles and practices of internship carried out.	45%
Review II	Presentation of internship experience with suitable methodology, structure and report writing.	55%

Scheme for Semester End Evaluation (SEE): The SEE examination shall be conducted by an external examiner and an internal examiner. Evaluation shall be done in batches, not exceeding 6 students per batch.



		SEN	IESTER: IV		
		MAJO	OR PROJECT		
		(	(Practice)		
<b>Course Code</b>	:	MCA491P	CIE	:	100 Marks
Credits L:T:P	:	0:0:15	SEE	:	100 Marks
Hrs/Week		30	SEE Duration	:	3.00 Hours
		GU	JIDELINES		
1. A major proje	ect wil	l have to be done by on	ly one student in his / her area of inter	rest.	
2. Each student	must s	select a contemporary to	opic in the area of application or rese	arch	that will use
the technical	the technical knowledge and skill set.				
3. The project ca	3. The project can be carried out on-campus or in an industry or an organization with prior approval				
from the Director. Department of MCA					
4. Students carry	4 Students carrying out the Project In house are required to be present in the college every day and				
report to the I	nterna	l Guide		8	ery any and
5 The candidate must maintain and submit a weekly project work dairy duly signed by the internal					

- 5. The candidate must maintain and submit a weekly project work dairy duly signed by the internal and external guide to verify the regularity of the student.
- 6. Internal Evaluation of the project work will be done by the evaluation committee appointed by the Director, Department of MCA.
- 7. The standard duration of the project is for 5-month duration, however if the evaluation committee of the department, after the assessment feel that the work is insufficient and it must be extended, then the student will have to continue as per the directions of the committee.
- 8. Students are mandatorily required to publish in reputed journals/ conferences.

# **Course Outcomes:**

After g	After going through this course, the students will be able to		
CO1	Conceptualize, design and implement solutions for specific problem defined		
CO2	Communicate the solutions through presentations and dissertation report		
CO3	Apply project and resource management skills, professional ethics, and societal concerns		
<b>CO4</b>	Exhibit self-learning, lifelong learning skills towards sustainable solutions		

# Scheme of Continuous Internal Examination (CIE)

Evaluation will be carried out in THREE Phases. The evaluation committee will comprise of guide and members appointed by Director, MCA

Phase	Activity	Weightage
Ι	Synopsis submission, Preliminary seminar for the approval of selected topic,	20%
	review and refinement of objectives, Literature survey	
II	Mid-term seminars to review the progress of the work and documentation -	40%
	SRS and algorithm development, Design and simulation/ experimental set up	
III	Experimental result & analysis, testing, Conclusions and Future Scope of	40%
	Work, Dissertation Report	

## <u>Note -</u>

- (a) 50% CIE is the prerequisite to appear for SEE.
- (b) Two hard bound dissertation reports are to be submitted. The report must be in light yellow color.
- (c) Certificate sheet having the signatures of Guide, Director and Principal must be included.
- (d) Plagiarism report must be <20% and to be included in the report.



#### Scheme for Semester End Examination (SEE):

The evaluation will be done by ONE Senior faculty / Internal Guide from the department and ONE External member from Academia / Industry / Research Organization. Evaluation will be done in batches not exceeding SIX students per batch.

### SEE procedure is as follows.

	Internal Examiner	External		Total
		Examiner		
SEE Dissertation	100 marks	100 marks		200 marks
			(A)	(200/2) =100 marks
Viva Voce	Jointly Evaluated			
	by Internal and		(B)	100 marks
	External Examiner			
		Total I	Marks	[(A)+(B)]/2 = 100

Final Marks / Grades = (CIE+SEE)/2



		SEMESTER: IV			
		TECHNICAL SEMINAR (Practice)			
Course Code	:	MCA492L	CIE	:	50 Marks
Credits: L:T:P	:	0:0:2	SEE	:	50 Marks
Hrs/Week	:	4	SEE Duration	:	2.00 Hours
GUIDELINES					

1. The seminar presentation shall be done by individual students.

2. The topic for seminar should be in one of the thrust areas relevant to industry or on-going research with in-depth technical review and analysis.

- 3. The topic can also be an extension of the Major project.
- 4. The student must be able to highlight or relate the technological developments with societal relevance and sustainability.
- 5. The students must mandatorily address professional computing practices relevant to the topic of study.
- 6. The student shall try to perform financial / cost analysis or apply project management tools as related to his/her topic of study.
- 7. Each student must submit both hard and soft copy of the presentation and report.

#### Course Outcomes: After going through this course, the students will be able to

CO1	Identify topics in recent trends in computing technology
-----	----------------------------------------------------------

- CO2 Perform literature / market / product survey and analyse information in the field of study
- CO3 Enhance communication skills and report writing skills

CO4 Exhibit creative thinking abilities

**Scheme of Continuous Internal Evaluation (CIE):** Evaluation would be carried out in TWO phases. The evaluation committee shall comprise of guide and senior faculty members. The evaluation criteria shall be as per the rubrics given below:

#### The evaluation criteria shall be as per the rubrics given below:

Reviews	Activity	Weightage
Phase 1	Selection of topic - Technical Relevance, review of literature, Presentation	50%
	skills, Sustainability and Societal Concerns	
Phase 2	Technological developments, key competitors, Presentation skills, Report	50%
	writing	

#### Scheme for Semester End Evaluation (SEE):

The evaluation will be done by ONE Senior faculty / Internal Guide from the department and ONE External member from Academia / Industry / Research Organization. Evaluation will be done in batches, 6 students per batch.

## **Rubrics for SEE evaluation.**

•	Topic	10%
•	Literature Review	20%
•	Technical relevance, Sustainability and Societal Concerns	30%
•	Presentation Skills	20%
•	Viva- Voce	20%



		SEMESTER: IV			
	ABILITY ENHANCEMENT COURSE-II				
		(NPTEL)			
Course Code	:	MHS102T	CIE	:	
Credits: L: T:P	:	2:0:0	SEE	:	
<b>Total Hours</b>	:		SEE Duration	:	

	GUIDELINES
1)	Students are mandatorily required to take One MOOC certification courses as recommended by
	HSS BoS, within I-IV Semester MCA and this is considered for the evaluation in course code
	MHS102T. This is included in the HSS board.
2)	Students are required to take and complete the NPTEL courses recommended by HSS BoS.
3)	The course completed certificates along with scores to be submitted to the department.

4) The grading is calculated as per the scores obtained.



# **Curriculum Design Process**



**Figure 1: Curriculum Design Process** 



**Figure 2: Academic Planning and Implementation** 





Figure 3: Process for Course Outcome Attainment



**Figure 4: Final CO Attainment Process** 



Figure 5: Program Outcome Attainment Process

#### RV Educational Institutions \* RV College of Engineering \* Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

# **PROGRAMME OUTCOMES (PO)**

#### MCA Graduates will be able to:

- **PO1** Foundation Knowledge: Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.
- **PO2 Problem Analysis:** Identify, review, formulate and analyze problems for primarily focusing on customer requirements using critical thinking frameworks.
- **PO3 Development of Solutions:** Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.
- **PO4** Modern Tool Usage: Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.
- **PO5** Individual and Teamwork: Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.
- **PO6 Project Management and Finance:** Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management
- **PO7** Ethics: Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware
- **PO8** Life-long learning: Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.