



SERVICE TO MANKIND IS SERVICE TO GOD

His Divine Soul Padmabhushana Sri Sri Sri Dr.Balagangadharanath Maha Swamiji Founder President, Sri Adichunchanagiri Shikshana Trust®



Belief in God is not ignorance or illusion. It is a belief that there is an unseen, ineffable Power that transcends all our powers of muscles, mind and lives.



His Holiness Parama Pujya Sri Sri Sri Dr. Nirmalanandanatha Maha Swamiji President, Sri Adichunchanagiri Shikshana Trust®

True richness is the generosity of heart. Cultivate it and work to help the less fortunate ones in life.

Revered Sri Sri Dr. Prakashanatha Swamiji Managing Director, BGS & SJB Group of Institutions & Hospitals

People and prosperity follow the path which the leaders take. So the elders and leaders should make sure that they give the right lead and take the right path.

Syllabus for 1 <sup>st</sup> to4 <sup>th</sup> Semester											
The syllabus, scheme and guidelines are provided in detail. The syllabus, scheme and guidelines are subjected to changes if any needed. The updates will be done and intimated timely.											
ook is availal	ole on	www.sjbit.edu.in									
es, please wr	ite to	academicdean@sjbit.edu.in									
UPDATES											
Release / RevisionDateRemarks											
Release06/02/2024First uploading, Version 1											
Version 2 05/04/2024 CIE and SEE guidelines modified											
	Sy cheme and gu cheme and gu ll be done an ook is availab es, please wr 06/02/2024 05/04/2024	Syllabus cheme and guideline cheme and guideline ll be done and intima ook is available on es, please write to 06/02/2024 First u 05/04/2024 CIE a 05/04/2024 I CIE a 05/04/2024 I CIE a									

	Sti Adichunchanagiri Shikshana Trust (B)         SJB Institute of Carved by Sti Scheme Trust (B)         BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060         Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi         Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015         Recognized by UGC, New Delhi with 2(f) & 12 (B)         AUTONOMOUS SCHEME (Tentative) PG - MCA 1st year															
5	SCHEME: 2023 Aca. Year.: 2023-24 Date 22.01.2024															
	SE	EM:	I													
					t.	۲.		Teac	hing	Hrs/	Week		Exa	ninati	ons	
~	<u>N</u>		P.			L	Т	Р	0			SEE				
SL No	Course	Course	Course Code	Course Title	Teaching	QPrettin	Credi	Locture	Tatorial	Practical	PBL/ABL/ SL/othm.	CIR Mark	Dur.	Th. Mrks	Lab. Mrks.	Tot. Mark
1	BSC	1	23MC AT101	Mathematical Foundation for Computer Applications			3	3	0	1		50	3	50	-	100
2	IPCC	1	23MC AI102	Operating Systems - Linux			4	3	0	2		50	3	50	-	100
3	IPCC	2	23MC AI103	Computer Networks			4	3	0	2		50	3	50	-	100
4	PCC	1	23MCAT104	Programming in Python	MC/	MC/	3	3	0	١		50	3	50	-	100
5	PCC	2	23MCAT105	Database Systems & Modeling			3	3	0	١		50	3	50	-	100
6	PCCL	1	23MCAL106	Python Programming Laboratory	]		2	-	2	2		50	3	-	50	100
7	PCCL	2	23MCAL107	Database Systems & Modeling			2	-	2	2		50	3	-	50	100
8	AEC	1	23MC AAE11	Ability Ennhancement course-1	Ħ	Ħ	2	-	2	2		50	3	50	-	100
	Total 23 15 6 10 0 400 300 - 8									800						
9	MAC	1	23MCAM108	Basics of Programming & Computer Organization	MCA		PP	2	2			50		-	-	50

BSC-Basic Science Courses, PCC: Professional core. IPCC-Integrated Professional Core Courses, PCCL - Professional Core Course Laboratory, MAC - Mandatory Audit course for non Computer Science students only.Each Course (PCC/PCE) shall have case study discussion and may be considered as a part of assignment. AEC: Ability Enhancement Course,

SLC : 10 courses shall be defined at the begining of the course. The student should select any one course of their interest and mentors will be alloted to them to guide through the course. Weekly assignment reviews shall be done by mentors. The sudent should complete the course by end of 3rd semester. Rubrics and methodology will be defined separately. SLC will be credited in 4th Semester

	STANDARD SHI GAN SHI G															
			A	UTONOMOUS SCHEME (Ten	tativ	e) I	PG-	M	$\mathbf{A}$ 1	lsty	ear					
SCHEME: 2023 Aca. Year.: 2023-24 Dat 2												22.01.2024				
	S	EM:	п													
		1						Tes	oc hing	Hrs/V	Veek	Evaninations				
S	J.	5	Commo				.2	L	т	Р	0	9		SEE		
0 N	Course	Coursetyp	Code	Course Title	Teaching	QPadth	Cree	Lecture	Tutorial	Practical	PBLABL SLiether.	CIEMar	Dur.	Th. Mrts	Lab. Mrts.	Tot. Mart
1	PCC	3	23MCAT201	Data Structures & Analysis of Algorithms			3	3				50	3	50	_	100
2	PCC	4	23MCAT202	Object Oriented Programming			3	3	1			50	3	50	_	100
3	PCC	5	23MCAT203	Software Engineering & Product Management			3	3				50	3	50	_	100
4	IPCC	3	23MCAI204	Web Technologies -1	-	-	4	3		2		50	3	50		100
5	PEC	1	23MCAE205	Professional Elective 1	WC	MC	3	2	2	-		50	3	50	_	100
6	PEC	2	23MCAE206	Professional Elective 2			3	2	2			50	3	50		100
7	PCCL	3	23MCAL207	DSA Laboratory			2		2	2		50	3		50	100
8	PCCL	4	23MCAL208	Object Oriented Programming Laboratory			2		2	2		50	3		50	100
9	PCC	6	23MCAM209	Reseach Methodology & IPR			2	2				50	3	50		100
10	AEC	2	23MCAAE21	Ability Ennhancement course-2	н	н	2		2	2		50	3	50		100
	Total 27 18 10 6 500 400 100 10												1000			

PCC: Professional core courses, PEC: Professional Elective Courses, IPCC-Integrated Professional Core Courses, PCCL - Professional Core Course Laboratory, AEC- Ability Enhancement Course.

SLC: 10 courses shall be defined at the begining of the course. The student should select any one course of their interest and mentors will be alloted to them to guide through the course. Weekly assignment reviews shall be done by mentors. The sudent should complete the course by end of 3rd semester. Rubrics and methodology will be defined separately. SLC will be credited in 4th Semester.

	Professional Elective 1	Professional Elective 2											
Course	Course title	Cot	irse C				C	ourse	title				
23MCAE211	Data Mining & Warehousing	23MCAE221			A	Artificial Intelligence & Machine Learning							
23MCAE212	UI & UX Design	23MCAE222 23MCAE223		N	Mobile Computing								
23MCAE213	Cloud Computing			E	Edge Computing								
23MCAE214	Computer Vision	233	<b>ICAE</b>	E224		igital	Mark	eting	5				





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2	23MCAI102	Operating Systems - Linux	4							
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4	23MCAT104	Programming in Python	10							
5	23MCAT105	Database Systems & Modeling	13							
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7	23MCAL107	Database Systems & Modeling Laboratory	19							
8	23MCAAE11	Ability Ennhancement course: Cyber Security Essential	21							
9	23MCAM108	Basics of Programming & Computer Organization	25							
10	23MCAT201	Data Structures & Analysis of Algorithms	29							
11	23MCAT202	Object Oriented Programming	32							
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13	23MCAI204	Web Technologies -1	38							
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20	CIE & SEE Guide	elines	80							
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semester:	I Co	urse Type: BSC										
Course Title	: Mathema	atical Foundation f	for Computer Applic	ations								
Course Code	2	3MCAT101		Credits:	3							
Teachin	g Hours/	Week (L:T:P:O)	3:0:0:0	Total Hours:	40							
CIE Marks:	50	SEE Marks:	50	Total Marks:	100							
SEE Type:		Theory		Exam Hours:	3 Hrs							
I. Course Objectives:												
Understand Discrete Mathematics Principles.												
Develop Numerical Problem-Solving Skills.												
Explore	• Explore Linear Algebra Applications in Computer Science.											
Build Co	Build Competence in Probability and Statistics.											
Gain Proficiency in Sampling Theory and Statistical Inference.												
	<b>II. I</b>	eaching-Learning	g Process (General	Instructions):								
These are sample course outcome	e Strategie s.	es, which teachers	can use to accelerate	e the attainment of	the various							
1. Lecturer meth teaching method	od (L) ne	ed not to be only t e adopted to attain	raditional lecture me the outcomes.	thod, but alternati	ve effective							
2. Use of Video	/Animatio	n to explain functi	oning of various con	cepts.								
3. Encourage co	llaborativ	e (Group Learning	) Learning in the cla	SS.								
4. Ask at least th thinking.	nree HOT	(Higher order Thi	nking) questions in t	he class, which pro	omotes critical							
5. Adopt Proble thinking skills s than simply reca	5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.											
6. Introduce Top	pics in ma	nifold representati	ons.									
7. Show the diff	erent way	s to solve the same	e problem and encou	rage the students t	o come up with							
their own creative ways to solve them.												
8. Discuss how improve the stud	8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.											
		III. CO	URSE CONTENT									
	III(a). Theory PART											

	8 Hrs
Propositional and First-Order Logic, Set Theory and Operations, Functions and Relations, Combinatorics (Permutations, Combinations, Pigeonhole Principle), Graph Theory (Basics, Graph Representations, Connectivity)	
Textbook1	
RBT Levels: 1,2	
Module-2: Numerical Methods and Optimization	8 Hrs
Introduction to Numerical Methods, Solving Equations (Root-finding methods), Interpolation and Extrapolation, Basics of Numerical Differentiation and Integration, Optimization Techniques (Gradient Descent, Newton's Method)	
Textbook5	
RBT Levels: 1,2	
Module-3: Linear Algebra	8 Hrs
Vectors and Matrices, Matrix Operations (Addition, Subtraction, Multiplication), Determinants and Inverses, Eigenvalues and Eigenvectors, Linear Transformations, Applications of Linear Algebra in Computer Science.	
Textbook2	
RBT Levels:2,3,4	
Module-4: Probability and Statistics,	8 Hrs
Probability Basics (Sample Spaces, Events, Probability Laws)- Introduction, Random Variables and Probability Distributions, Descriptive Statistics (Mean, Median, Variance), Discrete Probability Distributions – Binomial and Poisson distributions, Continuous Probability Distributions- Exponential and normal distribution.	
Textbook3	
RBT Levels:2,3,4	
RBT Levels:2,3,4     Module-5: Sampling Theory,	8 Hrs
<b>RBT Levels:2,3,4 Module-5: Sampling Theory</b> ,         Sampling distribution, standard error, Statistical Inference (Hypothesis Testing,         Confidence Intervals), Test of significance for large samples, comparison of large samples, Test of Significance for means of two small samples, Students 't' distribution, Chi-square distribution as a test of goodness of fit.         Textbook4	8 Hrs
RBT Levels:2,3,4         Module-5: Sampling Theory,         Sampling distribution, standard error, Statistical Inference (Hypothesis Testing,         Confidence Intervals), Test of significance for large samples, comparison of large         samples, Test of Significance for means of two small samples, Students 't'         distribution, Chi-square distribution as a test of goodness of fit.         Textbook4         RBT Levels:2.3.4	8 Hrs
<b>RBT Levels:2,3,4Module-5: Sampling Theory</b> , Sampling distribution, <b>standard error</b> , Statistical Inference (Hypothesis Testing, Confidence Intervals), Test of significance for large samples, comparison of large samples, Test of Significance for means of two small samples, Students 't' distribution, Chi-square distribution as a test of goodness of fit. <b>Textbook4RBT Levels:2,3,4</b>	8 Hrs
RBT Levels:2,3,4         Module-5: Sampling Theory,         Sampling distribution, standard error, Statistical Inference (Hypothesis Testing,         Confidence Intervals), Test of significance for large samples, comparison of large         samples, Test of Significance for means of two small samples, Students 't'         distribution, Chi-square distribution as a test of goodness of fit.         Textbook4         RBT Levels:2,3,4         IV. COURSE OUTCOMES	8 Hrs
RBT Levels:2,3,4         Module-5: Sampling Theory,         Sampling distribution, standard error, Statistical Inference (Hypothesis Testing,         Confidence Intervals), Test of significance for large samples, comparison of large         samples, Test of Significance for means of two small samples, Students 't'         distribution, Chi-square distribution as a test of goodness of fit.         Textbook4         RBT Levels:2,3,4         IV. COURSE OUTCOMES         CO1       Apply Discrete Math Concepts in Problem-Solving.	8 Hrs
<b>RBT Levels:2,3,4 Module-5: Sampling Theory</b> ,         Sampling distribution, standard error, Statistical Inference (Hypothesis Testing,         Confidence Intervals), Test of significance for large samples, comparison of large samples, Test of Significance for means of two small samples, Students 't' distribution, Chi-square distribution as a test of goodness of fit. <b>Textbook4 RBT Levels:2,3,4 IV. COURSE OUTCOMES CO1</b> Apply Discrete Math Concepts in Problem-Solving. <b>CO2</b> Demonstrate Effective Numerical Problem-Solving Techniques.	8 Hrs
RBT Levels:2,3,4         Module-5: Sampling Theory,         Sampling distribution, standard error, Statistical Inference (Hypothesis Testing,         Confidence Intervals), Test of significance for large samples, comparison of large samples, Test of Significance for means of two small samples, Students 't'         distribution, chi-square distribution as a test of goodness of fit.         Textbook4         RBT Levels:2,3,4         IV. COURSE OUTCOMES         CO1         Apply Discrete Math Concepts in Problem-Solving.         CO2         Demonstrate Effective Numerical Problem-Solving Techniques.         CO3         Understand the concept Linear Algebra for Practical Applications.	8 Hrs
RBT Levels:2,3,4Module-5: Sampling Theory, Sampling distribution, standard error, Statistical Inference (Hypothesis Testing, Confidence Intervals), Test of significance for large samples, comparison of large samples, Test of Significance for means of two small samples, Students 't' distribution, Chi-square distribution as a test of goodness of fit.TextbookIV. COURSE OUTCOMESCO1Apply Discrete Math Concepts in Problem-Solving.CO2Demonstrate Effective Numerical Problem-Solving Techniques.CO3Understand the concept Linear Algebra for Practical Applications.CO4Apply Statistical Analysis for Informed Decision-Making in Computer Scie	8 Hrs

PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	<b>S</b> 4	
C01	2	2												1			
C01	$\frac{2}{2}$	$\frac{2}{2}$												1	1		
CO3	2	2												2	1		
CO4	2	2												2			
					VI.	Ass	essmei	nt Deta	ails (C	TE &	SEE)				1	1	
Gener	ral R	ules:	Refer	Annex	ure sec	ction	1										
Asses	Assessment Details (both CIE and SEE) : Refer Refer Annexure section 1																
Seme	Semester End Examination (SEE): Refer Annexure section 1																
	VII. Learning Resources																
VII(a)	): Te	xtboo	ks:														
Sl. No.	Title	e of tl	ne Boo	ok			Name	e of the	e auth	or	Edit Yea	tion a r	nd N p	lame ( ublish	of the ner		
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	App	licatio	ons				& Mc										
3	Intro	ducti	on to	Probal	bility a	and	Ross,	S. M			201'	7	A	caden	nic Pre	ess	
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4	Info	rmatio	on The	eory, I	nferer	nce,	David	Mack	Kay		2003	3	C	ambri	dge		
_	and	Learn	ing A	lgorith	nms			~					U	nivers	sity Pr	ess	
5	Num	nerica	I Meth	nods fo	or		Amos	Gilat,			201	/	W	lley			
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VII(D	): we	ed lin	ks an		eo Leo	ctur	es (e-k	esour	ces):								
1. http	s://ocv	w.mit.	edu/co	urses/1	.8-06-li	near-	algebra-	spring-2	2010/								
2. http	s://wv	vw.kha	anacade Infor	emy.org	g/math	/stat	istics-pro	bability ,	y huile a			Oodee	COTA				
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Khan	Acad	emy,	Comp	outer S	cience	e Di	screte I	Mather	natics	: https	://sup	oort.kł	nanaca	ademy	.org/h	c/en-	
us/cor	us/community/posts/201470924-Discrete-Mathematics																
VIII:	VIII: Activity Based Learning / Practical Based Learning/Experiential learning:																
Activi	Activity Based Learning (Suggested Activities in Class)/ Practical Based learning																
• Quiz	zzes																
۰ م I																	

- Assignments
- Seminar







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#### Master of Computer Applications (MCA)

Semester:	Ι	Course Type:		IPCC									
Course Tit	le: Ope	rating Systems -	Linux	Σ.									
Course Cod	le:	23MCAI102		Credits: 4									
Teach	ing Ho	urs/Week (L:T:	:P:O)	3:0:2:0	Total Hours:	40 hours+ Lab sessions							
CIE Marks	s: 50	0 SEE Ma	arks:	50	Total Marks:	100							
SEE Туре	:	Т	heory	ory <b>Exam Hours:</b> 3Hrs									
I. Course Objectives:													

- Understand the fundamental concepts and principles of operating systems, with a focus on Linux.
- Gain hands-on experience in working with Linux-based systems.
- Develop proficiency in system administration tasks and troubleshooting on Linux platforms.
- Explore advanced features of the Linux operating system, such as shell scripting and security.
- Acquire the skills necessary to deploy and manage Linux servers in a networked environment.

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

# **III. COURSE CONTENT**

	III(a). Theory PART	
Module Comma	<b>-1:</b> Overview of Linux OS, Linux File System Hierarchy, Basic Shell nds, Process Management in Linux, Introduction to System Administration	8 Hrs
Textboo	ok1: Chapter1- 4	
RBT Le	evels: 2	
Module and Serv	-2: Advanced File Operations, Shell Scripting Basics, System Initialization vices, Linux Networking Basics, Process Automation and Cron Jobs.	8 Hrs
Textboo	ok1 : Chapter 4 - 7	
RBT Le	evels: 2,3	
Module Best Pra	-3: Linux Security Principles, Firewalls and Network Security, Security actices, Encryption and Data Security, User Access Control.	8 Hrs
Textboo	ok 2: Chapter 8, 9, 10, 14	
RBT Le	evels:2,3,4	
Module Introduc	-4: Introduction to Linux Servers, Web and FTP Servers, Database Servers, etion to Virtualization, Managing Virtual Machines.	8 Hrs
Texboo	k2: Chapter 1,6, 10, 11	
RBT Le	evels:2,3,4	
Module	-5: System Logging and Log Analysis, Performance Monitoring and Tuning	8 Hrs
Trouble	shooting Network Issues, Backup and Recovery Strategies, Case Studies	
Textboo	ok 1: Chapter 11-15	
Texboo	k2: Chapter 15-19	
RBT L	evels:2,3,4	
	III(b). PRACTICAL PART	
Sl. No.	<b>Experiments / Programs / Problems</b>	
1	Write a shell script to display the current date and time.	
2	Create a script that lists all files in a specified directory along with their size	es.
3	Develop a shell script that automates the backup of a designated directory.	
4	Write a script to configure a static IP address on a Linux machine.	
5	Create a script to retrieve and display information about the network interfa system.	ces on a
6	Develop a script that changes the permissions of a file or directory based on	user input.
7	Set up a basic firewall using iptables to allow or block specific ports.	
8	Configure and deploy an Apache web server to serve a simple webpage.	
9	Write a script to check and display the available disk space on the system.	
10	Develop a script that adds a new user to the system and sets up a home direct	ctory.
11	Create a script that monitors a specific log file and alerts the user if certain of	conditions are
12	met. Implement a script that allows the user to input a process name and terminal	tes all
14	instances of that process.	us all

13	V lo	Write a script that continuously monitors system resources (CPU, memory, disk) and logs the information at regular intervals.														
		<u> </u>			]	IV. CO	DURS	E OL	TCO	MES						
СО	1 U	Inders	tand I	Linux	OS fu	ndame	entals.									
CO	2 A	dmin	ister L	inux :	system	ns prof	ficientl	y.								
CO	<b>3</b> D	evelo	p shel	l scrip	ts for	autom	nation.									
CO	4 C	onfig	ure an	d mar	age L	inux s	ervers.									
				V. C	D-PO-	-PSO	MAPI	PING	(marl	к Н=3	; M=2	; L=1)	)			
PO/PS	5 1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	S4
C01	2	1	1										1			
CO2	CO2         2         2         1         1           CO3         2         1         1         2															
C03	CO3     2     1     1     2       CO4     2     1     1															
	CO4         2         1         1           VI.         Assessment Details (CIE & SEE)         1															
Gene	ral R	ules:	Refer 2	Annex	ure sec	ction 2										
Asses	smen	t Det	ails (b	oth C	IE an	d SEI	E): Ref	fer An	inexure	e sectio	on 2					
Seme	ster l	End E	xami	natio	n (SEI	E): Re	fer Ann	exure	sectio	n 2						
	VII. Learning Resources															
VII. Dearning Resources																
Sl.	Titl	e of tl	he Bo	ok I	Name	of the	autho	r	Ed	lition	and Y	'ear		Nam pul	ne of t blishe	he r
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Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

## Master of Computer Applications (MCA)

Semester:	Ι	Course Type:		IPCC									
Course Tit													
Course Coo	le:	23MCAI103		<b>Credits:</b> 4									
Teach	ing Ho	urs/Week (L:T:	:P:O)	3:0:2:0	3:0:2:0 <b>Total Hours:</b> 40 Hrs + I sessions								
CIE Mark	s: 5	0 SEE Ma	arks:	50	Total Marks:	100							
SEE Type	e:	Т	heory	,	Exam Hours:	3 Hrs							
I. Course Objectives:													

- Demonstration of application layer protocols
- Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
- Explain routers, IP and Routing Algorithms in network layer
- Discuss transport layer services and understand UDP and TCP protocol.
- Illustrate concepts of Multimedia Networking, Security and Network Management

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

- 3. Encourage collaborative (Group Learning) Learning in the class.
- 4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

# **III. COURSE CONTENT**

## III(a). Theory PART

**Module-1:** Applications, Requirements, Network Architecture, Implementing Network Software, Performance.

#### 8 Hrs

# **Textbook: Chapter**

**RBT Levels: 1** 

Module 4B/5B).	<b>2:</b> Perspectives on Connecting, Encoding (NRZ, NRZI, Manchester, Framing, Error Detection, Reliable Transmission, Ethernet and Multiple	8 Hrs							
Access I	Vetworks (802.3), Wireless.								
Textboo	k : Chapter								
RBT L	evels: 1,2								
Module Bridgin among	e-3: Internetworking and Advanced Internetworking Switching and g, Basic Internetworking (IP), Routing, The Global Internet, Routing Mobile Devices	8 Hrs							
Textboo	k :								
RBT L	evels:2,3,4								
Module (UDP), Control	e-4: End-to-End Protocols and Congestion Control Simple Demultiplexer Reliable Byte Stream (TCP), Queuing Disciplines, TCP Congestion , Congestion-Avoidance Mechanisms k:	8 Hrs							
RBT L	evels:2.3.4								
Module Key Pre	e-5: Network Security and Applications Cryptographic Building Blocks, e-distribution, Firewalls, Traditional Applications, Infrastructure Services.	8 Hrs							
Textboo	k : Chapter								
RBT L	evels:2,3,4								
III(b). PRACTICAL PART									
Sl. No.	Experiments / Programs / Problems								
1	Write a program for distance vector algorithm to find suitable path for transmission.								
2	Using TCP/IP sockets, write a client-server program to make the client send the file								
	name and to make the server send back the contents of the requested file if	present							
3	Write a program for Hamming code generation for error detection and corre	ection							
4	Write a program for congestion control using leaky bucket algorithm								
5	Simulate a three nodes point — to — point network with duplex links betw the queue size and vary the bandwidth and find the number of packets drop	veen them. Set ped.							
6	<ul> <li>Simulate the network with five nodes n0, n1, n2, n3, n4, forming a star topology. The node n4 is at the centre. Node n0 is a TCP source, which transmits packets to node n3 (a TCP sink) through the node n4. Node n1 is another traffic source, and sends UDP packets to node n2 through n4. The duration of the simulation time is 10 seconds</li> </ul>								
7	Simulate to study transmission of packets over Ethernet LAN and determined of packets drop destination	ne the number							
8	Simulate working of multicasting routing protocol and analyze the thro network/protocol	ughput of the							
9	Simulate the different types of internet traffic such as FTP and TELNET	over a wired							
	network and analyze the packet drop and packet delivery ratio in the network	rK							
	Apply the basic concepts of networking and to analyze different param	neters such as							
CO1	bandwidth, delay, throughput of the networks for the given problem.								
CO2	Apply different techniques to ensure the reliable and secured communicat	ion in wired							

-																
	aı	nd wii	reless	com	municati	on										
CO	3 A	nalyz	e the	netwo	rking co	ncep	ots of	TCP/I	P for	wired	d and w	vireles	s com	poner	nts	
CO	4 Id	lentify	y the i	ssues	of Trans	port	layer	to an	alyze	the co	ongesti	on cor	ntrol r	necha	nism	
				V. C	D-PO-P	<b>SO</b> 1	MAP	PING	(mar	k H=	3; M=2	2; L=1	)			
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0	2	1	2											1	-	
CO1	2	1	$\frac{2}{2}$											2	-	
CO3	1	2	2											1	-	
CO4	1		1											1		
VI. Assessment Details (CIE & SEE)																
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Asses	smen	t Det	ails (b	ooth C	IE and	SEF	E): Re	fer An	nexure	e secti	ion 2					
Seme	ster I	End E	xami	natior	n (SEE):	Ref	er An	nexure	sectio	on 2						
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• Quiz	zzes			0 (~ 4	00-3.00	_ • •		01		0			B	,		
• Assi	Assignments															

• Seminar



BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060 Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semester:	Ι	<b>Course Type:</b>			PCC				
Course Title	e: Prog	gramming in Pyt	hon						
Course Code	e:	23MCAT104			Credits:	3			
Teachi	ng Ho	urs/Week (L:T:	:P:O)	3:0:0:0	Total Hours:	40			
CIE Marks	: 5	0 SEE Ma	arks:	50	Total Marks:	100			
SEE Type	:	Т	heory		Exam Hours:	3 Hrs			
		I.		Course Objectives:					
<ul> <li>Establish a strong foundation in Python programming from basic to intermediate concepts.</li> <li>Develop practical programming skills through hands-on exercises and projects.</li> <li>Understand Python's syntax, data structures, and best practices for coding.</li> <li>Explore intermediate topics like file handling, error handling, and Python modules.</li> <li>Apply Python programming skills to solve real-world problems.</li> </ul>									
II. Teaching-Learning Process (General Instructions):									
These are sample Strategies, which teachers can use to accelerate the attainment of the various									
<ol> <li>Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> </ol>									
2. Use of Video	o/Anin	nation to explain	funct	ioning of various cor	cepts.				
3. Encourage c	ollabo	rative (Group Le	arning	g) Learning in the cla	SS.				
4. Ask at least thinking.	three H	HOT (Higher ord	er Thi	nking) questions in t	he class, which pro	motes critical			
5. Adopt Probl thinking skills than simply rec	em Ba such a call it.	sed Learning (PI s the ability to de	BL),wl esign,	hich fosters student's evaluate, generalize,	Analytical skills, c and analyze inform	levelop design ation rather			
6. Introduce To	pics in	n manifold repres	sentati	ions.					
7. Show the dif	ferent	ways to solve th	e sam	e problem and encou	rage the students to	come up with			
their own creat	ive wa	sys to solve them							
8. Discuss how improve the stu	every dent's	concept can be a understanding.	applie	d to the real world ar	nd when that's possi	ble, it helps to			
		III	. CO	URSE CONTENT					
Module-1: Intr	oducti	on to Python, In	troduc	ction to Python and it	s applications,	8 Hrs			
variables, data	ion env types,	and operators, C	, Jupy Control	ter notebooks), Pythe l flow: conditional sta	on basic syntax: atements and loops.				
Textbook1: C	hapter	: 1-4							

Module-2: Data Structures in Python, Lists, tuples, and sets, Dictionaries and their	8 Hrs									
applications, Working with strings and string manipulation, List comprehensions										
and generators.										
Taythaak1: Chapter 5.7										
RBT Levels: 2,3										
Module-3: Functions and Modules, Defining and calling functions, Scope and	8 Hrs									
lifetime of variables, Introduction to Python modules, Importing and using modules.										
Textbook1: Chapter 8-10										
RBT Levels:2,3,4										
Module-4: File Handling and Error Handling, Reading and writing files in Python	8 Hrs									
Understanding exceptions and error handling, Try-except blocks for robust code,										
Using the with statement for file handling.										
Textbook3: Chapter 11-14										
RBT Levels:2.3.4										
<b>Module-5:</b> Intermediate Python Concepts, Introduction to regular expressions,	8 Hrs									
Working with dates and times, Introduction to Python's standard library, Overview										
of third-party libraries (e.g., NumPy, Pandas).										
Textbook2 : Chapter 1-3										
RBT Levels:2,3,4										
IV. COURSE OUTCOMES										
<b>CO1</b> Apply practical programming skills through hands-on exercises and projects.	•									
<b>CO2</b> Understand Python's syntax, data structures, and coding best practices.										
<b>CO3</b> Explore intermediate topics like file handling, error handling, and Python mo	odules.									
<b>CO4</b> Apply Python programming skills to solve real-world problems effectively.										
CO4 Apply I yaton programming skins to solve real world problems effectively.										
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)		C 4								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)           PO/PS         1         2         3         4         5         6         7         8         9         10         11         12         S1         S2	2 S3	54								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)           PO/PS         1         2         3         4         5         6         7         8         9         10         11         12         S1         S2           O <td< td=""><td>2 S3</td><td>54</td></td<>	2 S3	54								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)           PO/PS         1         2         3         4         5         6         7         8         9         10         11         12         S1         S2           O         CO1         2         2         Image: Colored and the second and the seco	2 \$3	54								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)           PO/PS         1         2         3         4         5         6         7         8         9         10         11         12         S1         S2           O         . <td>2 S3</td> <td>54</td>	2 S3	54								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)         PO/PS       1       2       3       4       5       6       7       8       9       10       11       12       S1       S2         O	2 \$3									
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)         PO/PS       1       2       3       4       5       6       7       8       9       10       11       12       S1       S2         O	2 \$3	1								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)         PO/PS       1       2       3       4       5       6       7       8       9       10       11       12       S1       S2         O	2 \$3	1								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)         PO/PS       1       2       3       4       5       6       7       8       9       10       11       12       S1       S2         O       Image: Color of the state of	2 \$3	1								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)         PO/PS       1       2       3       4       5       6       7       8       9       10       11       12       S1       S2         O       1       2       3       4       5       6       7       8       9       10       11       12       S1       S2         O       1       2       2       1       1       1       1       1         CO1       2       2       1       1       1       1       1       1         CO2       2       2       1       1       1       1       1       1         CO3       2       2       1	2 \$3	54       1								
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)         PO/PS       1       2       3       4       5       6       7       8       9       10       11       12       S1       S2         O       Image: Color of the stress of t	2 \$3	54       1								

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher							
1	Python Crash Course	Eric Matthes	2019	No Starch Press, 2019							
2	Fluent Python	Luciano Ramalho	2015	O'Reilly Media							
VII(b): Web links and Video Lectures (e-Resources):											
1.	<ol> <li>FreeCodeCamp: Learn Python - Full Course for Beginners: https://www.youtube.com/watch?v=ROjZy1WbCIA: https://www.youtube.com/watch?v=ROjZy1WbCIA</li> </ol>										
2.	<ol> <li>Crash Course Python by FreeCodeCamp: https://www.freecodecamp.org/news/tag/python/: https://www.freecodecamp.org/news/tag/python/</li> </ol>										
3.	Python for Everybody Spe https://www.coursera.org/ python	ecialization by University of Mi specializations/python: https://v	ichigan on Cou www.coursera.	rsera: org/specializations/							
4.	Automate the Boring Stuff https://automatetheborings	f with Python by Al Sweigart: stuff.com/: https://automatetheb	ooringstuff.com	n/							
VIII:	Activity Based Learning /	Practical Based Learning/Ex	periential lear	rning:							
Activ	ity Based Learning (Suggest	ed Activities in Class)/ Practica	al Based learni	ng							
• Qui	zzes										
• Ass	ignments										
• Sem	ninar										



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Recognized by UGC, New Delhi with 2(f) & 12 (B)

# Master of Computer Applications (MCA)

Semester:	1	Co	urse Type:			PCC					
Course Title: Database Systems & Modelling											
Course Code: 23MCAT105					Credits: 3						
Teaching Hours/Week (L:T:P:O)					3:0:0:0	Total Hours:	40				
CIE Marks	Marks: 50 SEE Marks:		50	Total Marks:	100						
SEE Type			Т	heory	ry Exam Hours: 3						
I Course Objectives:											

- Grasp fundamental concepts of Database Management Systems (DBMS).
- Apply SQL for data retrieval and manipulation in RDBMS.
- Understand advanced database concepts like indexing and normalization.
- Create Entity-Relationship Diagrams (ERD) for effective data modelling.
- Explore and implement NoSQL databases for varied data requirements.

## **II. Teaching-Learning Process (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

COURSE CONTENT	
Module-1:Introduction to Database Management Systems (DBMS) Definition and	8 Hrs
importance of DBMS Data models: relational, hierarchical, and network	
Components of a DBMS Types of databases: operational, analytical, distributed	

Textbook: Chapter 1, 2, 3											
RBT Levels: 2											
Module-2:Relational Database Management System (RDBMS) Relational modelconcepts SQL: Data Definition Language (DDL) and Data Manipulation Language(DML) Normalization and denormalization Integrity constraints and keys	8 Hrs										
Textbook : Chapter 1, 2											
RBT Levels: 2, 3											
Module-3:Advanced Database Concepts Indexing and hashing Transactionmanagement and concurrency control Recovery and backup strategies Queryoptimization and execution plans	8 Hrs										
Textbook : Chapter 6, 18											
RBT Levels:2,3,4											
Module-4:Data Modeling and Entity-Relationship Diagrams (ERD) Basics of data modeling Entity-Relationship model Cardinality and relationships Attribute types and constraints	8 Hrs										
Textbook: Chapter 1, 5											
RBT Levels:2,3,4											
Module-5:Advanced Data Modeling and NoSQL Databases Advanced ERD concepts Database normalization techniques Introduction to NoSQL databasesComparison of SQL and NoSQL databases	8 Hrs										
Textbook : Chapter 1, 4, 8, 9											
RBT Levels:2,3,4											
IV.COURSE OUTCOMES											
CO1 Demonstrate proficiency in using and managing Database Management Syster (DBMS).	ems										
CO2 Execute SQL queries and normalize databases for efficient data management	t.										
CO3 Implement advanced database techniques, including indexing and query optim	mizatio	n.									
<b>CO4</b> Design effective data models using Entity-Relationship Diagrams (ERD) and databases.	l NoSQ	L									
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)											
PO/P         1         2         3         4         5         6         7         8         9         10         11         12         S1         S2	<b>S</b> 3	S4									
CO1         2         1         1         2		<u> </u>									
CO2 2 1 1 1	1										
CO3     2     1     1     2											
CO4         2         1         1         1											
VI. Assessment Details (CIE & SEE)		<u>.</u>									
General Rules: Refer Annexure section 1											
Assessment Details (both CIE and SEE) : Refer Annexure section 1											
Semester End Examination (SEE): Refer Annexure section 1											

	VII. Learning Resources										
VII(a	VII(a): Textbooks:										
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher							
1	Database System Concepts	AviSilberschatz Henry F. Korth S. Sudarshan	7 <sup>th</sup> edition, 2019	McGraw-Hill							
VII(b	VII(b): Reference Books:										
1	Database Design	Adrienne Watt and	2nd Edition, 2021	BCampus,							
	(E-book, Online Read)	Watt, Adrienne		OpenEd							
VII(c	e): Web links and V	ideo Lectures (e-Resou	irces):								
1.http	s://www.coursera.or	g/learn/advanced-data-i	nodeling								
2. http	ps://www.coursera.o	rg/projects/database-cre	ation-and-modeling-using-my	ysql-							
work	bench3.https://www.	udemy.com/course/data	-modelling-and-relational-dat	tabase-design/							
VIII:	Activity Based Lear	ning / Practical Based L	earning/Experiential learning	:							
Activ	ity Based Learning (	Suggested Activities in	Class)/ Practical Based learni	ng							
• Qui	zzes										
• Ass	ignments										

• Seminar



Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semes	ter:	1	Co	urse Type:			PCCL				
Course 7	'itle: P	ythor	n Prog	gramming I	Labora	tory					
Course	Code	:	23	MCAL106		Credits: 2					
Т	eachin	g Ho	urs/\	Week (L:T:	:P:O)	0:2:2:0	Total Hours:	Lab sessions			
CIE M	arks:	5	0	SEE Ma	arks:	50	Total Marks:	100			
SEE	SEE Type: Laborate				oorato	ry	Exam Hours:	3			
I. Course Objectives:											
<ul> <li>Enhance problem-solving capabilities by tackling real-world scenarios with Python programming.</li> <li>Sharpen Python programming skills through practical exercises covering diverse concepts.</li> <li>Apply theoretical Python concepts to create functional programs, reinforcing understanding.         II. Teaching-Learning Process (General Instructions):     </li> </ul>											
<ul> <li>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</li> <li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> </ul>											
2. Use of	Video	/Anin	natio	n to explain	functi	ioning of various cor	cepts.				
3. Encour	age co	llabo	rative	e (Group Le	arning	g) Learning in the cla	.ss.				
4. Ask at thinking.	least tl	nree F	łOT	(Higher ord	er Thi	nking) questions in t	he class, which pr	omotes critical			
5. Adopt thinking s than simp	Proble kills s ly reca	m Ba uch a all it.	sed L s the	earning (PI ability to de	BL),wl esign,	hich fosters student's evaluate, generalize,	Analytical skills, and analyze infor	develop design mation rather			
6. Introdu	ce Top	pics ir	n mai	nifold repre	sentati	ons.					
7. Show t	he diff	erent	ways	s to solve th	e sam	e problem and encou	rage the students	to come up with			
their own	creativ	ve wa	ys to	solve them	l <b>.</b>						
8. Discu improve	ss how the stu	v ever udent	y cor 's un	cept can be	applie	ed to the real world a	nd when that's po	ssible, it helps to			
		~		III. Prac	ctical (	Component - Exper	iments				
	Basic ( Impler	Calcu	lator	: nle calculat	or that	can perform basic a	rithmetic operatio	ne			
2	List O Create sum of	perati a Pyt	ons: thon	program to in a list.	perfor	m operations like so	ting, reversing, ar	nd finding the			
3	String	Mani	pulat	ion:							

	Develop a program that manipulates strings, including tasks like reversing, counting characters, and checking for palindromes.
4	Function Practice:
	Write Python functions to calculate factorial, find prime numbers, and generate Fibonacci series.
5	File Handling:
	Create a program that reads data from a file, performs some operations, and writes the results to a new file.
6	Exception Handling:
	Develop a program that uses try-except blocks to handle exceptions, ensuring robust error handling.
7	Module Exploration:
	Explore and use built-in Python modules such as math, random, and datetime in practical
0	scenarios.
8	Write a program that utilizes regular expressions to validate and manipulate strings.
9	Date and Time Operations:
	Develop a Python program that performs operations on dates and times, such as calculating age and time differences.
10	List Comprehensions: Use list comprehensions to create and manipulate lists efficiently.
11	Dictionary Operations:
	Implement a program to perform operations on dictionaries, including merging and sorting.
12	Recursive Functions:
	Write recursive functions to solve problems like calculating factorials and Fibonacci
13	Reading and Writing Files:
15	Create a program that reads data from one file, processes it, and writes the results to another file
14	Advanced String Handling:
	Build a program that utilizes advanced string handling functions, such as formatting and regular expressions.
15	Working with CSV Files:
	Develop a program that reads data from a CSV file, performs analysis, and presents the results.
16	Using Third-Party Libraries:
	Explore and use third-party libraries like NumPy or Pandas for basic data manipulation.
17	Web Scraping: Write a program that extracts information from a website using web scraping techniques.
18	Database Interaction:
	Develop a program that interacts with a simple database, performing operations like insertion, retrieval, and updating.
19	API Consumption: Create a Puthon program that consumes data from a public API and procents it is a
	meaningful way.
20	Capstone Project:
	Combine multiple concepts learned throughout the course to create a comprehensive Python program solving a real-world problem
	r juion program, sorving a rour world problem.

IV. COURSE OUTCOMES																
C01	D	Develo	p effe	ctive c	lebugg	ging sl	kills fo	or idei	ntifyin	ig and	fixing	codir	ng erro	ors.		
CO2	A	Apply third-party Python libraries for efficient and practical problem-solving.														
CO3	S	Strengthen self-reliance in problem-solving by tackling coding challenges individually.														
CO4	E w	Demonstrate practical understanding by integrating concepts into a final project for real- world scenarios.														
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																
PO/PS O	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	S4
CO1	2	2											1			
CO2	2	2												2		
CO3	2	2												2		
CO4	2	2	2													1
					VI	. Asse	ssmer	nt Det	ails (O	CIE &	SEE)	)				
Genera	al R	ules:	Refer .	Annexu	ire sec	tion 3										
Assess	mer	nt Det	ails (b	ooth C	IE an	d SEI	E): Re	efer Aı	nnexur	e secti	on 3					
Semest	ter l	End E	xami	nation	(SEI	E): Ret	fer An	nexure	sectio	n 3						



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Semes	nester: 1 Course Type: PCCL							
Course T	'itle: [	Databa	ise S	ystems & N	Iodelii	ng Laboratory		
Course	Course Code:			MCAL107			Credits:	2
Teaching Hours/Week (L:T:P:O)						0:2:2:0	Total Hours:	40
CIE M	[arks:	5	)	SEE Ma	arks:	50	Total Marks:	100
SEE	Туре:			Lal	oorato	ry	Exam Hours:	3
				I	, (	Course Objectives:		
• Insta	ll and o	config	gure	a Database I	Manag	gement System (DBN	AS) software.	
Perfc	orm SQ	QL op	erati	ons and data	base 1	management tasks.		
Desig	gn a da	atabas	e mo	odel for vari	ous us	e cases.		
II. Teaching-Learning Process (General Instructions):								
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.								
1. Lecture teaching	er metl nethoo	hod (I ds cou	L) ne Ild b	ed not to be e adopted to	only t attain	traditional lecture me	thod, but alternati	ve effective
2. Use of	Video	/Anin	natio	n to explain	funct	ioning of various cor	ncepts.	
3. Encour	age co	ollabo	rativ	e (Group Le	arning	g) Learning in the cla	SS.	
4. Ask at thinking.	least tl	hree F	IOT	(Higher ord	ler Thi	inking) questions in t	he class, which pro	omotes critical
5. Adopt thinking s than simp	5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it							
6. Introdu	ice Toj	pics ir	n ma	nifold repre	sentati	ions.		
7. Show t	he diff	ferent	way	s to solve th	e sam	e problem and encou	rage the students t	o come up with
their own	creati	ve wa	ys to	o solve them	l <b>.</b>			
8. Discu improve	ss how the stu	v ever	y co 's un	ncept can be derstanding	e appli	ed to the real world a	and when that's pos	ssible, it helps to
	III. Practical Component - Experiments							
1	Install	l a DB	MS	software (e.	g., M	ySQL, Oracle, or Pos	stgreSQL)	
2	Set up	o a sar	nple	employee d	atabas	se and execute basic s	SQL queries	
3	Write	SQL	quer	ies for data	retriev	al and manipulation.		
4	Perform normalization on a given set of tables							

5	Implement indexing and hashing techniques															
6	Design and execute transactions with concurrency controlOptimize SQL queries															
7	Demonstrate SQL query optimization on bank transaction database															
8	Create an ERD for a given scenario, identify cardinality and relationships and apply attribute constraints															
9	Set up and work with a NoSQL database (e.g., Postgres)															
10	D	Design	and i	mplen	nent a	schen	na in a	NoS	QL da	tabase						
IV. COURSE OUTCOMES																
C01	CO1 Demonstrate proficiency in DBMS installation and setup procedures.															
CO2	O2 Execute SQL queries for data manipulation and retrieval.															
CO3	<b>CO3</b> Apply normalization techniques to ensure data integrity.															
CO4	D	esign	and in	nplem	ent a	datab	ase scl	nema	using	Entity	-Relat	tionshi	p Dia	grams	(ERD	<b>)</b> ).
	•			V. CO	<b>)-PO-</b>	PSO 1	MAPI	PING	(mark	: H=3;	M=2	; L=1)				
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	S4
$\frac{0}{0}$	2	2											1			
CO1 CO2	$\frac{2}{2}$	2											1	2		
CO3	2	2												2		
CO4	2	2	2													1
					VI	. Asse	essmer	nt Det	ails (O	CIE &	SEE	)				
Genera	ıl R	ules:	Refer .	Annex	ure sec	ction 3										
Assess	nen	t Det	ails (b	oth C	IE an	nd SE	E): Re	fer An	nexure	e sectio	on 3					
Semest	er I	End E	xami	nation	(SEI	E): Re	efer An	nexur	e sectio	on 3						



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## Master of Computer Applications (MCA)

Semester:	Ι	Course Type:	AEC							
Course Title: Cyber Security Essential										
Course Cod	le:	23MCAAE1	1		Credits:	2				
Teach	ing Ho	urs/Week (L:	<b>Г:Р:О</b> )	0:1:2:1	Total Hours:	40				
CIE Marks	s: 50	0 SEE N	larks:	50	Total Marks:	100				
SEE Type	e: The	ory/practical/o	ther ass	essment (Practical)	Exam Hours:	2				
I. Course Objectives:										

#### 1.Introduction to Cybersecurity:

Understand the importance of cybersecurity in today's digital landscape.

Define key terms and concepts related to cybersecurity.

#### 2.Networking Fundamentals:

Gain knowledge of basic networking protocols, devices, and services.

Understand common network vulnerabilities and attacks.

#### 3.Legal and Ethical Considerations:

Explore legal and ethical aspects of cybersecurity.

Understand the importance of compliance with regulations and standards.

#### 4. Emerging Threats and Trends:

Stay updated on the latest cybersecurity threats and trends.

Discuss the evolving nature of cyber threats and the importance of continuous learning.

#### 5. Hands-on Labs and Practical Exercises:

Provide hands-on experience through labs and practical exercises.

Allow students to apply theoretical knowledge to real-world scenarios.

#### **II. Teaching-Learning Process (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analysed information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come

up with their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

# **III. COURSE CONTENT**

# III(a).Theory PART

Module-1	Hrs 8							
Heading: Essential Security Principles								
1. Define essential security principles.								
2. Explain common threats and vulnerabilities.								
3. Explain access management principles.								
4. Explain encryption methods and applications.								
Textbook: Chapter: sections								
1. Network Security Essentials, 6e - by William Stallings (Author)								
Pre-requisites (Self Learning)								
RBT Levels: L2& L3								
Module-2	Hrs 8							
Heading: Basic Network Security Concepts								
1. Describe TCP/IP protocol vulnerabilities.								
2. Explain how network addresses impact network security.								
3. Describe network infrastructure and technologies.								
4. Set up a secure wireless SoHo network.								
5. Implement secure access technologies.								
Textbook: Chapter: sections								
Network Security Essentials, 6e - by William Stallings (Author)								
Pre-requisites (Self Learning): Security Principals								
RBT Levels: L2& L3								
Module-3	Hrs 8							
Heading: Endpoint Security Concepts								
1. Describe operating system security concepts.								
2. Demonstrate familiarity with appropriate endpoint tools that gather security a	ssessment information.							
3. Verify that endpoint systems meet security policies and standards.								
4. Implement software and hardware updates.								
5. Interpret system logs.								
6. Demonstrate familiarity with malware removal.								
Textbook:Chapter:sections								
1. Endpoint Security - by Mark Kadrich (Author)								
Pre-requisites (Self Learning): Network Basics								
RBT Levels: L2 & L 3								
Module-4	Hrs 8							
Heading:Vulnerability Assessment and Risk Management								
1. Explain vulnerability management.								
2. Use threat intelligence techniques to identify potential network vulnerabilities	8.							
3. Explain the importance of disaster recovery and business continuity planning.								
Textbook:Chapter:sections								
1. Security Risk Management Program from the Ground Up - by Evan Wheeler (A	uthor)							
Pre-requisites (Self Learning): System Security								

RBT L	evels:	L3							
Module	-5					Hrs	8		
Heading:Incident Handling         1. Monitor security events and know when escalation is required.         2. Explain digital forensics and attack attribution processes.         3. Explain the impact of compliance frameworks on incident handling.         4. Describe the elements of cybersecurity incident response. <b>Textbook:Chapter:sections</b> 1. Incident Handling and Response: A Holistic Approach for an efficient Security Incident Management.         - by Jithin Alex (Author)         Pre-requisites (Self Learning): Vulnerability Management									
KBI L	evels:	L2 & L3		PRACTICAL PAR	Г				
			<b>III(b):</b>		•				
Sl. No.			F	Experiments / Progr	ams				
1	Wel	osite Penetration	Festing						
2	Coo	kie Injection Test	ing						
3	Working with Bash Scripting								
4	Working with Virtual Machine and Kali Linux								
5	Working with Various tools like, Burp Suite & Port Swigger.								
6	6 Working with Sender Policy Frame Work								
IV. COURSE OUTCOMES									
CO1	Desc vecto	bribe the fundame	ntals of cyberse	curity, including the	threat lands	cape and c	ommon at	tack	
CO2	Deve	elop proficiency in	n network secur	ity principles, protoc	ols, and bes	st practices			
CO3	Inter	pret knowledge o	f cryptography	and its role in securin	ng data and	communic	ations.		
CO4	Eval	uate to implemen	t and manage ac	ccess controls to safe	guard system	ms and sen	sitive info	rmation.	
CO5	Desi requ	gn a small project irements to ensure	using emerging e effective defer	g cybersecurity trend nce strategies.	s, technolog	gies, and co	ompliance		
		V.	CO-PO-PSO N	AAPPING(mark H=	3; M=2; L=	:1)			
PO/PS	0	1	2	3	4	PEO 1	PEO 2	PEO 3	
C01	) >	2		2		2			
C02	3	2		2		2			
CO4	1	2		2		_	2		
COS	5	2		2				2	
			VI. Assess	ment Details (CIE &	& SEE)				
General	Rule	s: Refer Annexure	section 4						
Continu	ous I	nternal Evaluation	on (CIE): Refe	r Annexure section 4					
Semeste	r End	l Examination (S	EE): Refer Ann	exure section 4					
			VII.	Learning Resource	es				
				Page <b>23</b>					

## VII(c): Web links and Video Lectures (e-Resources):

- 1. Cyber Security Full Course https://www.youtube.com/watch?v=lpa8uy4DyMo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4
- 2. <u>https://www.youtube.com/watch?v=hXSFdwIOfnE</u>

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Working with Kali Linux, Penetration Testing, SQL Injection, Cookie Injection etc



Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

# Master of Computer Applications (MCA)

Semester:	Ι	Co	urse Type:	MAG	2				
Course Title: Basics of Programming & Computer Organization									
Course Code	:	23	MCAM108		Credits: -				
Teachi	ng Ho	urs/\	Week (L:T:	<b>P:O</b> )	2:2:0:0	Total Hours:	40		
CIE Marks:	5	0	SEE Ma	rks:	-	Total Marks:	50		
SEE Type:			Т	heory		Exam Hours:	-		
	I. Course Objectives:								
• Master C D			a Eun domor	stalar I	Desision Malting Co	ntrol Structures	mays and		

- Master C Programming Fundamentals: Decision Making, Control Structures, Arrays, and Functions.
- Comprehend Structures, Pointers, Binary Systems, Logic, and Computer Hardware and Software Basics.
- Develop Proficiency in Applying C Programming and Utilizing Pointers Effectively.
- Apply Binary Systems, Logic, and Understand Computer Hardware and Software Basics in Problem-Solving.

# **II. Teaching-Learning Process (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

- 2. Use of Video/Animation to explain functioning of various concepts.
- 3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

# **III. COURSE CONTENT**

Module-1:C Programming: decision making, control structures and arrays C	8 Hrs
Structure, Data Types, Input-Output Statements, Decision making with if statement,	
simple if statement, the ifelse statement, nesting of ifelse statements, the else-if	
ladder, the switch statement, the ?: operator, the 'goto' statement, the break	
statement, programming examples. The while statement, the dowhile statement,	
the 'for' statement, nested loops, jumps in loops, the continue statement,	
programmingexamples.One-dimensionalandtwo-	
dimensionalarrays,declarationandinitializationofarrays,reading,writing and	
manipulation of above types of arrays.	
Textbook1: Chapter 1-3	
RBT Levels: 2	
Module-2:Structures Defining a structure, declaring structure variables, accessing	8 Hrs
structure members, structure initialization, copying and comparing structure	
variables, operations on individual members, array of structures, structures within	
structures, structures and functions, Unions, size of structures.	
Textbook2: Chapter 1-5	
RBT Levels: 2, 3	
Module-3: Pointers in C, Declaring and accessing pointers in C, Pointer arithmetic,	8 Hrs
Functions, Call by value, Call by reference, Pointer as function arguments,	
recursion, Passing arrays to functions, passing strings to functions, Functions	
returning pointers, Pointers to functions, Programming Examples.	
Textbook1: Chapter 4-7	
Textbook1: Chapter 4-7	
Textbook1: Chapter 4-7 RBT Levels: 2,3	
Textbook1: Chapter 4-7         RBT Levels: 2,3         Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital	8 Hrs
Textbook1: Chapter 4-7         RBT Levels: 2,3         Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal	8 Hrs
Textbook1: Chapter 4-7         RBT Levels: 2,3         Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage	8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.	8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4	8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3	8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3Module-5:Basic Structure of Computer Hardware and Software Computer Types,	8 Hrs 8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3Module-5:Basic Structure of Computer Hardware and Software Computer Types, 	8 Hrs 8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3Module-5:Basic Structure of Computer Hardware and Software Computer Types, 	8 Hrs 8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3Module-5:Basic Structure of Computer Hardware and Software Computer Types, 	8 Hrs 8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3Module-5:Basic Structure of Computer Hardware and Software Computer Types, 	8 Hrs 8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3Module-5:Basic Structure of Computer Hardware and Software Computer Types, 	8 Hrs 8 Hrs
Textbook1: Chapter 4-7RBT Levels: 2,3Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.Textbook3: Chapter 1-4RBT Levels:2,3Module-5:Basic Structure of Computer Hardware and Software Computer Types, 	8 Hrs 8 Hrs
Textbook1: Chapter 4-7         RBT Levels: 2,3         Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.         Textbook3: Chapter 1-4         RBT Levels:2,3         Module-5:Basic Structure of Computer Hardware and Software Computer Types, Functional Units, Basic Operational Concepts,Bus structure, Software, Performance, Multiprocessing and Multi computers, Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Interrupts.         Textbook3 : Chapter 7-11         RBT Levels:2,3,4	8 Hrs 8 Hrs
Textbook1: Chapter 4-7         RBT Levels: 2,3         Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.         Textbook3: Chapter 1-4         RBT Levels:2,3         Module-5:Basic Structure of Computer Hardware and Software Computer Types, Functional Units, Basic Operational Concepts,Bus structure, Software, Performance, Multiprocessing and Multi computers, Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Interrupts.         Textbook3 : Chapter 7-11         RBT Levels:2,3,4         IV. COURSE OUTCOMES         OUTCOMES	8 Hrs 8 Hrs
Textbook1: Chapter 4-7         RBT Levels: 2,3         Module-4:Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates.         Textbook3: Chapter 1-4         RBT Levels:2,3         Module-5:Basic Structure of Computer Hardware and Software Computer Types, Functional Units, Basic Operational Concepts,Bus structure, Software, Performance, Multiprocessing and Multi computers, Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Interrupts.         Textbook3 : Chapter 7-11         RBT Levels:2,3,4         IV. COURSE OUTCOMES         CO1       Apply C Programming to Solve Problems: Decision Making, Arrays, and Coop         Effectively Use Pointers in C Programming for Arithmetic Functions and Coop	8 Hrs 8 Hrs 8 Hrs Structures.

CO	3	Apply Binary Systems, Logic, and Grasp Computer Hardware and Software Basics.														
CO	4	Under	stand	and A	pply	Comp	uter H	ardwa	re and	l Softv	ware E	Basics	in P	ractical	Conte	exts.
	V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)															
PO/PS O	1	2	3	4	5	6     7     8     9     10     11     12     5						SI	1 S2	<b>S</b> 3	S4	
CO1	2	1												1		
CO2	2	1												1		
CO3	2	2	1													1
CO4         2         2         1         1           VI<         A gaggement Dataila (CIE         6: SEE)																
General Rules: Refer Annexure section 5																
	Assessment Details (both CIE and SEE) : Defar Appendix a section 5															
Seme	ster l	End E	xami	natior		E): Re:	fer An	nexure	sectio	n 5						
						VII.	Lea	rning	Reso	urces						
VII(a	): Te	xtboo	ks:						·							
Sl.	Titl	o of th	no Roc	sk		Nam	of th	ارت م	hor		Edit	tion a	nd	Name of the		
No.	-				_						Yea	r		publisł	ner	
1	Prog	gramn	ning ir	1 ANS	Ι	C. Ba	lagurı	iswam	ıy		2018			1. McGraw		
														HillEducation		
2	C : 7	The C	omple	te		Herbe	ert Sch	nild			2000	)		1. Mc0	Graw	
	Refe	erence	•											Hill	Educa	tion
	Let	us C				Yash	vantK	anetk	ar		2008	3		BPBP	ublicat	tions
									-							
VII(b	): Re	eferen	ce Bo	oks:												
1	Digi	ital Lo	ogic ar	nd		M.Mo	orris N	Iano			2012	2		Pe	earson	
	Con	nputer	Desig	gn												
2	Con	nnuter	Orga	nizatio	n	Carl I	Hamad	her			5th			Tata	McGr	aw-
-	Con	iputor	orgu	mzan	/11	Zvon	koVra	nesic			editi	on.20	11	Hill		
						Safwa	atZaky	7				,				
VII(c	): W	eb lin	ks and	l Vide	o Le	ctures	(e-Re	sourc	es):							
1 Ha	rvard	's CS4	50's In	troduc	$\frac{1}{2}$	to Con	nuter	Scien	$\frac{ce}{ht}$	tns·//le	earnin	o edx	org/	course/a	course	_
v1:	Harv	ardX-	+CS50	+X/ho	ome		iputer	Selen	00.110	.po.// K	amm	5.0um.	015/	000100/	ouise	
2. MI	Т Ор	enCo	ursewa	are's I	ntrodu	uction	to Coi	npute	r Scie	nce an	d					
Pro	ogram	nming	: https	://ocw	.mit.e	edu/co	urses/	6-00sc	e-intro	ductio	on-to-c	compu	ter-s	science-	and-	
pro	gram	iming.	-spring	g-2011	l/	<b>D</b> /1								•		
	Acti	vity B	ased	Learn	ıng /	Practi	cal Ba	ased I	Learn	ing/Ex	xperie	ntial	lear	ning:		
Activi	ity Ba	ased L	earnir	ıg (Su	ggest	ed Act	ivities	in Cl	ass)/ I	ractic	al Bas	sed lea	ırnir	ıg		
• Qui	zzes	onto														
• Assi	ignin inar	ents														

# **II Semester MCA Syllabus**



Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi

Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B)

## Master of Computer Applications (MCA)

Semester:	II	Сог	arse Type:		РСС						
Course Title: Data Structures & Analysis of Algorithms											
Course Cod	Credits:	3									
Teaching Hours/Week (L:T:P:O)					3:0:0:0	Total Hours:	40 Hrs				
CIE Marks	5: 5	0	SEE Ma	rks:	50 Total Marks:		100				
SEE Type	e:		Т	heory		Exam Hours:	3 Hrs				

## I. Course Objectives:

- Understand fundamental data structures and algorithms.
- Gain practical knowledge in implementing and using data structures.
- Develop algorithmic problem-solving skills.
- Analyze time and space complexity of algorithms.
- Apply data structures and algorithms in solving real-world problems.

## **II.** Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

III. COURSE CONTENT																
Module-1: Introduction to Data Structures and Algorithms, Definition and8Importance of Data Structures, Types of Data Structures: Arrays, Linked Lists, Stacks, Queues, Basics of Algorithm Analysis, Asymptotic Notations: Big O, Omega, Theta, Introduction to Algorithm Design.8																
Textboo	k1: Chapter 1-4	I														
RBT Lev	vels: 2															
Module- Linked L Lists, Co Linked L	8 Hrs															
Textboo	k2: Chapter 3-4	I														
RBT Le	evels: 2, 3, 4															
Module- Definitio Arrays ar	Module-3: Stacks and Queues, Stack: Definition, Operations, Applications, Queue:8 HrsDefinition, Operations, Applications, Implementing Stacks and Queues using Arrays and Linked Lists, Solving Problems using Stacks and Queues.8 Hrs															
Textboo	k2: Chapter 5-6	I														
RBT Le	evels:2,3,4															
Module- AVL Tre Definitio Problems	Module-4: Trees and Graphs, Trees: Binary Trees, Binary Search Trees (BST), AVL Trees, Tree Traversal Algorithms: Inorder, Preorder, Postorder, Graphs: Definitions, Representations, Graph Traversal Algorithms: BFS, DFS, Solving Problems using Trees and Graphs.8 Hrs															
Textboo	k2: Chapter 7-9	I														
RBT Le	evels:2,3,4															
Module- Selection Linear Se Solving I	<b>5:</b> Sorting and Searching Algorithms, Sorting Algorithms: Bubble Sort, Sort, Insertion Sort, Merge Sort, Quick Sort, Searching Algorithms: earch, Binary Search, Analysis and Comparison of Sorting Algorithms, Problems using Sorting and Searching Algorithms.	8 Hrs														
Textboo	k1 : Chapter 2, 6-9	I														
RBT Le	evels:2,3,4															
	IV. COURSE OUTCOMES															
CO1	Expertise in the implementation of advanced data structures.															
CO2	Design and optimize algorithms with a focus on efficiency.															
CO3	Apply dynamic programming and greedy algorithms effectively.															
CO4	Analyze algorithmic performance through comprehensive assessments.															
V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																
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PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	S4
0																
CO1	2	2	1										1			
CO2	2	1												2		
CO3	2	1												2		
CO4	2	2													2	
	VI. Assessment Details (CIE & SEE)															
General Rules: Refer Annexure section 1																
Assessment Details (both CIE and SEE) : Refer Annexure section 1																
Semes	ster H	End E	xami	natior	ı (SEI	E): Ref	fer An	nexure	sectio	n 1						
	VII. Learning Resources															
VII(a)	VII(a): Textbooks:															
Sl. No.	Title	e of th	ne Boo	ok		Name of the author					Edit Yea	tion ai r	nd N F	Name o Dublish		
1	Intro	ducti	on to			Thom	as H.	Corm	en, Cł	narles	2009	Ð	Ν	MIT Pr	ess	
	Algo	orithm	is			E. Le	iserso	n, Ror	hald L	•						
						Rivest, and Clifford Stein										
2	Data	Struc	ctures	and		Micha	ael T.	Good	rich,		2014	1	V	Viley		
	Algo	orithm	ns in J	ava		Rober	rto Ta	massi	a, Mic	hael						
						H. Go	oldwas	sser								
VII(c)	): We	b linl	ks and	d Vide	eo Leo	tures	(e-Re	sourc	es):							
1. F B 2. N ir 3. C 4. S	<ol> <li>VII(c): Web links and Video Lectures (e-Resources):</li> <li>1. FreeCodeCamp: Learn Data Structures and Algorithms (DSA) - Full Course for Beginners: https://www.freecodecamp.org/news/learn-data-structures-and-algorithms/</li> <li>2. MIT OpenCourseware Introduction to Algorithms (6.006): https://ocw.mit.edu/courses/6-006- introduction-to-algorithms-spring-2020/</li> <li>3. Crash Course Data Structures: https://m.youtube.com/watch?v=jQqQpPMYPXs</li> </ol>															
VIII:	VIII: Activity Based Learning / Practical Based Learning/Experiential learning:															
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning																
• Ouiz	zes				00000					1				2		
• Assi	• Assignments															
• Sem	inar															



Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B)

#### Master of Computer Applications (MCA)

Semester:	II	Co	urse Type:			PCC						
Course Tit	le: Obj	ect O	riented Prog	gramm	ing							
Course Coo	le:	23	MCAT202			Credits:	3					
Teach	ing Ho	ours/	Week (L:T:	<b>P:O</b> )	3:0:0:0	Total Hours:	40					
CIE Mark	s: 5	0	SEE Ma	rks:	50	Total Marks:	100					
SEE Typ	e:		Т	heory		Exam Hours:	3					
				I. (	Course Objectives:							
• Understand the principles of object-oriented programming (OOP).												
• Develop skills in designing and implementing object-oriented solutions.												
• Gain protand enca	<ul> <li>Gain proficiency in using OOP concepts such as classes, objects, inheritance, polymorphism, and encapsulation.</li> </ul>											
Apply de	sign pa	tterns	s to solve co	mmon	programming probl	ems.						
<ul> <li>Explore advanced topics in OOP, including generics and exception handling.</li> </ul>												
II. Teaching-Learning Process (General Instructions):												
These are sam	nple Str nes.	ategie	es, which te	achers	can use to accelerate	e the attainment of t	he various					
1. Lecturer me teaching meth	ethod ( ods co	L) neould be	ed not to be e adopted to	only t attain	raditional lecture me the outcomes.	thod, but alternative	e effective					
2. Use of Vide	eo/Anii	natio	n to explain	functi	oning of various con	cepts.						
3. Encourage	collabo	orative	e (Group Le	arning	) Learning in the cla	SS.						
4. Ask at least thinking.	t three ]	HOT	(Higher ord	er Thi	nking) questions in t	he class, which pro	notes critical					
5. Adopt Prob thinking skills than simply re	olem Ba s such a ecall it.	ised I is the	earning (PI ability to de	BL),wł esign, o	nich fosters student's evaluate, generalize,	Analytical skills, d and analyze inform	evelop design ation rather					
6. Introduce 7	opics i	n mai	nifold repres	sentati	ons.							
7. Show the d	ifferen	way	s to solve th	e same	e problem and encou	rage the students to	come up with					
their own crea	their own creative ways to solve them.											
8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.												
			III	. COI	URSE CONTENT		-					
Module-1: In Programming Programming	Module-1: Introduction to Object-Oriented Programming, Evolution of Programming Paradigms, Basics of Procedural Programming vs Object-Oriented Programming, Key Concepts: Classes, Objects, Methods, and Attributes8 Hrs											

Benefits of Object-Oriented Programming.

Textl	Textbook1: Chapter 1- 4																									
RBT	Leve	els: 2																								
Modu and D	ile-2: Destru	Class ctors,	es and Class	l Obje Metl	ects, Do nods an	efinin d Inst	g Class tance N	ses ⁄Ietl	and Ot 10ds, A	jects in ccess l	n Java Modif	, Cons iers: P	tructo ublic,	ors 8	Hrs											
Privat	te, Pi	otecte	d, Cla	$\frac{ss}{4}$	lations	hips:	Assoc1	atic	on, Agg	regatic	on, Co	mposi	tion.													
RBT	Lev	els: 2,	3	4-0																						
Mod	ule-3	: In	herita	nce	and	Poly	morph	ism	n, In	neritan	ce:	Types	an	d 8	3 Hrs											
Impl	emer	itation	, Metl	nod (	Overloa	ding	and Ov	veri	iding,	Polym	orphis	m: Co	mpile	÷-												
Time	e and	Runti	me, A	bstra	ct Clas	ses an	d Inter	fac	es.																	
Text	book	1: Ch	apter	5 - 8																						
KB1	<b>KD1</b> Levels: 2, 3,4 Module-4: Encapsulation and Design Patterns Encapsulation and Information 8 Hrs																									
MO0 Hidii	Module-4: Encapsulation and Design Patterns, Encapsulation and Information 8 Hrs Hiding Design Principles: SOLID, Design Patterns: Singlaton, Factory, Observar																									
Appl	ving, L	Desig	n Patt	erns 1	o Real	-Worl	d Prob	len	115. 5111 18.	gicton,	racio	ny, Ot	501 00	1												
Text	book	3: Ch	apter	1 - 5																						
RBT	RBT Levels:2,3,4																									
Mod	Module-5: Advanced OOP Concepts, Generics: Generic Classes and Methods, 8 Hrs																									
Exce	Exception Handling: Try-Catch Blocks, Custom Exceptions, Reflection and																									
Meta	Metadata, Advanced Topics in OOP: Reflection and Metadata																									
Textbook2 : Chapter 18, 19, 21																										
RBT Levels:2,3,4																										
IV. COURSE OUTCOMES																										
CO	CO1 Understand the principles of object-oriented programming.																									
CO	Develop skills in designing and implementing object-oriented solutions.																									
CO	Gain proficiency in using OOP concepts such as classes, objects, inheritance,																									
		polym	orphis	sm, a	nd enca	apsula	tion.			•	1															
CO	94	Apply	desig	n pat	terns to	solve	e comn	non	progra	mming	g prob	lems.														
		T -	1 -	<b>V.</b> C	O-PO	-PSO	MAPI	PIN	G (ma	rk H=3	; M=2	2; L=1	)		T											
PO/PS	5 1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	S4										
0	2	2	1																							
C01	$\frac{2}{2}$	$\frac{2}{2}$	1																							
CO3	2	2	1																							
CO4	2	2	1																							
					VI.	Asses	ssment	t De	etails (	CIE &	SEE)															
Gene	ral F	Rules:	Refer	Anne	xure sec	ction 1																				
Asses	sme	nt Det	ails (b	oth	CIE ar	d SE	<b>E) :</b> Re	efer	Annexu	ire secti	on 1															
Seme	ster	End F	Exami	natio	n (SEI	E): Re	fer Ann	nexu	ire secti	on 1																
	VII. Learning Resources																									
VII(a	i): Te	extboo	oks:						0																	
Sl.	Sl. Title of the Book Name of the author Edition and Vear Name of the																									
No.	TT	1 []'			7 1 0		1.D		2020						blishe	r										
	неа	la Firs	i java	1	⊾atny S Bates	Sierra	and Be	ert	2020					Keill	y Med	na										
2	Jav	a: The			Herber	t Schi	ldt		2018				N	/IcGra	w-Hill	[										
	Co	nplete							•				E	ducati	ion											
	Ref	erence	<u> </u>													Complete     Education       Reference     Image: Complete in the second secon										

3	Head First Design	Eric Freeman	2020	O'Reilly Media						
U	Patterns	Elisabeth Robson	2020	o nomy would						
	1 attorns	Bert Bates, Kathy								
		Sierra								
VII(c): Web links and Video Lectures (e-Resources):										

- Crash Course Object Oriented Programming: https://m.youtube.com/watch?v=SiBw7os-\_zI
  - 2. MIT OpenCourseware Introduction to Object-Oriented Programming: https://ocw.mit.edu/courses/6-01sc-introduction-to-electrical-engineeringand-computer-science-i-spring-2011/pages/unit-1-software-engineering/object-orientedprogramming/
  - 3. University of California, Berkeley CS61A: Introduction to Object-Oriented Programming: https://m.youtube.com/watch?v=CoHCUimLmdM
  - 4. freeCodeCamp: Learn Object Oriented Programming (OOP) Full Course for Beginners: https://www.freecodecamp.org/news/object-oriented-programming-crashcourse/

## VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminar



Approved by AICTE, New Delhi.

Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B)

## Master of Computer Applications (MCA)

Semester:	Π	Course Type:			PCC						
<b>Course Title:</b>	Softwa	are Engineering d	& Prod	luct Management							
Course Cod	le:	23MCAT203			Credits:	3					
Teach	ing Ho	urs/Week (L:T:	:P:O)	3:0:0:0	Total Hours:	40					
CIE Marks	s: 50	0 SEE Ma	arks:	50	Total Marks:	100					
SEE Туре	e:	Т	Theory		Exam Hours: 3						
			I. (	Course Objectives:							
• Understar	nd the p	rinciples and pra	actices	of software enginee	ring.						
<ul> <li>Develop skills in managing the entire software development lifecycle.</li> </ul>											
• Gain insig	ghts into	o product manag	ement	strategies and metho	odologies.						
<ul> <li>Apply ind</li> </ul>	- lustry-s	tandard practices	s for ef	fective software dev	velopment and proc	luct					
managemei	nt.	-									
	]	II. Teaching-Le	earning	g Process (General	Instructions):						
These are sam	ple Stra	ategies, which te	achers	can use to accelerat	e the attainment of	the various					
1. Lecturer me teaching meth	<ol> <li>Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> </ol>										
2. Use of Video/Animation to explain functioning of various concepts.											
3. Encourage collaborative (Group Learning) Learning in the class.											
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.											
5 Adopt Drok	lam Da	and I comming (DI	DI )L	ich fostors student?	A malartian 1 alrilla	davialan dagian					

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

# **III. COURSE CONTENT**

8 Hrs

**Module-1:** Introduction to Software Engineering, Definition and Scope of Software Engineering, Software Development Life Cycle (SDLC), Roles and Responsibilities in Software Development, Introduction to Agile Methodologies Overview of Scrum Framework.

Textbook: Chapter 1-5																
RBT Le	RBT Levels: 2															
Module Elicitati Stories, Manage Textboo	e-2: on a Rec mer	Requ and D quiren nt. : Cha	iireme Oocum nents	nts En entatio Valida <b>6-10</b>	ginee on of l ation a	ring, I Requin and Ve	mport remen erifica	ance of ts, Uso tion, T	of Req e Case Fracea	uirem e Mode bility	ents E eling a and C	Engine and Us hange	ering ser	8	Hrs	
RBT L	eve	ls: 2.	3													
Modul Archite Design	e-3: ectur Qua	Soft ral St ality	ware I yles a Attrib	Design nd Pat utes, I	and Aterns,	Archit Desig	ecture n Not to Mi	, Prino ations croser	ciples and I vices	of Sof Docum Archit	tware entati	Desig on e.	gn	8	Hrs	
RBT Levels:2,3,4																
Modul SDLC, Testing Metrics Textboo	Module-4: Software Testing and Quality Assurance, Importance of Testing in SDLC, Types of Testing: Unit, Integration, System, Acceptance, Automated Testing and Continuous Integration, Software Quality Assurance (SQA) Metrics and Measurement in Software Quality.8 HrsTextbook1: Chapter 16-20															
RBT Levels:2,3,4																
Modul Produc Produc Manag Textboo	Module-5: Product Management Strategies, Introduction to Product Management8 HrsProduct Lifecycle Management, Lean Product and Lean StartupMinimum Viable8Product (MVP) and Prototyping, Introduction to Scrum, Agile Product8Management.7Textbook : Chapter 16-19, 21															
	eve.	18:2,3	<b>)</b> ,4		_											
		r 1	. 1	.1 .	]	$\mathbf{V.C}$		E OU	TCO	MES	•					
CO1		nder	stand	the pr	inciple	$\frac{1}{1}$ es and	practi	ces of	softw	are er	iginee	ring.				
CO2		)evel	op ski	lls in r	nanag	ing th	e entir	e soft	ware o	develo	pmen	t lifec	ycle.			
CO3	G	bain i	nsight	s into	produ	ct mai	nagem	ent st	rategi	es and	meth	odolog	gies.			
CO4	A n	apply nanag	indus gement	stry-st t.	andar	d prac	ctices	for e	ffectiv	ve soft	tware	devel	opme	nt and	l proc	luct
	V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)															
PO/PS O	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	<b>S</b> 2	<b>S</b> 3	S4
CO1	2	2	1													
CO2	2	1	1													
CO3         2         1																
VI. Assessment Details (CIE & SEE)																
General Rules: Refer Annexure section 1																
Assessment Details (both CIE and SEE) : Refer Annexure section 1																
Semeste	er E	nd E	lxami	natior	n (SEI	E): Re	fer An	nexure	sectio	n 1						

#### VII. **Learning Resources** VII(a): Textbooks: SI. Name of the **Edition and Year** Title of the Book Name of the author No. publisher 1 Software Engineering: A Roger S. Pressman 2020 McGraw-Hill Practitioner's Approach Education Inspired: How To Create 2 Marty Cagan 2018 Wiley **Products Customers** Love VII(b): Reference Books: (Insert or delete rows as per requirement) 1 2 VII(c): Web links and Video Lectures (e-Resources): 1. Software Engineering for Product Management: https://www.coursera.org/courses?query=software%20product%20management 2. Introduction to Software Engineering: https://ocw.mit.edu/courses/6-01sc-introduction-toelectrical-engineering-and-computer-science-i-spring-2011/pages/unit-1-softwareengineering/ 3. Software Engineering (CSC705C): https://onlinecourses.nptel.ac.in/noc20\_cs68/preview

- 4. Software Design (CSE2106): https://onlinecourses.nptel.ac.in/noc20\_cs68/preview
- 5. UDEMY:
- 6. The Complete Software Engineer Bootcamp 2023: https://www.udemy.com/course/the-complete-developer-bootcamp/

# VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminar



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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B)

#### Master of Computer Applications (MCA)

Semester:	II	Cou	irse Type:	IPCC								
Course Tit	le: Wet	o Tecł	nnologies -	1								
Course Code:23MCAI204Credits:4												
Teach	ing Ho	urs/V	Veek (L:T:	<b>P:O</b> )	3:0:2:0	Total Hours:	40					
CIE Marks	s: 50	0	SEE Ma	rks:	50	Total Marks:	100					
SEE Type	3 Hrs											
I. Course Objectives:												

- Understand the foundational concepts of web technologies.
- Develop skills in building and designing dynamic web applications.
- Gain proficiency in front-end and back-end web development.
- Acquire knowledge of web security and best practices.
- Explore emerging trends and technologies in the field of web development.

#### II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

#### **III. COURSE CONTENT**

#### III(a). Theory PART

Module-1: Introduction to Web Technologies, Evolution of the World Wide Web,	8 Hrs
Basics of HTML and CSS, Overview of Client-Server Architecture, Introduction to	
Web Browsers, Web Standards and Validation	
	•

Textbook: Chapter 1-5

RBT Le	vels: 2										
Module Object M Design,	Module-2: Front-End Web Development, JavaScript Fundamentals, Document8 HrsObject Model (DOM), CSS Frameworks (e.g., Bootstrap), Responsive Web8 Design, Front-End Build Tools (e.g., npm, webpack)										
Textboo	Textbook : Chapter 1 – 4										
RBT L	RBT Levels: 2,3										
Module Program Integrat Express Textboo	Module-3:Back-EndWebDevelopment,IntroductiontoServer-Side8 HrsProgramming,Server-SideScripting (e.g., PHP),DatabaseBasics andIntegration,RESTfulAPIs and WebServices,Server-SideFrameworks (e.g.,Express.js)Textbook : Chapter 2 – 6										
RBT L	RBT Levels: 2,3,4										
Module HTTPS Forgery Applica Textboo	e-4: Web Security and Best Practices, Common Web Security Threats, and SSL/TLS, Cross-Site Scripting (XSS) and Cross-Site Request (CSRF), Web Application Security Best Practices, Introduction to Web tion Firewalls (WAF) k:2-5	8 Hrs									
RBT L	evels:2,3,4										
Module (PWAs) Framew Develop	Module-5: Emerging Trends in Web Development, Progressive Web Apps8 Hrs(PWAs) ,Single Page Applications (SPAs), WebAssembly and JavaScript8 HrsFrameworks (e.g., React, Angular, Vue), Microservices Architecture in Web9Development, Introduction to Web 3.0 and Beyond1000 PPACTICAL PAPT										
Sl.	Experiments / Programs / Problems										
1 1	HTML and CSS Basics:										
	• Create a simple webpage with HTML and apply CSS styles for form	natting.									
	Design a webpage layout using CSS flexbox or grid.										
2	<ul> <li>JavaScript Interaction:</li> <li>Develop a JavaScript program that prompts the user for input and d the webpage.</li> </ul>	isplays it on									
2	• Use JavaScript to manipulate the Document Object Model (DOM)	dynamically.									
3	<ul> <li>Build a responsive webpage using Bootstrap components (e.g., navi cards).</li> <li>Customize the appearance of Bootstrap components using CSS</li> </ul>	gation bar,									
4	• Customize the appearance of Bootstrap components using CSS. PHP and MySOL Integration:										
•	<ul> <li>Create a PHP script that connects to a MySQL database and retrieve</li> <li>Implement a simple registration form using PHP and validate user i</li> </ul>	es data. nput.									
5	<ul> <li>RESTful API Interaction:</li> <li>Use JavaScript to make asynchronous requests to a RESTful API and display the results.</li> <li>Develop a basia CPUD (Create Read Undate Delete) application using a</li> </ul>										
	RESTfulAPI	8									
6	<ul> <li>Web Security Practices:</li> <li>Implement a simple login form with secure password hashing in PHP.</li> <li>Integrate HTTPS into a web application and understand its impact on security.</li> </ul>										

7	JavaScript Framework Exploration:														
	•	Creat	e a ba	sic Re	act co	mpone	ent an	d rend	ler it iı	n a we	bpage	•			
	•	Build	a sing	gle-pa	ge app	olicatio	on (SP	PA) us	ing Ar	ngular	or Vu	ie.js.			
8	Micro	oservice	es Arch	nitectu	ire:										
	•	Desig	gn a m	icrose	rvices	archit	tecture	e for a	web a	pplica	ation u	ising a	ı diagı	am.	
	•	Imple	ement	a simj	ole con	nmun	icatio	n mec	hanisn	n betw	veen m	nicrose	ervice	s.	
9	WebA	Assemb	ly Exp	erime	ntatio	n:									
	•	Write	a bas	ic pro	gram i	in a la	nguag	e like	C or F	Rust a	nd con	npile i	t to		
		Web	Assem	bly.											
10	Integrate a WebAssembly module into a web application.  Web Application Security Audit:														
10	Web	Web Application Security Audit:													
	•	Cond	uct a s	ecurit	y aud	it for a	ı givei	n web	applic	ation,	identi	fying	poten	tial	
		Vuine		ies.	try has	t <b>m</b> no ot	ioon t	o oddr	and the	. idam	field				
11	Woh		tion E	irowo	ly des	t praci	lices to		ess the	e iden	linea	issues	•		
11	WEU.	Confi		newa	n seu	ip. sh ann	licatio	n fire	wall (I		to pro	tect a	aginet	comn	lon
	•	attack	iguie a	inu ica	st a we	o app	ncan		wall (	( AI)	to pro	neet a	gamsi	comm	1011
	<ul> <li>Analyze the WAF logs for detected security events.</li> </ul>														
12	Progr	essive V	Web A	pp (P	WA) ]	Impler	nenta	tion:							
	•	Conv	ert a b	asic v	veb ap	plicati	on int	to a Pr	ogress	sive W	veb Ap	op wit	h offli	ne	
	capabilities.														
	•	Test t	he PW	/A on	differ	ent de	vices	and b	rowsei	rs.					
13	Respo	onsive I	Design	Enha	nceme	ent:									
	•	• Enhance an existing webpage's responsiveness using media queries.													
	Ensure a seamless user experience on various screen sizes.														
14	Implementing Single Sign-On (SSO):														
	•	Integ	rate a s	single	sign-o	on aut	nentic	ation	mecha	nism	using	OAuti	1 or O	penID	
		Collin Test /	ect.	rify th	A 550	) impl	ement	ation	in a m	ulti_91	mlicat	ion er	wiron	ment	
15	Weh	$\frac{10500}{30 \text{ Exp}}$	loratio	n.		/ mpi	cilicin	anon	111 a 111	uni-aj	phea		IVIIOII	ment.	
10	•	Explo	ore and	imnl	ement	a bas	ic feat	ure or	conce	ent rel	ated to	o Weh	3.0 (6	• <b>σ</b>	
		decer	tralize	ed app	licatio	ons).			••••••	-p+1+1			0.00 (1		
	•	Refle	ct on t	he po	tential	impa	ct of V	Veb 3	.0 on f	uture	web d	eveloj	oment	•	
				]	<b>V. C</b>	OURS	E OU	TCO	MES						
CO1	Unde	erstand	found	ationa	l conc	epts of	f web	techn	ologie	s.					
CO2	Deve	elop ski	lls in t	ouildir	ng and	desig	ning c	lynam	ic weł	o appli	icatior	ns.			
CO3	Gain	profici	ency i	n fron	t-end	and ba	ack-en	id web	o devel	lopme	nt.				
CO4	Acqu	ire kno	wledg	e of v	veb se	curity	and b	est pra	actices	•					
			V. CO	D-PO	PSO	MAP	PING	(mar	k H=3	; M=2	; L=1)	)			
PO/PS	1 2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	<b>S</b> 4
0															
CO1	2 2	1													
CO2	2 2	2													
CO3	$\frac{2}{2}$ 1	1													
				VI.	Asses	smen	t Deta	uls (C	IE &	SEE)					
General	<b>Rules</b>	: Refer	Annex	ure sec	ction 2										

#### Assessment Details (both CIE and SEE): Refer Annexure section 2 Semester End Examination (SEE): Refer Annexure section 2

v 11(a	I): I EXIDOOKS:	1		
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	HTML and CSS:	Jon Duckett	2011	Wiley
	Design and Build Websites			
2	JavaScript and	David Sawyer	2014	O'Reily Media
	jQuery: The	McFarland		
	Missing Manual			
3	PHP and MySQL	Luke Welling,	2016	Addison-Wesley
	Web Development	Thomson		
4	Web Application	Bryan Sullivan	2018	McGraw-Hill
	Security: A			Education
	Beginner's Guide			
VII(b	): Reference Books:			
1	Bootstrap	Official Website		
	Documentation			
2	JavaScript	Official Website		

#### VII. Learning Resources

#### VII(c): Web links and Video Lectures (e-Resources):

1. Introduction to Web Technologies by University of Michigan: https://www.udemy.com/course/web-technology-for-entrepreneurs/

- 2. Web Technologies (CSE206C) by IIT Bombay: https://onlinecourses.nptel.ac.in/
- 3. Introduction to HTML5 || Web Technologies Tutorial: https://www.youtube.com/watch?v=DgRngrWG590
- 4. FreeCodeCamp Web Development playlist: https://www.freecodecamp.org/news/tag/webdevelopment/
- 5. Crash Course Web Technologies: https://www.youtube.com/watch?v=RkAXDGnz0FQ
- 6. The Complete Web Developer Bootcamp 2023: https://www.udemy.com/course/web-development-complete-bootcamp-2023/

#### VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
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#### Master of Computer Applications (MCA)

Semester:	II	Co	urse Type:		PEC								
Course Title:	Course Title: Data Mining & Warehousing												
Course Cod	le:	23	MCAE211			Credits:	3						
Teaching Ho	urs/W	'eek (l	2:2:0:0	Total Hours:	40								
CIE Marks	CIE Marks: 50 SEE Marks: 50 Total Marks												
SEE Type	e:		Т	heory		Exam Hours:	3						
				I. (	Course Objectives:								
• Understan	nd the	funda	mental conc	epts o	of data mining and da	ta warehousing.							
• Develop s	skills i	n extr	acting valua	ble pa	tterns and knowledg	e from large datas	ets.						
• Gain proficiency in designing and implementing data warehouses.													
• Apply data mining techniques to support decision-making processes.													
• Explore r	• Explore real-world applications and challenges in data mining and warehousing.												

#### **II. Teaching-Learning Process (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.

2. Use of Video/Animation to explain functioning of various concepts.

3. Encourage collaborative (Group Learning) Learning in the class.

4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.

- 6. Introduce Topics in manifold representations.
- 7. Show the different ways to solve the same problem and encourage the students to come up with

their own creative ways to solve them.

7. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.

#### **III. COURSE CONTENT**

Module-1: Introduction to Data Mining, Definition and Objectives of Data Mining, Data Mining Process and Techniques, Data Exploration and Pre-processing, Data Mining Algorithms Overview, Applications of Data Mining.

8 Hrs

Textbook1: Chapter 1 - 5

RBT Le	evels	: 2														
Module-2: Data Warehousing Concepts, Definition and Purpose of Data Warehousing, Components of Data Warehouses, Data Warehouse Architecture, Data Marts and OLAP (Online Analytical Processing), ETL (Extract, Transform, Load) Processes.										ure, form,		8 Hı	<u>.</u> S			
Textboo	ok2:	Cha	pter	1 - 6												
RBT L	evels	s: 2,	3													
Module- Techniq Warehow	-3: D ues, use E	ata V Fact Desig	Wareh and I gn Bes	ouse Dimen st Prac	Desig sion 7 ctices,	n and Tables Case	Imple , Star ; Studie	menta and Si es in E	tion, I nowfla Data W	Dimen ake Sc /areho	sional hema use D	l Mode s, Data esign.	eling a		8 Hrs	3
Textboo	ok2:	Cha	pter '	7 - 11												
RBT L	evels	s:2,3	,4													
Module- Clusteri Evaluati	-4: D ng A lon ai	ata N Igori nd V	Minin ithms alidat	g Algo , Asso tion of	orithm ciatio f Data	ns, Cla n Rule Minin	ussifica e Mini ng Mo	ation a ng, O dels.	and Pr utlier	edictio Detect	on Alg ion To	gorithr	ns, jues,		8 Hrs	>
Textboo	JKI:		apter	0-9												
RBT L	evels	5:2,3	,4													
Analysis Data Mi	-5: A s, Da ning, <b>ok1:</b>	dvar ta M , Rea <u>Cha</u>	lining al-wor	in Big rld Ap 10 -13	g Data	Applic Envi ions a	ronme	, Text ents, C se Stu	cand V Challer dies.	nges ai	nd Eth	, 11me	ssues i	n	8 Hrs	
RBT L	evels	s:2,3	,4													
					]	<b>IV. C</b>	OURS	E OU	TCO	MES						
CO1	Un	derst	and t	he fun	dame	ntal co	oncept	s of d	ata mi	ning a	nd da	ta war	ehous	ing.		
	D	1	1-:11		-4		1			11	11.	<u> </u>	1	1.4	- 4 -	
CO2	Dev	veloj	p skill	is in e	xtracti	ing va	iuable	patter	ths and		vieago	e from	large	datas	ets.	
CO3	Gai	in pr	oficie	ncy ir	ı desig	gning	and in	nplem	enting	g data v	vareh	ouses.				
CO4	Ap	ply c	lata n	nining	techn	iques	to sup	port d	ecisio	n-mak	ting p	rocess	es.			
				V. CO	D-PO	-PSO	MAP	PING	(mar	k H=3	: M=2	2; L=1	)			
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	S1	<b>S</b> 2	<b>S</b> 3	<b>S</b> 4
0	-	1														
C01	2	$\frac{1}{2}$	2													
$CO_2$	1	<u>2</u> 1	1													
CO4	2	1	1													
	•				VI.	Asses	smen	t Deta	nils (C	TE &	SEE)					
General	l Rul	es: I	Refer	Annex	ure sec	ction 1										

## Assessment Details (both CIE and SEE) : Refer Annexure section 1 Semester End Examination (SEE): Refer Annexure section 1

## VII. Learning Resources

VII(a): Textbooks:										
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher						
1	Data Mining: Concepts and	Jiawei Han and	2011	Morgan						
	Techniques	Micheline Kamber,		Kaufmann						
2	The Data Warehouse Toolkit: The	Ralph Kimball and	2013	Wiley						
	Definitive Guide to Dimensional	Margy Ross								
	Modeling									
VII(c	): Web links and Video Lectures (	e-Resources):	I							
1.	https://www.coursera.org/courses	?query=data%20mini	ng							
2.	https://www.coursera.org/speciali	zations/data-mining								
3.	https://onlinecourses.nptel.ac.in/n	oc21_cs06/preview								
4.	https://onlinecourses.swayam2.ac	.in/cec19_cs01/previe	ew							
5.	https://ocw.mit.edu/courses/15-06	52-data-mining-spring	-2003/							
6.	https://ocw.mit.edu/courses/15-06	52-data-mining-spring	-2003/							
7.	https://www.youtube.com/watch?	v=Dr4nW64TFAI								
8.	https://www.tutorialspoint.com/da	ata_mining/index.htm								
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:										
Activ	ity Based Learning (Suggested Activ	vities in Class)/ Practic	cal Based learni	ng						
• Qui	zzes									
• Ass	• Assignments									
• Sem	ninar									



S.





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Master of Computer Applications (MCA)

Semester:	II	Course T	ype:		PEC						
Course Title	: UI 8	k UX Desig	gn								
Course Code	:	23MCAI	E212		Credits:	3					
Teachin	ng Ho	urs/Week	(L:T:P:O)	2:2:0:0	Total Hours:	40					
CIE Marks:	50	) SE	E Marks:	50	Total Marks:	100					
SEE Type:			Theory		Exam Hours:	3 Hrs					
			I. (	Course Objectives:							
<ul> <li>Understand design.</li> <li>Develop pra</li> <li>Gain insight</li> <li>Apply usabi</li> <li>Explore the</li> </ul>	the pr actical ts into lity pr latest	inciples and skills in cr user-center rinciples an trends and <b>II. Teach</b>	d fundamer eating visua red design r d conduct e technologie <b>ing-Learn</b> i	ntals of User Interfact ally appealing and us methodologies. effective user testing. es in UI & UX design ing Process (Genera	e (UI) and User Ex er-friendly interfa n. <b>ll Instructions):</b>	xperience (UX) ces.					
These are sample course outcome 1. Lecturer meth	le Stra s. nod (L	ntegies, whi	to be only t	can use to accelerate	e the attainment of	the various the various ve effective					
teaching method	ds cou	ld be adopt	ted to attain	the outcomes.							
2. Use of Video	/Anin	nation to ex	plain funct	ioning of various con	ncepts.						
3. Encourage collaborative (Group Learning) Learning in the class.											
4. Ask at least the thinking.	hree H	IOT (Highe	er order Thi	nking) questions in t	he class, which pro	omotes critical					
5. Adopt Proble thinking skills s than simply reca	5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.										

6. Introduce Topics in manifold representations.

7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world and when that's possible, it helps to

improve the student's understanding.

					III. (	COUF	RSE C	ONT	ENT						
Module	-1:Intro	ductio	n to U	I & U	X Des	sign, D	<b>D</b> efinit	ion an	ıd Imp	ortand	e of U	Л&U	JX 8	Hrs	
Design,	Differer	nces be	etween	UI aı	nd UX	, The	Desig	n Pro	cess: Io	deatio	n to				
Impleme	entation,	Roles	s and F	Respor	nsibili	ties in	UI &	UX E	Design,	, Over	view o	of			
Design 7	Fools an	d Soft	ware												
Textboo	ok1: Ch	apter	1-3										•		
RBT Le	evels: 2														
Module	-2: Prin	ciples	of Vis	ual De	esign,	Color	Theo	ry and	l Psych	nology	, Тур	ograpl	ny 8	Hrs	
Basics a	nd Font	Pairin	g, Lay	out a	nd Cor	mposi	tion P	rincip	les, Im	agery	and				
Iconogra	aphy, De	esignir	ng for	Differ	ent De	evices	and P	latfor	ms.						
Textboo	ok2: Ch	apter	1-5												
RBT L	evels: 2														
Module	-3: User	-Cente	ered D	esign,	Unde	erstand	ling U	ser N	eeds a	nd Go	als, Pe	ersona	8	Hrs	
Creation	and Us	er Res	earch,	Infor	matio	n Arch	itectu	re and	l Wire	framiı	ng,				
Prototyp	ing Tec	hnique	es, Des	sign T	hinkir	ng in U	Л&Ц	JX.							
Textboo	ok1: Ch	apter	4-7												
RBT L	evels:2,	3,4													
Module	-4: Usał	oility 7	Testing	g and l	Feedba	ack, Ir	nporta	ince o	f Usab	ility 7	Festing	5,	8	Hrs	
Conduct	ing Usa	bility '	Tests,	Analy	zing U	Jser F	eedba	ck, Ite	erative	Desig	gn and				
Continu	ous Imp	rovem	ent, A	ccessi	bility	in UI	& UX	Desi	gn.	-	-				
Textboo	ok3: Ch	apter	1-4						-						
RBT L	evels:2,	3,4													
Module	-5: Eme	rging	Trends	s and '	Fechn	ologie	s, Res	ponsi	ve Des	sign a	nd Mo	bile-	8	Hrs	
first App	proach, '	Voice	User I	nterfa	ce (VI	UI) De	esign,	Augm	nented	Reali	ty (AF	R) and			
Virtual I	Reality (	(VR), A	AI and	Mach	nine L	earnin	g in U	Л&С	JX, Fu	ture I	Directi	ons in			
UI & UZ	X Desig	n.					-								
Textboo	$\mathbf{k3}:\mathbf{Ch}$	apter	7-11												
RBT L	evels:2,	3,4													
				]	V. CO	OURS	E OU	TCO	MES						
	Unders	stand t	he pri	nciple	s and	fundaı	nenta	ls of I	Jser In	terfac	e (UI)	and I	Jser E	xperie	ence
CO1	(UX) d	lesign.	I	r							()			1	
		0													
CO2	Develo	op prac	ctical s	kills i	n crea	ting v	isuall	y appe	aling	and us	ser-frie	endly	interfa	aces.	
CO3	Gain i	nsights	s into ı	iser-co	entere	d desi	gn me	thodo	logies						
CO4	Apply usability principles and conduct effective user testing.														
	1 0	2	<b>v. C</b>	J-PO	-r50			(mar	K H=3	; IVI=2	L = I	)	62	62	C 4
0/25	1 2	5	4	5	0		δ	9	10	11	12	51	52	55	54
CO1	2 1	1										1			
CO2	2 2	1										_	2		
CO3	2 2	1											2		
CO4	2 2	1												1	

VI. Assessment Details (CIE & SEE)											
Gene	General Rules: Refer Annexure section 1										
Asses	Assessment Details (both CIE and SEE) : Refer Annexure section 1										
Seme	Semester End Examination (SEE): Refer Annexure section 1										
	VII. Learning Resources										
VII(a	VII(a): Textbooks:										
Sl. No.Title of the BookName of the authorEdition and YearName of the publisher											
1	1     Don't Make Me Think, Revisited: A Common Sense Approach to Web     Steve Krug     2014     New Riders										
2	The Non-Designer's Design Book	Robin Williams	2014	Peachpit Press							
	Rocket Surgery Made Easy: The Do-It-Yourself Guide to Finding and Fixing Usability Problems	Steve Krug	2009	New Riders							
VII(c	c): Web links and Video Le	ctures (e-Resources):									
1. ht 2. ht 3. ht	<ol> <li>https://www.figma.com/resource-library/</li> <li>https://www.coursera.org/professional-certificates/google-ux-design</li> <li>https://onlinecourses.nptel.ac.in/noc21_ar05/</li> </ol>										
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:											
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning											
• Qui	zzes										

- Assignments
   Seminar



Semester:	Semester: II Course Type: PEC										
Course Tit	le: Clo	ud Computing	Computing								
Course Coo	le:	23MCAE213			Credits:	3					
Teach	ing Ho	ours/Week (L:T	:P:O)	2:2:0:0	Total Hours:	40					
CIE Mark	s: 5	0 SEE Ma	arks:	50	Total Marks:	100					
SEE Type	e:	Т	heory		Exam Hours:	3 Hrs					
I. Course Objectives:											
• Unde	rstand t	he fundamental	concep	ots and principles of	cloud computing.						
• Gain	practica	al knowledge of	cloud	service models (IaaS	, PaaS, SaaS) and o	leployment					
models (pu	blic, pr	ivate, hybrid).									
• Deve	lop skil	ls in designing a	nd imp	plementing cloud-bas	sed solutions.						
• Explo	ore secu	rity, scalability,	and pe	erformance considera	tions in cloud com	puting.					
• Stay i	informe	ed about emergin	g tren	ds and technologies i	n cloud computing						
		II. Teaching-I	learni	ing Process (Genera	l Instructions):						
These are sam outcomes.	ple Stra	ategies, which teac	hers ca	an use to accelerate the	e attainment of the va	rious course					
1. Lecturer met methods could	hod (L) be adop	need not to be on ted to attain the ou	ly tradi itcome	tional lecture method, s.	but alternative effect	ive teaching					
2. Use of Video	o/Anima	tion to explain fu	nctioni	ng of various concepts.							
3. Encourage c	ollabora	tive (Group Learn	ing) Le	earning in the class.							
4. Ask at least	three HO	OT (Higher order	Fhinkir	ng) questions in the cla	ss, which promotes o	critical thinking.					
5. Adopt Proble skills such as th	em Base ne ability	ed Learning (PBL) y to design, evalua	,which te, gen	fosters student's Anal heralize, and analyze in	ytical skills, develop formation rather that	design thinking n simply recall it.					
6. Introduce To	pics in	manifold represen	tations								
7. Show the dif	ferent w	vays to solve the sa	ame pr	oblem and encourage t	he students to come	up with					
their own creat	ive way	s to solve them.									
8. Discuss how the student's un	8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.										
	III. COURSE CONTENT										
Module-1:Intr	oductio	on to Cloud Com	puting	g, Definition and Cha	racteristics of	8 Hrs					
Cloud Compu	ting, H	istorical Evolution	on and	Milestones, Cloud S	Service Models:						
IaaS, PaaS, Sa in the Cloud (	aaS, Clo Comput	oud Deployment ing Industry.	Mode	ls: Public, Private, H	ybrid, Key Players						
	P	6j.									

Textboo	ok1:	Cha	pter	1-4												
RBT Le	evels	s: 2														
Module-	-2:C	loud	Infras	structu	re and	l Virtu	ıalizat	ion, V	'irtual	izatior	n Func	lamen	tals,		8 H	rs
Virtual I	Mac	hines	and ]	Hyper	visors	, Clou	ıd Infr	astruc	ture C	ompo	nents,					
Containe	eriza	ation	and C	Orches	tratior	ı, Cloi	ud Sto	rage a	nd Ne	etwork	ing.					
Textboo	ok2:	Cha	pter :	5-9												
RBT L	evel	s: 2,	3													
Module-	-3:C	loud	Servi	ce Pro	viders	s and l	Platfor	rms, C	vervie	ew of	Major	Cloue	ł		8 H	rs
Service	Prov	vider	s (AW	/S, Az	ure, C	Google	e Clou	d), Cl	oud Pl	atforn	n Serv	ices:				
Databas	es, A	AI/M	L, Io7	r, Man	aging	and N	Monito	oring (	Cloud	Resou	irces,	Billing	g and			
Cost Ma	inag	emer	nt in th	ne Clo	ud.											
Textboo	ok2:	Cha	pter	1-5												
RBT L	evel	s:2,3	,4													
Module-	-4:C	loud	Secur	ity an	d Con	nplian	ce, Se	curity	Chall	enges	in Clo	oud			8 H	rs
Comput	ing,	Iden	tity ar	nd Acc	ess M	lanage	ement,	Data	Encry	ption	and P	rivacy	,			
Regulate	ory (	Com	plianc	e in th	e Clo	ud, In	cident	Resp	onse a	nd Clo	oud Se	ecurity	Best			
Practice	s.															
Textboo	ok3:	Cha	pter	1-5												
RBT L	evel	s:2,3	,4													
Module-	-5:A	dvan	ced T	opics	and E	mergi	ng Tre	ends, S	Server	less C	ompu	ting a	nd		8 H	rs
Function	1-as-	-a-Se	rvice	(FaaS)	), Edg	e Con	nputin	g and	Fog C	Compu	ting, l	Block	chain i	n		
Cloud C	omp	outin	g, Gre	en Co	mputi	ng an	d Sust	ainabi	lity, F	uture	Direct	tions i	n Clou	ıd		
Comput	ing.															
Textboo	ok1	: Cha	apter	9												
Textboo	ok2	: Cha	apter	11, 12	2											
Textboo	<u>)k3 :</u>	: Cha	apter	11, 13	8, 14											
	ever	8:2,3	,4													
					]	<b>V. C</b>	OURS	E OU	TCO	MES						
C01	Un	ders	tand t	he fun	dame	ntal co	oncept	s and	princi	ples of	fclou	d com	puting	<b>.</b>		
	Ga	in pr	actica	l knov	vledge	e of cl	oud se	ervice	mode	ls (Iaa	S, Paa	aS, Saa	aS) an	d depl	loyme	nt
CO2	ma	odels	(publ	ic, pri	vate, l	nybrid	l).									
CO3	De	evelo	p skill	ls in de	esigni	ng and	d impl	ement	ing cl	oud-ba	ased s	olutio	ns.			
CO4	Ex	plore	e secu	rity, so	calabi	lity, a	nd per	forma	nce co	onside	ration	s in cl	oud co	omput	ing.	
	1			V. CO	)-PO	-PSO	MAP	PING	(marl	к H=3	; M=2	2; L=1	)			
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	<b>S</b> 2	<b>S</b> 3	S4
0		•	1													
COL	2	2	1	1		1	1	1				1		1	1	1

$CO^2$	2	1	1												
$CO_2$	$\frac{2}{2}$	1	1												
CO4	2	2	1												
	1 =				VI	Asses	smen	t Dets	ils (C	IE &	SEE)				
Gene	ral R	ules:	Refer	Annexi	ire se	ction 1	smen	i Deu							
Asses	smen	t Det	ails (t	ooth C	IE ai	nd SEI	E):R	efer A	nnexur	e secti	on 1				
Seme	ster I	End E	xami	nation	(SE	E): Ref	fer An	nexure	sectio	n 1					
						VI	. L	earni	ng Re	sourc	es				
VII(a	): Te	xtboo	ks:												
Sl. No.	Title	e of th	ne Bo	ok		Name	e of th	e aut	hor		Edit Yea	tion and r	Name o publisł	of the ner	
1	Clou	id Co	mputi	ng:		Thom	as Erl	, Zaig	ham		201	3	Pearsor	1	
Concepts, Technology & Mahmood, and Ricardo															
Architecture Puttini															
2	Mas	tering	clou	d		RajkumarBuyya, Christian					2013 Morgan			1	
	Com	putin	g: Fo	undatio	ons	Vecch	niola,	and S					Kaufma	ann	
	and	Appli	catior	ıs		Tham	araiSe	elvi							
	Prog	gramn	ning												
	Clou	id Sec	curity	and		Tim N	Aathe	r, Sub	ra		200	9	O'Reill	y Med	ia
	Priv	acy: A	An En	terpris	e	Kuma	araswa	amy, a	nd Sh	ahed					
	Pers	pectiv	ve on ]	Risks a	and	Latif									
	Com	nplian	ce												
VII(c	:): We	eb lin	ks an	d Vide	o Le	ctures	(e-Re	sourc	es):						
1. http	os://oi	nlinec	ourse	s.nptel	.ac.in	/noc21	_cs14	Ļ							
2. http	os://w	ww.c	ourse	ra.org/	learn/	/introd	uction	-to-cl	oud						
3. http	ps://av	vs.am	azon.	com/ee	lucat	ion/aw	seduc	ate							
4. http	4. https://azure.microsoft.com/en-in/resources/training-and-certifications#self-directed-training														
5. https://cloud.google.com/learn/training/															
VIII:	VIII: Activity Based Learning / Practical Based Learning/Experiential learning:														
Activ	ity Ba	ised L	earni	ng (Su	ggest	ed Act	ivities	in Cl	ass)/ I	Practic	al Bas	sed learn	ing		
• Qui	zzes														
• Ass	ignme	ents													
• sen	• Seminar														







BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060 Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semester:	II	Course Type:		PEC								
Course Title: Computer Vision												
Course Cod	le:	23MCAE214			Credits:	3						
Teach	ing Ho	urs/Week (L:T	: <b>P:O</b> )	2:2:0:0	Total Hours:	40 hrs						
CIE Marks	s: 50	) SEE Ma	arks:	50	Total Marks:	50						
SEE Type	e:	Г	heory		Exam Hours:	3Hrs						
			I. (	Course Objectives:								
<ul> <li>Under</li> <li>Gain p</li> <li>Develo</li> <li>Explor</li> <li>Stay in</li> </ul>	<ul> <li>Understand the fundamental principles and techniques of computer vision.</li> <li>Gain practical knowledge in image processing and feature extraction.</li> <li>Develop skills in object recognition, tracking, and scene understanding.</li> <li>Explore advanced computer vision topics such as deep learning and applications.</li> <li>Stay informed about the latest research trends in computer vision.</li> </ul>											
		II. Teaching-I	Jearn	ing Process (Genera	l Instructions):							
These are sam outcomes. 1. Lecturer met methods could 2. Use of Video 3. Encourage co 4. Ask at least to 5. Adopt Probles skills such as th 6. Introduce To 7. Show the diff their own creat 8. Discuss how	ple Strat hod (L) be adopt o/Anima ollaborat three HC em Base ne ability opics in r ferent w ive ways	regies, which teach need not to be on ted to attain the out tion to explain function tive (Group Learn OT (Higher order 7 d Learning (PBL) v to design, evaluation nanifold represent ays to solve the sa s to solve them.	hers ca ly tradi itcome actioni ing) L Thinkin ,which te, ger tations ame pr lied to	in use to accelerate the itional lecture method, es. ng of various concepts. earning in the class. ng) questions in the cla fosters student's Anal heralize, and analyze in oblem and encourage t the real world and whe	attainment of the va but alternative effec ss, which promotes ytical skills, develop formation rather tha he students to come en that's possible, it	rious course tive teaching critical thinking. o design thinking in simply recall it. up with helps to improve						
	iderstand	ung.	CO	URSE CONTENT								
Module-1:Int	roductio	on to Computer	Visior	. Definition and Sco	oe of Computer	8 Hrs						
Vision, Histor Vision, Basic Preprocessing Textbook1: (	Vision, Historical Development and Milestones, Human Vision vs. Computer Vision, Basic Concepts: Pixels, Images, and Color Spaces, Image Acquisition and Preprocessing Techniques Textbook1: Chapter 1-4											
	Textbook1: Chapter 1-4											

RBT Le	evel	s: 2														
<b>Module</b> Spatial a Histogra	2: and am I	Imag Frequ Proce	e Proc lency ssing,	cessing Doma Morp	g and l in Filt holog:	Filteri tering, ical O	ng, Im , Edge perati	age E Deteo ons.	inhanc	ement and Fe	and I ature	Restor Extrac	ation, tion,	8	Hrs	
Textboo	ok2	: Cha	pter (	3-7												
RBT L	eve	ls: 2,	3													
Module Recogni Tracking Motion	<b>-3:(</b> itior g M Ana	Objec n Tecl fethoc alysis	t Reco hniquo ls, Mu	ognitic es, Tei iltiple	on and nplate Objec	Tracl Matc t Trac	king, ( hing a king a	Dbject and Fe and Ka	Repro ature	esenta Match Filters	tion an iing, C s, Opt	nd )bject ical Fl	ow an	d 8	Hrs	
Textboo	Textbook1: Chapter 5-8															
RBT L	eve	ls:2,3	<b>5,4</b>													
Module Neural N Object I Vision, 0	<b>Module-4:</b> Deep Learning in Computer Vision, Introduction to Deep Learning and Neural Networks, Convolutional Neural Networks (CNNs) for Image Recognition, Object Detection and Localization with CNNs, Transfer Learning in Computer Vision, Generative Adversarial Networks (GANs) in Vision.												I 8 ,	Hrs		
Textboo	ok3	: Cha	pter 9	9-11												
RBT L	eve	ls:2,3	3,4													
Module- Robotics Comput Trends a	-5:A s, M er V and	Applic Iedica /ision Conf	cations al Ima a, Cha erence	s and I ging, llenge es.	Future Augm s and	Trend ented Oppor	ls, Co Realit tuniti	mpute ty, Eth es in tl	er Visi iical C he Fie	on Ap Conside Id, La	plicat eration test R	ions: ns in esearc	h	8	Hrs	
Textboo Textboo Textboo RBT L	ok1 ok2 ok3 eve	: Cha : Cha : Cha : Cha ls:2,3	apter apter apter 3,4	10, 11 10 12, 13	8, 14											
					Ι	V. CO	OURS	E OU	TCO	MES						
CO1	U	nders	tand t	he fun	damei	ntal pr	incipl	es and	l techr	niques	of co	npute	r visio	n.		
CO1	G	ain pr	actica	ıl knov	vledge	e in in	nage p	rocess	sing ar	nd feat	ure ex	tracti	on.			
CO3	CO3 Develop skills in object recognition, tracking, and scene understanding.															
CO4	<b>CO4</b> Explore advanced computer vision topics such as deep learning and applied										icatio	ns.				
	V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)															
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	<b>S</b> 2	<b>S</b> 3	S4
CO1	2	2	1										1			
CO2	2	1	1											2		
CO3	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												2			

#### VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Assessment Details (both CIE and SEE) : Refer Annexure section 1

#### Semester End Examination (SEE): Graduation

VII. Learning Resources

#### VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Computer Vision:	Richard Szeliski	2010	Springer
	Algorithms and			
	Applications			
2	Digital Image Processing	Rafael C. Gonzalez and	2017	Pearson
		Richard E. Woods		
3	Deep Learning	Ian Goodfellow,	2016	MIT Press
		YoshuaBengio, and Aaron		
		Courville		

#### VII(c): Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/106106224

2. https://www.coursera.org/learn/introduction-computer-vision-watson-opencv

3. https://www.youtube.com/watch?v=l\_Mhv0rxbQk&list=PLaHodugB5x-

Ddy\_H951h0VHjOjfzZNCBh&ab\_channel=AskItLoud

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

• Quizzes

• Assignments

• Seminar



Semester:	Semester: II Course Type: PEC								
Course Tit	ile: Arti	ficial Intelligenc	e & M	Iachine Learning					
Course Coo	le:	23MCAE221			Credits:	3			
Teach	ing Ho	urs/Week (L:T:	P:O)	2:2:0:0	Total Hours:	40			
CIE Mark	s: 50	) SEE Ma	rks:	50	Total Marks:	100			
SEE Type	e:	Т	heory		Exam Hours:	3 Hrs			
			I. (	Course Objectives:					
<ul> <li>Understand the fundamental concepts and principles of Artificial Intelligence (AI) and Machine Learning (ML).</li> <li>Gain practical knowledge in basic ML algorithms and techniques.</li> <li>Develop skills in problem-solving using AI and ML approaches.</li> <li>Explore real-world applications and ethical considerations in AI and ML.</li> <li>Stay informed about the latest trends and technologies in the field</li> </ul>									
		II. Teaching-I	learni	ing Process (Genera	ll Instructions):				
These are sam course outcom	nple Stra nes.	tegies, which te	achers	can use to accelerate	e the attainment of t	he various			
1. Lecturer me teaching meth	ethod (I ods cou	L) need not to be ald be adopted to	only t attain	raditional lecture me the outcomes.	thod, but alternative	e effective			
2. Use of Vide	eo/Anin	nation to explain	funct	ioning of various cor	ncepts.				
3. Encourage	collabo	rative (Group Le	arning	g) Learning in the cla	SS.				
4. Ask at least thinking.	t three H	IOT (Higher ord	er Thi	nking) questions in t	he class, which prop	notes critical			
5. Adopt Prob thinking skills than simply re	olem Ba s such as ecall it.	sed Learning (PI s the ability to de	BL),wi esign,	hich fosters student's evaluate, generalize,	Analytical skills, c and analyze inform	evelop design ation rather			
6. Introduce T	Copics in	n manifold repres	sentati	ions.					
7. Show the d	ifferent	ways to solve th	e sam	e problem and encou	rage the students to	come up with			
their own crea	ative wa	ys to solve them	•						
8. Discuss how improve the states	8. Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the student's understanding.								
		III	. CO	URSE CONTENT					
			III(a)	. Theory PART					
Module-1: Introduction to Artificial Intelligence, Definition and Scope of Artificial       8 Hrs         Intelligence, Historical Development and Milestones, Types of AI: Narrow vs.       8									

General	Probler	n-solv	ing A	pproad	ches i	n AI, (	Overvi	ew o	f Al	I Ap	plica	atic	ons.					
Textboo	ok1: Cha	apter	1-3															
	vols. ?	-																
	- <b>?</b> •Rasic	s of M	Iachin	e I ea	mina	Intro	duction	to N	/lac	hine	Lea	rni	na '	Tune	s of	8	H1	
Machine	-2.Dasic Learnir	s of w	pervis	ed, Ur	nsupe	rvised	, Rein	force	men	nt Le	earni	ng.	ng, Dat	a ype	5 01	0	1 1 1	.3
Represe	ntation a	nd Fe	ature l	Engine	ering	, Mod	lel Tra	ining	anc	l Ev	alua	tion	1,					
Overfitt	ing and I	Under	fitting	•														
Textboo	ok2: Cha	apter	1-4															
RBT L	evels: 2,	4																
Module	-3:Class	ical M	Iachin	e Lear	ming	Algori	ithms,	Line	ar R	legr	essio	on a	nd l	Logis	tic	8	Hı	.s
Regress	on, Dec	ision [	Frees a	and Ra	andon	n Fore	sts, Su	ppor	t Ve	ecto	r Ma	ichi	nes	(SVN	Л),			
k-Neare	st Neigh	bors (	k-NN)	, Clus	tering	g Algo	rithms	: K-N	Mea	ns,	Hiera	arc	пса	l				
Clustern	ng																	
Textboo	ok2: Cha	apter	6-9															
RBT L	evels:2,	3,4					_											
Module Introduce	-4:Neura	al Net	works	and D	Deep L	Learnii	ng, Ba	sics o	of N		al Ne	etw	orks	,		8	Hı	S
Convolu	tional N	Jeep L	Netwo	ig, Bu vrks (C	NNs	g and 1 ) for Ii	I rainii mage l	ig Ne	ura	i ne	Reci	rks,	ent	Veura	1			
Network	s (RNN	s) for	Seque	nce D	ata.	) 101 11	inage i	ACCO2	Sint	1011,	Rec	un		vcur	11			
Textbo	k3. Ch	nter	1-10															
DRTI																		
KDI L Madula	5. A mali	<b>,</b> ,4	d	E4hio			4:000	Decl		له اس	A	1:	4:04	a of	AT	0	TL.	
and MI	-5:Appli Ethical	Consi	is and	Ethica	al Cor d Bia	isidera	ations, Iachin	Real	-W0 rnir	oria ng 1	Appi Evol	llC8 ain	uion abili	lS OI A tv. an	AI d	8	HI	.s
Interpret	ability i	n ML	Mode	ls. AI	and N	AL Re	gulatio	ons ai	nd (	Ig, I Guid	leline	es.	aom	ty an	u			
				,			8					• • •						
Textboo	k1 : Ch	apter	27															
RBT L	ok2 : Ch evels:2.3	apter 3.4	11															
										EC								
	<b></b>					UUKS		<u>.</u>		EQ						<u> </u>		
CO1	Unders Machin	stand t	ne tun		ntal c	oncept	ts and	princ	iple	es of	Arti	111C	iai I	ntelli	gence	(AI)	) ar	ıd
	Wiacini		unnig	(IVIL).	•													
CO2	Gain p	ractica	al knov	wledge	e in b	asic M	IL algo	orithr	ns a	and t	techn	niqu	ies.					
CO3	Develo	p skil	ls in p	robler	n-solv	ving us	sing A	I and	MI	_ ap	proa	che	es.					
CO4	Explor	e real-	world	appli	cation	is and	ethica	l con	side	erati	ons i	in A	AI ar	nd Ml	L.			
			V. C	)-PO	-PSO	МАР	PING	(ma	rk F	1=3·	: M=	2:1	·1	)				
PO/PS	1 2	3	4	5	6	7	8	9	1	10	11	, _	12	, S1	S2	S	3	<b>S</b> 4

r			1	1					1	1	1	1			
0															
CO1	2	2	2												
CO2	2	2	2												
CO3	2	2	2												
CO4	2	2	2												
					VI.	Asses	smen	t Det	ails (C	CIE &	SEE)				
Gene	ral R	ules:	Refer A	Annex	ure see	ction 1									
Asses	smen	t Det	ails (b	oth C	IE ar	nd SE	E):R	efer A	nnexu	re secti	on 1				
Seme	Semester End Examination (SEE): Refer Annexure section 1														
	VII. Learning Resources														
VII(a	VII(a): Textbooks:														
Sl. No.	Title	e of th	ne Boo	ok		Nam	e of th	ne aut	hor		Edit Yea	tion and r	Name publisl	of the her	
1	Arti	ficial	Intelli	gence	A	Stuar	t Russ	ell an	d Pete	er	2020	)	Pearson	n	
	Mod	lern A	pproa	ch		Norvi	g								
2	Hand Lear Lear Tens	ds-On ming v m, Ke sorFlo	Mach with S ras, ar	nine cikit- nd		Aurél	ienGé	éron			2019	)	O'Reill	y Med	ia
3	Deej	p Leai	rning			Ian G Yosh Cour	oodfe uaBen ville	llow, 1gio, a	and Aa	aron	2016	5	MIT Pi	ress	
VII(c	): We	eb linl	ks and	l Vide	o Leo	ctures	(e-Re	esour	ces):						
1. http 2. http 3. http	VII(C): Web IINKS and Video Lectures (e-Resources):         1. https://www.coursera.org/collections/best-machine-learning-ai         2. https://nptel.ac.in/courses/106105077         3. https://www.youtube.com/watch?v=5NgNicANyqM&ab_channel=freeCodeCamp.org														
VIII:	Activ	vity B	ased ]	Learn	ing /	Practi	cal B	ased	Learn	ing/E	xperie	ntial lea	rning:		
Activ	ity Ba	used L	earnir	ıg (Su	ggeste	ed Act	ivities	s in C	lass)/ ]	Practic	al Bas	sed learni	ing		
• Qui	• Quizzes														
	ianma	onte													

AssignmentsSeminar



Semester:	II	Course Type:			PEC						
Course Tit	le: Mot	oile Computing									
Course Coo	le:	23MCAE222			Credits:	3					
Teach	ing Ho	urs/Week (L:T:	:P:O)	2:2:0:0	Total Hours:	40					
CIE Mark	s: 50	0 SEE Ma	arks:	50	Total Marks:	100					
SEE Typ	e:	Т	heory		Exam Hours:	3 Hrs					
I. Cours	e Obje	ctives:									
<ul> <li>Course objectives.</li> <li>Understand the fundamental concepts and principles of mobile computing.</li> <li>Gain practical knowledge in mobile application development.</li> <li>Develop skills in mobile network communication and protocols.</li> <li>Explore mobile operating systems and their features.</li> <li>Stay informed about the latest trends and technologies in mobile computing.</li> <li>II. Teaching-Learning Process (General Instructions):</li> </ul>											
These are sample Strategies, which teachers can use to accelerate the attainment of the various course											
outcomes.											
1. Lecturer met methods could	thod (L) be adopt	need not to be onl ted to attain the ou	ly tradi itcome	tional lecture method, es.	but alternative effecti	ve teaching					
2. Use of Video	o/Anima	tion to explain fur	nctioni	ng of various concepts							
3. Encourage c	ollabora	tive (Group Learn	ing) Lo	earning in the class.							
4. Ask at least	three HC	OT (Higher order ]	Thinkiı	ng) questions in the cla	ss, which promotes cr	itical thinking.					
5. Adopt Probleskills such as the	em Base ne ability	d Learning (PBL) to design, evalua	,which te, gen	fosters student's Anal heralize, and analyze in	ytical skills, develop formation rather than	lesign thinking simply recall it.					
6. Introduce To	opics in r	nanifold represent	tations								
7. Show the dif	ferent w	ays to solve the sa	ame pr	oblem and encourage t	he students to come u	p with					
their own creat	ive ways	s to solve them.									
8. Discuss how the student's up	every conderstant	oncept can be app ding.	lied to	the real world and who	en that's possible, it he	elps to improve					
	III. COURSE CONTENT										
III(a). Theory PART											
Module-1: Int	roductio	on to Mobile Co	mputi	ng, Definition and S	cope of Mobile	8 Hrs					
Computing, E	volutio	n of Mobile Con	nputin	g, Mobile Devices ar	nd Platforms,						
Mobile Appli	Mobile Applications and Services, Challenges in Mobile Computing.										

Textbo	ok1	: Cha	pter	1-3												
RBT L	evel	s: 2														
Module	-2: ]	Mobi	le Ap	olicati	on De	velop	ment,	Basics	s of M	obile	App D	Develo	pment	t, 8	Hrs	
Native	vs. (	Cross	-Platfo	orm D	evelop	oment	, Intro	ductio	on to A	ndroi	d and	iOS	1			
Develo	pme	nt, A	pp De	ploym	ent ar	nd Dis	tributi	on, U	ser Int	erface	Desig	gn for	Mobi	le		
Apps.	-	-									-	-				
Textbo	ok2	: Cha	pter	1-5												
RBT I	Leve	els: 2,	3													
Module	-3:1	Mobi	le Net	work	Comn	nunica	tion, l	Mobil	e Com	munic	cation	Techr	nologi	es: 8	Hrs	
2G to 5	G, V	Virele	ess Co	ommui	nicatio	on Pro	tocols	: Blue	tooth,	Wi-Fi	, NFC	C, Mot	oile			
Sensing	g and	l Con	text A	waren	ness, I	Locatio	on-Ba	sed Se	rvices	s, Mob	ile Cl	oud				
Compu	ting	•														
Textbo	ok1	: Cha	pter	4-7												
RBT I	Leve	els:2,3	3,4													
Module	-4:1	Mobi	le Ope	erating	g Syste	ems, C	Overvi	ew of	Mobi	le Ope	rating	Syste	ems,	8	Hrs	
Androi	d Ar	chited	cture a	and Co	ompor	nents,	iOS A	rchite	cture a	and Co	ompor	nents,	Securi	ity		
in Mob	ile (	Operat	ting S	ystem	s, Upc	lates a	ind Ap	p Sto	res.							
Textbo	ok3	: Cha	pter	1-4												
RBT I	Leve	els:2,3	3,4													
Module	-5:	Adva	nced <sup>-</sup>	Fonics	and F	Emerg	ing Tr	ends.	Wear	able C	ompu	ting ar	nd	8	Hrs	
Internet	of '	Thing	s (IoT	). Au	pment	ed Re	ality (	AR) a	nd Vi	rtual R	leality	(VR)	. Mob	ile	1115	
Edge C	omr	outing	(ME)	C). M	bile S	Securi	tv Bes	t Prac	tices.	Future	e Dire	ctions	in			
Mobile	Cor	nputi	ng.	- / )			- J		,							
Textbo	ok3	: Ch	apter	7-11												
RBT I	Leve	ls:2,3	- 3,4													
		,	,													
				1 0			JUKS			MES						
CO1	U	nders	tand t	he fun	dame	ntal co	oncept	s and	princi	ples of	t mobi	ile cor	nputir	ıg.		
CO2	G	ain pı	actica	al knov	wledg	e in m	obile	applic	ation	develo	pmen	t.				
CO3	D	evelo	p skil	ls in n	nobile	netwo	ork con	mmun	icatio	n and j	protoc	cols.				
CO4	E	xplore	e mob	ile op	erating	g syste	ems an	nd thei	r featı	ires.						
	<u> </u>			V. CO	D-PO	-PSO	MAP	PING	(mar	k H=3	; M=2	2; L=1	)			
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	<b>S</b> 4
0																
CO1	2	1	2										1			
C02	2	1 2	2 1										2	1		
CO3	2 2	<u> </u>	2											1	1	

#### VI. Assessment Details (CIE & SEE) General Rules: Refer Annexure section 1 Assessment Details (both CIE and SEE) : Refer Annexure section 1 Semester End Examination (SEE): Refer Annexure section 1 **Learning Resources** VII. VII(a): Textbooks: Name of the SI. **Edition and** Title of the Book Name of the author No. Year publisher 1 Mobile Computing: Asoke K. Talukder and 2012 McGraw-Hill Education Technology, RoopaYavagal Applications, and Service Creation 2 Mobile Application Chris Haseman 2010 O'Reilly Media Development

#### VII(c): Web links and Video Lectures (e-Resources):

1. https://www.coursera.org/learn/illinois-tech-mobile-computing-and-cloud

2.https://archive.nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

 $3.\ https://www.youtube.com/playlist?list=PLV8vIYTIdSnZMKTQSTxWbx4NGNfxyZq_N$ 

#### VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

• Quizzes

- Assignments
- Seminar



Semester:	II Co	urse Type:			PEC							
Course Title:	Edge Cor	mputing										
Course Code:	23	MCAE223			Credits:	3						
Teaching	g Hours/\	Week (L:T:I	P:O)	2:2:0:0	Total Hours:	40 Hrs						
CIE Marks:	50	SEE Mai	rks:	50	Total Marks:	100						
SEE Type:		Tł	neory		Exam Hours:	3 Hrs						
I. Course C	Objective	s:										
Understar	nd the fun	ndamental co	ncept	s and principles of e	dge computing.							
Gain prace	• Gain practical knowledge in edge computing architectures and technologies.											
• Develop skills in deploying and managing edge devices and networks.												
• Explore real-world applications and challenges in edge computing.												
• Stay informed about the latest trends and technologies in the field.												
II. Teaching-Learning Process (General Instructions):												
These are sample Strategies, which teachers can use to accelerate the attainment of the various course												
outcomes.												
1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.												
2. Use of Video/A	nimation t	o explain func	ctionii	ng of various concepts.								
3. Encourage colla	borative (	Group Learnii	ng) Le	earning in the class.								
4. Ask at least three	e HOT (H	igher order T	hinkir	ng) questions in the cla	ss, which promotes cr	itical thinking.						
5. Adopt Problem skills such as the a	Based Lea bility to de	urning (PBL),v esign, evaluate	which e, gen	fosters student's Anal eralize, and analyze in	ytical skills, develop formation rather than	design thinking simply recall it.						
6. Introduce Topic	s in manif	old representa	tions.									
7. Show the different	ent ways to	o solve the sar	ne pro	oblem and encourage t	he students to come u	p with						
their own creative	ways to so	olve them.	•	C C		•						
8. Discuss how events the student's under	ery concep rstanding.	ot can be appli	ed to	the real world and whe	en that's possible, it he	elps to improve						
		III.	CO	URSE CONTENT								
		Ι	II(a)	. Theory PART		_						
Module-1:Introd	luction to	Edge Comp	uting	, Definition and Scor	be of Edge	8 Hrs						
Computing, Evol	lution and	I Motivation	for E	dge Computing, Key	Components:							
Edge Devices, E	dge Serve	ers, Edge Net	work	s, Edge vs. Cloud Co	omputing,							
Applications and	Use Case	es of Edge C	ompu	iting.								
Textbook1: Chapter 1-3												

RBT Le	evel	s: 2														
Module-2:Edge Computing Architecture, Architectural Components of Edge Computing, Fog Computing vs. Edge Computing, Edge Device Communication Protocols, Edge Server Configurations and Topologies, Security Considerations i Edge Architecture.												ge ation ions ir	n 8	Hrs		
Textbo	ok1:	: Cha	pter	4-7												
RBT L	eve	ls: 2,	4													
Module and Corr QoS and Edge Er	e <b>-3:</b> E figu d Ne tviro	Edge iratio etwor onme	Devic ns, De k Slic nts.	e and evice l ing in	Netw Manaş Edge	ork M gemen Netwo	anage t Prote orks, N	ment, ocols, Monit	Edge Edge oring	Devic Netwo and Tr	e Cha ork Co ouble	racteri onfigu shooti	istics ration ng in	s, 8	Hrs	
Textbo	ok1:	: Cha	pter	8-11												
RBT L	eve	ls:2,3	,4													
Module Smart C Autonor	e <b>-4:</b> A cities mou	Appli s and s Sys	cation Edge tems,	s of E Comp Gami	dge C outing ng an	ompu , Heal d Ente	ting, I thcare ertainn	ndust Appl nent a	rial Io ication t the E	T and ns, Edg Edge.	Edge ge Co	Comp mputii	uting, ng in	8	Hrs	
Textbo	ok3:	: Cha	pter	12-15												
RBT L	eve	ls:2,3	5,4													
Module Security Edge Co Textboo	e-5: A and omp	Advar d Priv uting : Cha	nced 7 vacy C , Futu apter	Topics Challer Ire Dir <b>16-18</b>	and H nges, l ectior	Emerg Edge ( as in E	ing Tr Compu dge C	ends, uting i ompu	Mach n 5G ting.	ine Le Netwo	arning rks, B	g at the	e Edge hain a	e, 8 nd	Hrs	
	eve	18:2,3	9,4						TTCO							
C01	Uı	nders	tand t	he fun	dame	ntal co	oncept	s and	princi	ples of	fedge	comp	outing.			
	Ga	ain pr	actica	ıl knov	vledg	e in ec	lge co	mputi	ng arc	hitectu	ires a	nd tec	hnolog	gies.		
	De	evelo	p skil	ls in d	eployi	ing an	d man	aging	edge	device	s and	netwo	orks.			
	Ех	plore	e real-	world	appli	cation	s and	challe	nges i	n edge	com	outing	•			
04		-				200			-							
	<b>V. CO-PO-PSO MAPPING</b> (mark H=3; M=2; L=1)															
PO/PS 0	1	Ζ	3	4	5	0	/	8	9	10	11	12	51	52	53	54
CO1	CO1         2         2         1															
CO2	2	1	1													
CO3																
CO4	2	2	2													
					VI.	Asses	smen	t Deta	ails (C	CIE &	SEE)					
Genera	General Rules: Refer Annexure section 1															

#### Assessment Details (both CIE and SEE) : Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

#### VII. Learning Resources

#### VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Edge Computing:	Danda B. Rawat, Joel J.P.C.	2021	Wiley
	Models, Technologies,	Rodrigues, and Ivan		
	and Applications	Stojmenović		

#### VII(c): Web links and Video Lectures (e-Resources):

1. https://onlinecourses.nptel.ac.in/noc24\_cs66/preview

2. https://www.udemy.com/course/introduction-to-edge-computing/

#### VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminar



Semester:	II	Co	urse Type:			PEC					
Course Tit	t <b>le:</b> Dig	ital N	Iarketing								
Course Coo	le:	23	MCAE224			Credits:	3				
Teach	ing Ho	ours/V	Week (L:T:	:P:O)	2:2:0:0	Total Hours:	40 Hrs				
CIE Mark	s: 5	0	SEE Ma	arks:	50	Total Marks:	100				
SEE Typ	e:		Г	heory		Exam Hours:	3 Hrs				
				I. (	Course Objectives:						
<ul> <li>Develop a foundational understanding of digital marketing concepts for non-commerce students.</li> <li>Introduce basic digital marketing tools and platforms to computer application students.</li> <li>Familiarize students with fundamental principles of consumer behavior applicable to digital marketing.</li> <li>Provide introductory awareness of emerging trends and technologies in digital marketing.</li> <li>Emphasize ethical considerations and best practices relevant to the beginner level of digital marketing knowledge.</li> </ul>											
	II. Teaching-Learning Process (General Instructions):										
These are sample Strategies, which teachers can use to accelerate the attainment of the various course.											
outcomes. 1. Lecturer methods could	<ul><li>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</li><li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching</li></ul>										
2. Use of Video	o/Anima	ation t	o explain fur	nctionii	ng of various concepts.						
3. Encourage c	ollabora	tive (	Group Learn	ing) Le	earning in the class.						
4. Ask at least	three H	H) TC	ligher order T	Fhinkir	g) questions in the cla	ss, which promotes o	ritical thinking.				
5. Adopt Probl skills such as th	em Bas ne abilit	ed Lea y to de	arning (PBL) esign, evalua	,which te, gen	fosters student's Anal eralize, and analyze in	ytical skills, develop formation rather that	design thinking simply recall it.				
6. Introduce To	opics in	manif	old represent	tations.							
7. Show the difference of the	ferent v	vays to	o solve the sa	ame pro	oblem and encourage t	he students to come	up with				
their own creat	ive way	s to so	olve them.								
8. Discuss how the student's up	v every o nderstar	concep iding.	ot can be app	lied to	the real world and whe	en that's possible, it l	elps to improve				
			III	. CO	URSE CONTENT						
				III(a)	. Theory PART						
Module-1:Int traditional to i implications f	roducti moderr for busi	on to era, i ness d	Digital Ma Role of Inte & society; E	rketing ernet; ( Emerge	g Evolution of Digita Current trends, Info-gence of digital marke	Il Marketing from graphics, ting as a tool;	8 Hrs				
Drivers of the new marketing environment; Digital marketing strategy; P.O.E.M.											

framework, Digital landscape, Digital marketing plan, Digital marketing models.	
Textbook1	
<b>RBT Levels: 2</b>	
Module-2: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.	8 Hrs
Textbook2: Chapter 1-5	
RBT Levels: 2, 3	
<b>Module-3:</b> Social Media Marketing – Role of Influencer Marketing, Tools & Plan– Introduction to social media platforms, penetration & characteristics; Building a successful social media marketing strategy Facebook Marketing: - Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools Linkedin Marketing: - Introduction and Importance of Linkedin Marketing, Framing Linkedin Strategy, Lead Generation through Linkedin, Content Strategy, Analytics and Targeting Twitter Marketing: - Introduction to Twitter Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter Advertising Campaigns Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics Introduction to social media metrics	8 Hrs
Textbook1: Chapter 4-7	
RBT Levels:2,3,4	
Module-4:Mobile Usage, Mobile Advertising- Mobile Advertising Models, advantages of Mobile advertising, Mobile Marketing Toolkit, Mobile Marketing features- Location based services, Social marketing on mobile, QR Codes, Augmented Reality, Gamification, Tracking mobile campaigns- Mobile Analytics. Live Project: Create a mobile advertising project.	8 Hrs
Textbook3: Chapter 1-4	
RBT Levels:2,3,4	
Module-5:Search Engine Optimization: How search engines work, concept of search engine optimisation (SEO), On Page Optimisation, Off Page Optimisation, Social media Reach, Maintenance- SEO tactics, Google Search Engine, Web Analytics- Key Metrics- concepts only.	8 Hrs
Textbook3 : Chapter 7-11	
RBT Levels:2,3,4	

						IV. CO	OURS	SE OU	TCO	MES						
CO	Apply foundational digital marketing knowledge to assess online promotional strategies.															
CO2	CO2   Demonstrate familiarity with essential digital marketing tools and their basic functionalities.															
COS	3 U	Inders	tand b	basic co	onsui	mer bel	havioi	r princ	iples 1	releva	nt to d	igital	mar	keting	practic	es.
CO4	CO4 Identify current trends in digital marketing within the context of introductory-level understanding.															
				V. CO	)-PO	)-PSO	MAP	PING	(marl	k H=3	; M=2	; L=1	)			
PO/PS O	1	2	3	4	5	6	7	8	9	10	11	12	S	1 S2	S3	S4
CO1	2	2	1										1			
CO2	2	$\frac{2}{2}$	$\frac{1}{2}$											2		
CO3     1     2     2       CO4     2     2     1																
	VI. Assessment Details (CIE & SEE)															
Gener	al R	ules:	Refer	Annexu	ire se	ction 1										
Assess	smer	t Det	ails (b	ooth C	IE a	nd SEI	E):R	efer A	nnexur	e secti	on 1					
Semes	ter l	End E	xami	nation	(SE	E): Ref	fer An	nexure	sectio	n 1						
						VII	[ <b>.</b> L	earni	ng Re	sourc	es					
VII(a)	: Te	xtboo	ks:													
Sl. No.	Titl	e of th	ne Boo	ok		Name	e of th	ie aut	hor		Edit Yea	tion a r	nd	Name publis	of the her	
1	Digi Ana	ital Ma lytical	arketi I Appi	ng: An roach		Avina Ledfo	ısh Ka ord	aushik	, Jerri	L.	2020	)		Wiley		
2	Digi Stra and	ital Ma tegy, l Practi	arketi Imple ce	ng: mentati	ion,	Dave Chady	Chaff wick	ey, Fi	ona El	llis-	2021	l		Pearso	n	
VII(c)	: We	eb linl	ks and	d Vide	o Le	ctures	(e-Re	sourc	es):							
1. http 2. http	s://n s://w	ptel.ac ww.y	c.in/cc outub	ourses/1 e.com/	l 101 watc	04070 h?v=n	U-IIX	BWIS	4&ab_	_chan	nel=Si	mplil	earn	l		
VIII:	Acti	vity B	ased	Learni	ing /	Practi	cal B	ased I	earni	ing/Ey	xperie	ntial	lear	ning:		
Activi	ty Ba	ased $\overline{L}$	earnii	ng (Sug	ggest	ted Act	ivities	$\sin Cl$	ass)/ I	Practic	al Bas	sed lea	arnir	ng		
• Quiz	zes															

- AssignmentsSeminar



Semeste	r:	II	Course Type:			PCCL										
Course Ti	le: D	SA La	boratory													
Course (	Code:		23MCAL207			Credits:	2									
Tea	chin	g Hou	rs/Week (L:T:	<b>P:O</b> )	0:2:2:0	Total Hours:	40									
CIE Ma	rks:	50	SEE Ma	rks:	50	Total Marks:	100									
SEE T	ype:		Lat	orato	ry	Exam Hours:	3									
				I. (	Course Objectives:											
<ul> <li>Der</li> <li>Enher</li> <li>env</li> <li>Ana</li> <li>Approx</li> </ul>	<ul> <li>Demonstrate hands-on proficiency in implementing data structures and algorithms.</li> <li>Enhance problem-solving skills through diverse algorithmic challenges in a coding environment.</li> <li>Analyze and optimize algorithms, gaining practical insights into their efficiency.</li> <li>Apply data structures and algorithms to solve real-world problems, translating theory into practice.</li> </ul>															
1		II. 7	<b>Feaching-Lea</b>	ning	Process (General In	structions):										
These are sa outcomes. 1. Lecturer in methods con 2. Use of Vi 3. Encourag 4. Ask at lea 5. Adopt Pro- skills such a 6. Introduce 7. Show the their own cr 8. Discuss h the student'	mple netho ild be deo/A e colla st thro oblem s the a differ eative ow ev s unde	Strateg d (L) no adopted aborativ ee HOT Based ability t cs in ma rent way ways t very cor erstandi	ies, which teach eed not to be onl d to attain the ou on to explain fur ve (Group Learn C (Higher order T Learning (PBL) to design, evalua anifold represent ys to solve the sa to solve them. neept can be app ng.	ers can y tradi itcome actionin ing) Le Thinkir which te, gen ations. ame pro-	tional lecture method, s. ng of various concepts. earning in the class. ng) questions in the cla fosters student's Anal eralize, and analyze in oblem and encourage t the real world and whe	ttainment of the var but alternative effec ss, which promotes ytical skills, develop formation rather tha he students to come en that's possible, it	ious course etive teaching critical thinking. o design thinking in simply recall it. up with helps to improve									
1 1	rrav	Onerat	III. Frac	ucar	Jomponent – Exper											
I A	nplem rite a	ent a fu program	inction to find th m to reverse an a	e maxi array ir	imum element in an ar 1-place.	ray.										
2 L C Ir	inked reate a nplem	List M a singly ent a fu	<b>Ianipulation:</b> Inked list and inction to detect	mplem a cycle	nent a function to rever e in a linked list.	se it.										
<ul> <li>Stacks and Queues:</li> <li>Implement a stack using arrays and perform basic stack operations.</li> <li>Design a queue using two stacks and demonstrate enqueue and dequeue operations.</li> </ul>																
4	4 Binary Search Tree:															
--	---	-------------------	----------	---------------	----------------	---------------	-----------	----------	-------------------	---------------------	-------------------	----------	---------	----------	--------	-----
	Create a binary search tree and perform an in-order traversal.															
	Im	pleme	ent a fi	unctior	n to fin	d the h	neight o	of a bi	nary tr	ee.						
5	Gr	aph '	Frave	rsal:					_							
	Im	pleme	ent a d	epth-fi	rst sea	rch (D	FS) alg	gorithr	n for a	graph						
	De	velop	a brea	adth-fi	rst seai	ch (Bl	FS) alg	orithm	n for g	raph tra	aversal	•				
6	Sol	rting	Algor	ithms												
	Im	pleme	ent the	quicks	sort alg	gorithn	n to so	rt an ai	rray.							
7	wr	ite a	progra	m to p	erform	merge	e sort c	on a gr	ven lis	t.						
/	Sea		ng Alg	gorithi	ns:		سبية أرمه									
	Implement binary search for a sorted array. Develop a linear search algorithm to find an element in an array															
8	Develop a linear search algorithm to find an element in an array.     Dynamic Programming:															
0	8 Dynamic Programming:															
	Solve the Fibonacci sequence using dynamic programming. Implement the Knapsack problem solution															
9	9 Creedy Algorithms:															
,	5 Greedy Algorithms: Solve the Fractional Knapsack problem using a greedy approach															
	Implement Dijkstra's algorithm for the shortest path in a graph.															
10	Implement Dijkstra's algorithm for the shortest path in a graph.       10       Hashing:															
10	Create a hash table and implement basic operations like insert and search.															
	Implement a program to detect duplicate elements in an array using hashing.															
11	11 <b>Priority Queues:</b>															
	Develop a priority queue using a max-heap.															
	Implement a program to merge k sorted arrays using a priority queue.															
12	12 Advanced Data Structures:															
	Implement a trie data structure for efficient string search.															
	Create and manipulate a self-balancing binary search tree (e.g., AVL tree).															
13	3 Algorithm Optimization:															
	Op	timiz	e a bas	sic sort	ing alg	gorithn	n for si	nall in	put siz	zes.						
14	De	velop	an op	<u>timize</u>	d algoi	<u>ithm t</u>	o find	the nth	n Fibor	nacci n	umber.					
14	Alg	goritl	ım Efi	ficienc	y Ana	lysis:		c ·		• •						
	An	alyze	the th	ne and	space	comp	lexity (	of a gr	ven alg	gorithm	l.	111.				
15		mpar	e the p	ertorn		of two	sorting	algor	ithms	using r	eal-wo	ria dat	a.			
15	Im	al-wo	oria A	olgorit	hm to	find or	nnooto	d com	nonon	to in o	social	notwo	rk arar	h		
	Sol	picina Ive a i	real_w	orld pr	nn io oblem	using	a cuita	ble da	iponen ta stru	is III a cture a	sociai nd algo	rithm	combi	nation		
	501	lvea	Ical-w	onu pi	1	V C				MFS	ilu aigo	Jium	como	nation	•	
~~~	Do	volor	oodin	a agili	tu bu c	ficior	ours		nting	lgorith	mani	thin tir	no con	atroint	0	
C01	De	velop	Courr	ig agin	ty Uy t		itty ini	pieme	nung a	ugonu	IIIS WI	unn un		strannt	5.	
CO2	Co	llabo	rate wi	ith pee	rs to so	olve co	omplex	progr	ammir	ng chal	lenges,	foster	ing tea	mwor	k.	
CO3	Ac	quire	debug	ging s	kills to	identi	ify and	rectif	y error	s in alg	gorithn	nic imp	olemen	itations	3.	
CO4	Cu	ltivat	e adap	tability	y by ap	plying	g vario	ıs data	struct	ures to	solve	dynan	nic pro	blem s	cenari	os.
	<b>V. CO-PO-PSO MAPPING</b> (mark H=3: M=2: L=1)															
$\begin{array}{c c c c c c c c c c c c c c c c c c c $																
0	$\begin{array}{c c c c c c c c c c c c c c c c c c c $															
CO1	2	2	1										1			
CO3	$\begin{array}{c c c c c c c c c c c c c c c c c c c $															
04	Ζ	Ζ													Z	
					VI	. Asse	ssmer	nt Det	ails (	CIE &	SEE	)				
Genera	l Ru	les:	Refer A	Annex	ure sec	tion 3										
Assessm	Assessment Details (both CIE and SEE): Refer Annexure section 3															
Semest	Semester End Examination (SEE): Refer Annexure section 3															



Recognized by UGC, New Delhi with 2(f) & 12 (B)

#### Master of Computer Applications (MCA)

Seme	mester: II Course Type: PCCL										
Course	Title:	Object	Oriented Progra	mmin	g Laboratory						
Cours	e Cod	e:	23MCAL208			Credits:	2				
r 	Гeachi	ing Ho	urs/Week (L:T	P:O)	0:2:2:0	Total Hours:	40				
CIE	Marks	: 50	) SEE Ma	arks:	50	Total Marks:	100				
SEE	2 Туре	:	Lal	oorato	ry	Exam Hours:	3				
I. Course Objectives:											
<ul> <li>Und class</li> <li>Den agg</li> <li>App Seg</li> </ul>	<ul> <li>Understand the principles of object-oriented design and apply them effectively to design classes and objects</li> <li>Demonstrate a clear understanding of different class relationships such as association, aggregation, and composition.</li> <li>Apply SOLID principles (Single Responsibility, Open/Closed, Liskov Substitution, Interface</li> </ul>										
	II. Teaching-Learning Process (General Instructions).										
These and course of	e samp utcom	ple Stra es.	tegies, which te	achers	s can use to accelerate	e the attainment of	f the various				
1. Lectu teaching	rer me metho	thod (L ods cou	.) need not to be ld be adopted to	only t attain	traditional lecture me the outcomes.	ethod, but alternati	ve effective				
2. Use o	f Vide	o/Anin	nation to explain	funct	ioning of various cor	ncepts.					
3. Encou	irage c	collabo	ative (Group Le	arning	g) Learning in the cla	ISS.					
4. Ask a thinking	t least	three H	IOT (Higher ord	er Thi	inking) questions in t	he class, which pr	omotes critical				
5. Adop thinking than sim	t Probl skills ply rec	em Bas such as call it.	sed Learning (PI s the ability to do	BL),wi esign,	hich fosters student's evaluate, generalize,	s Analytical skills, and analyze infor	develop design mation rather				
6. Introd	luce To	opics ir	manifold repres	sentati	ions.						
7. Show	the dif	fferent	ways to solve th	e sam	e problem and encou	rage the students	to come up with				
their ow	ir own creative ways to solve them.										
8. Disc improv	uss ho e the s	w ever	y concept can be s understanding	appli	ed to the real world a	and when that's po	ssible, it helps to				
			III. Prac	tical (	Component – Exper	riments					
1	Creat	te a Jav	a program demo	nstrat	ing the concept of cla	asses and objects.					
2	Imple	ement a	ı Java program s	howca	asing constructors an	d destructors.					
3	Deve	lop a Ja	ava program illu	stratin	ng class methods and	instance methods	•				

4	4 Design a Java program using access modifiers for encapsulation.															
5	Co an	onstru d con	ict a Ja nposit	ava pr ion.	ogran	n to de	emonst	trate c	lass re	elation	ships:	assoc	iation	, aggre	egation	n,
6	In	plem	ent a	Java p	rogra	m sho	wcasii	ng inh	eritan	ce and	meth	od ove	erridin	ıg.		
7	De	eveloj	p a Ja	va pro	gram	illustr	ating <sub>l</sub>	polym	orphis	sm thro	ough 1	netho	d over	loadin	ıg.	
8	Design a Java program demonstrating polymorphism at runtime.															
9	Construct a Java program using abstract classes and interfaces.															
10	10Implement a Java program showcasing encapsulation and information hiding.															
11	11Develop a Java program applying SOLID principles for better design.															
12	12   Design a Java program implementing the Singleton design pattern.															
13	3 Construct a Java program using the Factory design pattern.															
14	14Implement a Java program illustrating the Observer design pattern.															
15	15Develop a Java program applying generics for a generic class and method.															
					]	IV. C	OURS	SE OU	JTCO	MES						
CO1	In	nplem	nent ol	oject-o	oriente	ed pro	grams	in Jav	va witl	h clari	ty and	effici	ency.			
CO2	D	esign	effect	ive ob	oject-c	oriente	d solu	tions	using	classe	s and	object	s.			
CO3	U	se des	sign p	atterns	s (Sing	gleton	, Facto	ory, O	bserve	er) to s	olve p	orogra	mmin	g chal	lenges	5.
CO4	Ga ha	ain pr Indlin	oficie g.	ncy in	ı adva	nced c	concep	ots like	e gene	rics, re	eflecti	on, an	d effe	ctive e	except	ion
				V.	CO-I	PO-PS	SO M.	APPI	NG (n	nark H	=3; N	1=2; L	.=1)			
PO/PS	PO/PS 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4															
0	-															
COI	2	2	1										1	2		
$CO_2$	2	1 1												2		
$CO_{4}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $															
04	VI. Assessment Details (CIE & SEE)															
Genera	l Rı	iles:	Refer A	Annex	ure sec	ction 3			- ( '							
Assessn	nen	t Deta	ails (b	oth C	'IE an	d SE	E): Re	fer An	nexure	e sectio	on 3					
Semeste	Semester End Examination (SEE): Refer Annexure section 3															



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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B)

### Master of Computer Applications (MCA)

Semester: II Course Type: PCC												
Course Tit	tle: Rese	earch Methodolo	gy & ]	IPR								
Course Coo	de:	23MCAM209			Credits:	2						
Teach	ning Ho	urs/Week (L:T:	P:O)	2:0:0:0	Total Hours:	25						
CIE Mark	s: 5	0 SEE Ma	arks:	50	Total Marks:	100						
SEE Typ	e:	Т	heory		Exam Hours:	3 Hrs						
			I. (	Course Objectives:								
Grasp	Researc	ch Fundamentals	and P	roblem Definition S	kills.							
Attain	Profici	ency in Research	n Desig	gn and Data Collection	on Techniques.							
Develop Data Interpretation and Report Writing Skills.												
Gain A	Gain Awareness of Intellectual Property Types and Relevant Acts.											
		II. Teaching-I	<b>.earni</b>	ng Process (Genera	l Instructions):							
These are sample Strategies, which teachers can use to accelerate the attainment of the various												
course outcomes.												
1. Lecturer me teaching meth	ethod (I 10ds cou	<ol> <li>need not to be</li> <li>ild be adopted to</li> </ol>	only t attain	raditional lecture me the outcomes.	ethod, but alternative	effective						
2. Use of Vide	eo/Anin	nation to explain	functi	oning of various cor	ncepts.							
3. Encourage	collabo	rative (Group Le	arning	() Learning in the cla	ISS.							
4. Ask at least thinking.	t three H	HOT (Higher ord	er Thi	nking) questions in t	he class, which pror	notes critical						
5. Adopt Prob thinking skills than simply re	olem Ba s such a ecall it.	sed Learning (PI s the ability to de	BL),wl esign, (	nich fosters student's evaluate, generalize,	s Analytical skills, d and analyze inform	evelop design ation rather						
6. Introduce T	Topics in	n manifold repres	sentati	ons.								
7. Show the d	ifferent	ways to solve th	e same	e problem and encou	rage the students to	come up with						
their own crea	ative wa	ys to solve them	•									
8. Discuss how improve the s	w every tudent's	concept can be a understanding.	applied	d to the real world ar	nd when that's possil	ole, it helps to						
		III	. CO	URSE CONTENT								
			III(a)	. Theory PART								
Module-1: R	esearch Motive	Methodology: I	ntrodu	ction, Meaning of F	Research, Objectives	5 Hrs						

of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, andProblems Encountered by Researchers in India.

Textboo	k1								
RBT Le	vels: 2								
Module Problem Problem research methodo findings the sele conceptu	<b>-2:</b> Defining the Research Problem: Research Problem, Selecting the , Necessity of Defining the Problem, Technique Involved in Defining a , An Illustration. Reviewing the literature: Place of the literature review in , Bringing clarity and focus to your research problem, Improving research blogy, Broadening knowledge base in research area, Enabling contextual , How to review the literature, searching the existing literature, reviewing ected literature, Developing a theoretical framework, Developing a tal framework, Writing about the literature reviewed	5 Hrs							
Textboo	k1, 2								
RBT L	evels: 2,3								
Module Design, Design, Importan Design, Types of	-3:Research Design: Meaning of Research Design, Need for Research Features of a Good Design, Important Concepts Relating to Research Different Research Designs, Basic Principles of Experimental Designs, at Experimental Designs. Design of Sample Surveys: Introduction, Sample Sampling and Non-sampling Errors, Sample Survey versus Census Survey, & Sampling Designs.	5 Hrs							
Textboo	k2								
RBT L	evels:2,3,4								
Module Collectio Method Meaning Significa Reports, Writing	<b>4:</b> Data Collection: Experimental and Surveys, Collection of Primary Data, on of 02.03.2021 updated 17/ 104 Secondary Data, Selection of Appropriate for Data Collection, Case Study Method. Interpretation and Report Writing: g of Interpretation, Technique of Interpretation, Precaution in Interpretation, ance of Report Writing, Different Steps in Writing Report, Layout. Types of Oral Presentation, Mechanics of Writing aResearch Report, Precautions for Research Reports.	5 Hrs							
Textboo	k2								
RBT L	evels:2,3,4								
Module Intellectu scenario 2000. Co	-5:Intellectual Property (IP) Acts: Introduction to IP: Introduction to ual Property (IP), different types of IPs and its importance in the present , Patent Acts: Indian patent acts 1970.Design Act: Industrial Design act opy right acts: Copyright Act 1957. Trade Mark Act,1999.	5 Hrs							
	evels:2,3,4								
	IV. COURSE OUTCOMES								
CO1	Apply Research Fundamentals in Problem Solving.								
CO2	Demonstrate Effective Research Design and Data Collection Competence.								
CO3	CO3 Apply Skills in Data Interpretation and Report Writing.								

CO	CO4 Understand and Address Intellectual Property Issues in Practical Contexts.															
				V.CO	)-PO	-PSO	MAP	PINC	G (mar	k H=3	; M=2	; L=1)	)			
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	<b>S</b> 1	S2	<b>S</b> 3	S4
0																
CO1	2	2	1										1			
CO2	2	1	1											1		
CO3	1	2	1												2	
CO4	2	2	1													1
					VI.	Asses	smen	t Det	ails (C	IE &	SEE)					
Gener	ral R	ules:	Refer	Annexu	ure se	ection 1										
Asses	smei	nt Det	ails (t	ooth Cl	IE ai	nd SEI	E): Re	fer Aı	nnexure	e sectio	on 1					
Seme	ster	End E	xami	nation	(SE	E): Ref	fer An	nexure	e sectio	n 1						
						VII	[. L	earni	ng Re	source	es					
VII(a)	): Te	xtboo	ks:													
Sl. No.	Sl. No.Title of the BookName of the authorEdition and YearName of the publisher															
1	Res	earch	Metho	odology	y:	C.R.K	Kothar	i,Gau	ravGa	rg	2018	3	N	JewAg	eInter	natio
	Met	hods a	and Te	echniqu	ies			-				n	al			
2	Res	earch	Metho	odology	y a	Ranji	t Kum	ar			2011	1	S	lage		
	step	-by- s	tep gu	ide for												
	beg	inners	1			D 1'			1		2017	<u> </u>			1	•
	Inte	llectua	a proj	perty		Debir	ag E.	Bouc	noux		2013	5	C	engag	je lear	nıng
VII(b	): Re	eferen	ce Bo	oks:							I					
1	Res	earch	Metho	ods: the	•	Troch	im	2	2005				A	tomic	Dog	
	con	cise kı	nowle	dge bas	se								P	ublish	ing	
2	Cor	ductir	ng Res	search				2	2009				S	age		
	Lite	rature	Revie	ews: Fr	om											
	the	Intern	et to F	Paper Fi	ink											
VII(c)	): W	eb lin	ks and	d Video	o Le	ctures	(e-Re	sour	ces):							
1. http	1. https://onlinecourses.nptel.ac.in/noc22_ge08/preview															
2. http	os://w	/ww.c	oursei	ra.org/l	earn	resear	ch-me	thode	ologies							
VIII.	Acti	vity P	acad	Loorni	ng /	Draati	col D	neod 1	Loorn	ing/F-	morio	ntiall	00 mm	ina		
			ased		ng /							<u>11</u>	· ·	mg:		
Activi	ty B	ased L	earni	ng (Sug	ggest	ed Act	ivities	1n C	iass)/ ł	ractic	al Bas	sed lea	rnıng	г <b>,</b>		

- QuizzesAssignments
- Seminar





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## Master of Computer Applications (MCA)

Semester:	2	Course	e Type:		AEC							
Course Title:	AWS	Cloud Fo	oundations									
Course Cod	le:	23MC.	AAE21		Credits:	2						
Teach	ing Ho	ours/Wee	ek (L:T:P:O)	0:1:2:1	Total Hours:	40						
CIE Marks	s: 5	0 5	SEE Marks:	50	Total Marks:	100						
SEE Type	e: The	eory/prac	ctical/other as	ssessment(mention)	Exam Hours:	2						
I. Course Objectives:												
<ol> <li>Develo princip</li> <li>Gain p service</li> <li>Learn best pr</li> <li>Acquin resource</li> <li>Prepar skills a</li> </ol>	<ol> <li>Course Objectives:         <ol> <li>Course Objectives:</li> </ol> </li> <li>Develop a foundational understanding of AWS Cloud services and their basic architectural principles.</li> <li>Gain proficiency in navigating the AWS Management Console and using key AWS services.</li> <li>Learn about cloud security and compliance, including shared responsibility models and best practices.</li> <li>Acquire knowledge of billing, account management, and pricing models for efficient resource utilization.</li> <li>Prepare for the AWS Certified Cloud Practitioner exam, demonstrating essential cloud skills and knowledge.         </li> <li>II. Teaching-Learning Process (General Instructions):         These are sample Strategies, which teachers can use to accelerate the attainment of the various course         </li> </ol>											
1. Lecturer me	ethod (I	L) need n	ot to be only	a traditional lecture n	nethod, but alterna	tive effective						
teaching m	ethods	could be	adopted to a	ttain the outcomes.								
2. Use of Vide	eo/Anin	nation to	explain func	tioning of various cor	ncepts.							
3. Encourage	collabo	orative (G	roup Learnin	g) Learning in the cla	SS.							
4. Ask at least thinking.	three H	HOT (Hiş	gher order Th	inking) questions in t	he class, which pro	omotes critical						
5. Adopt Prob	lem Ba	ised Lear	ning (PBL), v	which fosters students	' Analytical skills,	, develop design						
thinking ski	ills sucl	h as the a	bility to desi	gn, evaluate, generaliz	ze, and analysed in	formation rather						
than simply	recall	it.										

6. Introduce Topics in manifold representations.

- 7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
- 8. Discuss how every concept can be applied to the real world and when that's possible, it helps improve the students' understanding.

III(a).Theory PART	
M. J. L. 1	
Module-1	Hrs 8
Heading: Cloud Concepts         1.1 Define the AWS Cloud and its value proposition.         • Define the benefits of the AWS cloud including:         • Security o Reliability         • High Availability         • Elasticity         • Agility         • Pay-as-you go pricing o Scalability         • Global Reach o Economy of scale         • Explain how the AWS cloud allows users to focus on business value o Shif resources to revenue-generating activities as opposed to managing infrastructure         1.2 Identify aspects of AWS Cloud economics         • Define items that would be part of a Total Cost of Ownership proposal         • Understand the role of operational expenses (OpEx)         • Understand labor costs associated with on-premises operations         • Understand the impact of software licensing costs when moving to the cloud         • Identify which operations will reduce costs by moving to the cloud         • Right-sized infrastructure         • Benefits of automation         • Reduce compliance scope (for example, reporting)         • Managed services (for example, RDS, ECS, EKS, DynamoDB)         1.3 Explain the different cloud architecture design principles         • Explain the design principles         • Design for failure         • Decouple components versus monolithic architecture         • Implement elasticity in the cloud versus on-premises </td <td>iting technical</td>	iting technical
RBT Levels: L2 & L3	
RBT Levels: L2 & L3       Module 2	Hrs 8
RBT Levels: L2 & L3         Module 2         Heading:Security and Compliance         2 1 Define the AWS shared responsibility model	Hrs 8

• Describe the customer's responsibly on AWS o Describe how the customer's responsibilities

may shift depending on the service used (for example with RDS, Lambda, or EC2)

• Describe AWS responsibilities 2.2 Define AWS Cloud security and compliance concepts

• Identify where to find AWS compliance information o Locations of lists of recognized available compliance controls (for example, HIPPA, SOCs) o Recognize that compliance requirements vary among AWS services

• At a high level, describe how customers achieve compliance on AWS o Identify different encryption options on AWS (for example, In transit, At rest)

• Describe who enables encryption on AWS for a given service

• Recognize there are services that will aid in auditing and reporting o Recognize that logs exist for auditing and monitoring (do not have to understand the logs) o Define Amazon CloudWatch, AWS Config, and AWS CloudTrail

• Explain the concept of least privileged access

2.3 Identify AWS access management capabilities

• Understand the purpose of User and Identity Management o Access keys and password policies (rotation, complexity)

o Multi-Factor Authentication (MFA) o AWS Identity and Access Management (IAM)  ${\scriptstyle \bullet}$  Groups/users  ${\scriptstyle \bullet}$  Roles

• Policies, managed policies compared to custom policies o Tasks that require use of root accounts Protection of root accounts

2.4 Identify resources for security support

• Recognize there are different network security capabilities o Native AWS services (for example, security groups, Network ACLs, AWS WAF) o 3 rd party security products from the AWS Marketplace

• Recognize there is documentation and where to find it (for example, best practices, whitepapers, official documents) o AWS Knowledge Center, Security Center, security forum, and security blogs o Partner Systems Integrators

• Know that security checks are a component of AWS Trusted Advisor

#### **Textbook:Chapter:sections**

#### **AWS Portal**

Pre-requisites (Self Learning): Security and Compliance

#### RBT Levels: L2 & L3

Module-3

Hrs 8

#### Heading:Technology

- a. Define methods of deploying and operating in the AWS Cloud
  - Identify at a high level different ways of provisioning and operating in the AWS cloud

o Programmatic access, APIs, SDKs, AWS Management Console, CLI, Infrastructure as Code

- Identify different types of cloud deployment models
- o All in with cloud/cloud native
- o Hybrid
- o On-premises
- Identify connectivity options
- o VPN

## o AWS Direct Connect

- o Public internet
- b. Define the AWS global infrastructure
  - Describe the relationships among Regions, Availability Zones, and Edge Locations
  - Describe how to achieve high availability through the use of multiple Availability Zones
  - o Recall that high availability is achieved by using multiple Availability Zones
  - o Recognize that Availability Zones do not share single points of failure
  - Describe when to consider the use of multiple AWS Regions
  - o Disaster recovery/business continuity
  - o Low latency for end-users
  - o Data sovereignty
  - Describe at a high level the benefits of Edge Locations o Amazon CloudFront o AWS Global Accelerator
  - 3.3 Identify the core AWS services
  - Describe the categories of services on AWS (compute, storage, network, database)
  - Identify AWS compute services
  - o Recognize there are different compute families
  - o Recognize the different services that provide compute (for example, AWS Lambda compared to Amazon Elastic Container Service (Amazon ECS), or Amazon EC2, etc.)
  - o Recognize that elasticity is achieved through Auto Scaling o Identify the purpose of load balancers Identify different AWS storage services
  - o Describe Amazon S3
  - o Describe Amazon Elastic Block Store (Amazon EBS)
  - o Describe Amazon S3 Glacier o Describe AWS Snowball o Describe Amazon Elastic File System (Amazon EFS)
  - o Describe AWS Storage Gateway
  - Identify AWS networking services
  - o Identify VPC
  - o Identify security groups
  - o Identify the purpose of Amazon Route 53
  - o Identify VPN, AWS Direct Connect
  - Identify different AWS database services
  - o Install databases on Amazon EC2 compared to AWS managed databases Version
- o Identify Amazon RDS
- o Identify Amazon DynamoDB
- o Identify Amazon Redshift
- c. Identify resources for technology support
  - Recognize there is documentation (best practices, whitepapers, AWS Knowledge Center, forums, blogs)
  - Identify the various levels and scope of AWS support
  - o AWS Abuse
  - o AWS support cases
  - o Premium support
  - o Technical Account Managers
  - Recognize there is a partner network (marketplace, third-party) including Independent Software Vendors and System Integrators

- Identify sources of AWS technical assistance and knowledge including professional services, solution architects, training and certification, and the Amazon Partner Network
- Identify the benefits of using AWS Trusted Advisor

# **Textbook:Chapter:sections**

AWS Po	ortal	
Pre-rec	uisites (Self Learning): Security and Compliance	
RBT L	evels: L2 & L4	
	Module-4	Hrs 8
Headin	g:Billing and Pricing	
4.1 Co	mpare and contrast the various pricing models for AWS (for example,	On-Demand
Instance	es, Reserved Instances, and Spot Instance pricing)	
• Identi	fy scenarios/best fit for On-Demand Instance pricing	
• Identi	fy scenarios/best fit for Reserved-Instance pricing	
o Desc	ribe Reserved-Instances flexibility o Describe Reserved-Instances behavi	or in AWS
Organiz	ations • Identify scenarios/best fit for Spot Instance pricing	
4.2 Rec	ognize the various account structures in relation to AWS billing and pricing	
• Recog	nize that consolidated billing is a feature of AWS Organizations	
• Identi	fy how multiple accounts aid in allocating costs across departments	
Textbo	ok:Chapter:sections	
AWS P	ortal	
Pre-rec	uisites (Self Learning): Technology	
RBT L	evels: L2 & L3	
	Module-5	Hrs 8
Headin	g:Billing and Pricing	
5.1 Ider	tify resources available for billing support	
• Identi	fy ways to get billing support and information	
o Cost	Explorer, AWS Cost and Usage Report, Amazon QuickSight, third-party p	artners, and
AWS N	farketplace tools	
o Open	a billing support case	
o The ro	ble of the Concierge for AWS Enterprise Support Plan customers	
• Identi	fy where to find pricing information on AWS services	
o AWS	Simple Monthly Calculator	
o AWS	Services product pages	
o AWS	Pricing API	
• Recog	gnize that alarms/alerts exist	
• Identi	fy how tags are used in cost allocation	
Textbo	ok:Chapter:sections	
AWS P	ortal	
Pre-rec	uisites (Self Learning):Billing and Pricing	
RBT L	evels: L2 & L3	
	III(b). PRACTICAL PART	
Sl.	Experiments / Programs / Problems	
No.		
1	Lab 1 - Introduction to AWS IAM	

2	2 Lab 2 - Build your VPC and Launch a Web Server													
3	Lab 3 - Introduc	ction to Amazon	EC2											
4	Lab 4 - Working	g with EBS												
5	Lab 5 - Build a	Database Server	•											
Instructions for conduction of practical part: AWS Portal registration.														
		IV. CO	URSE (	OUT	COMES									
CO	Attain a compresentation of the services.	rehensive under	standin	g of	AWS C	loud cond	cepts	and f	oundational					
CO2	2 Demonstrate pr key cloud service	oficiency in nav	vigating	the .	AWS M	anagement	t Con	sole a	nd utilizing					
COS	3 Develop skills i	n managing AW	'S resou	irces e	efficientl	y and cost	-effec	tively						
CO4	Acquire knowle	dge of cloud sec	curity b	est pra	actices an	nd complia	ance n	neasur	es.					
CO	Gain insights i optimal cost cor	nto billing, prio ntrol.	cing m	odels,	and eff	fective acc	count	mana	gement for					
	V.	CO-PO-PSO M	IAPPI	NG(m	nark H=3	; M=2; L=	:1)							
PO/PS	1	2	3		4	PEO 1	PE	O 2	PEO 3					
0														
CO1	2		2			2								
CO2	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$													
CO3	2 2 2													
CO4	2	2 2 2												
CO5	2 2 2 2													
		VI. Assessi	ment D	etails	(CIE &	SEE)								
Gener	al Rules: Refer Ann	nexure section 4												
Contin	nuous Internal Eva	luation (CIE):	Refer A	Innexu	are section	n 4								
Semes	ter End Examinati	on (SEE): Refe	r Annex	ure se	ction 4									
		VII.	Learni	ing R	esources	5								
VII(a)	: Textbooks:													
Sl. No.	Title of the Book	Name of the a	uthor		Edition	and Year		N I	ame of the publisher					
1.	AWS Certified	Ben Piper&D	avid	1st	edition (2	2 August 20	)19)		Sybex					
	Cloud Practitioner	Clinton												
VII(b)	Study Guide													
VII(D) 1	AWS Certified	Anthony I Se	augira	F	irst Editio	n (15 Augu	ict	Dear	son Education					
	Cloud Practitioner (CLF-C01) Cert Guide	initiony 5. Sec	quena		2(	)20)	151	i cui						
VII(c)	: Web links and Vi	deo Lectures (e	e-Resou	irces)	:									
AWS	PORTAL: <u>https://av</u>	vsacademy.instr	ucture.c	com/c	ourses/58	8071/								
VIII:	Activity Based Lea	rning / Practica	al Base	d Lea	rning/E	xperientia	l lear	ning:						
Refer .	Refer AWS Portal for quiz and assessments.													



#### **Program Outcomes (PO's) – Graduate Attributes**

#### MCA Graduates will be able to

**1.** Acquire knowledge of modern techniques, tools, and practices, including their limitations, for the software development process.

2. Demonstrate the application of mathematical and computer-based techniques to derive feasible solutions for problems within the computer applications domain.

3. Design and derive solutions for complex computer-based problems, and evaluate systems, components, or processes with due consideration for societal and environmental impact.

4. Develop a habit of self-learning for continuous career development, and professional skills to effectively conceive, design, and develop software applications, along with associated practices.



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#### CIE & SEE Evaluation strategy for PG- MCA Autonomous Scheme 2023 (Tentative)

Date: 28/03/2024

Calcuation of components of CIE for final marks is modified as per regulations

1263			L. S. Martin		and the second	-	No.		Conti	inuous Inte	rnal Eva	luation (	CIE)				The second	A Statistics	NES RE		S	emester	End E	xamina	tion (SE	E)	T. S. C. M.	Children .	walk of
TR			RE.		22/	I. The	eory Cor	npone	nt		Art St	1.25	II.	Practica	I Comp	ponent	a fight		at Wilso			Theory		P	ractical			-	
S. #	Course Type /Credits	Total	Min.		Min	A. U	nit test	B. For Asses	sments	Tot		Min	C. W Evalu	eekly uation	D.	Internal	Test	Tot marks	Total	n hrs.	Max.	Max.	min.	Max.	Max.	min.	Total	Marks (CIE+SE	Passing
		marks	Eligty.	Marks	Eligty.	Nos.	Marks / Each	Nos.	Marks/ Each	Theory marks (I)	Marks	Eligty.	Each week	Tot. marks	Nos.	Marks/ Each	Total marks	(II)	marks	Dur.	cond. marks	red marks	pass %	cond. marks	ered marks	pass %	marks	E)	
1	BSC/PCC/PEC (3 or 4 Credit courses)	50	50%	50	50%	2	50	1	50	50 (avg. of A + B) reduced to 50			5-1			-		-	50 (I)	03	100	50	40%	-	-	1	50	100	50%
2	IPCC (4 Credit courses)	50	50%	50	50%	2	50		-	50 (avg. of 2)	50	50%	50	50 (Avg. of all)	1	50	50	50 (Avg. of C & D)	50 (Avg. of I & II)	03	100	50	40%	-	-	1	50	100	50%
3	PCCL (2 Credit courses)	50	50%	1	-		-	- I		1	50	50%	50	50 (Avg. of all)	1	50	50	50 (Avg. of C & D)	50 (11)	03	-	I	-	100	50	40%	50	100	50%
4	AEC (2 credit course)	50	50%	50	50%	2	50	1	50	50 (avg. of A + B) reduced to 50	1		1	-		-	- Maria		50 (I)	1	-	-	-	-	-	1	-	50	50%
5	MAC- (No credit course)	50	50%	50	50%	2	50	1	50	50 (avg. of A + B) reduced to 50	-			-	-	-	IN.	-	50	-	-	-	-	-	-	1	-	50	50%

Formative (Successive) Assessments: Assignments/quiz/ seminars/field survey and report presentation/course project/ctc. based on the faculty & dept. planning

Practical Conduction: The conduction of each experiment/program per week should evaluate for 50 Marks and average of all shall be taken.

In case of Integrated course, minimum eligibility shall be attained as prescribed in both the theory and practical components.

Self Learning Courses (SLC) Courses, Internship, Mini project & Major Project: Rubrics & Methodology shall be defined seperately

S. Nagamani

Note:

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Approved by AICTE, New Delhi.

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CIE and SEE guidelines based on course Type for MCA Autonomous Scheme 2023

- > The CIE conduction coordination will be done by the office of Controller of Examination (COE).
- > The SEE will be conducted by the office of Controller of Examination (COE).

<b>Continuous Internal Evaluation (CIE)</b>	Semester End Examination (SEE)	Final Passing requirement								
1. BSC/PCC/ PEC– Theory Course (03 & 04 Credit courses)										
The weightage of Continuous Internal Evaluation (CIE) is 50% and	for Semester End Exam (SEE) is 50%.									
The minimum passing mark for the CIE is 50% of the maximum	The minimum passing mark for SEE is	The student is								
marks (25 marks out of 50).	40% of the maximum marks (20 out of	declared as a pass in								
<b>Continuous Internal Evaluation:</b> CIE will be conducted by the department and it will have only 01 component:	50 marks). Semester-End Examination: Durationof 03 hours and total marks of	the course if he/she secures a minimum of 50% (50 marks out of 100) in the								
I. Theory component. Theory Component will consist of	<ul><li>The question paper will have ten</li></ul>	sum total of the CIE and SEE taken together.								
<ul><li>A. Internal Assessment Test</li><li>B. Formative assessments</li></ul>	questions. Each question is set for 20 marks.									

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	• There will be 2 questions from each
A. Internal Assessment Test:	module. Each of the two questions
• There are 02 tests each of 50 marks conducted during 7 <sup>th</sup> week & 14 <sup>th</sup> week respectively	under a module (with a maximum of 3 sub-questions), should have a mix of
• The question paper will have four questions (may of 3 sub	topics under that module
• The question paper will have four questions (max of 5 sub	• The students have to answer 5 full
questions) nom the normed synabus. Each question is set for	questions selecting one full question
25 marks.	questions, selecting one run question
• The student has to answer 2 full questions (one from 1 & 2"	from each module.
questions and another from 3 <sup>rd</sup> & 4 <sup>rd</sup> question).	• Marks scored shall be proportionally
• Internal Assessment Test question paper shall be designed to	reduced to 50 marks.
attain the different levels of Bloom's taxonomy as per the	
outcome defined for the course.	
B. Formative assessments:	
•01 formative assessment of 50 marks shall be conducted by the	
course coordinator before 10 <sup>th</sup> week.	
• The syllabus content for the formative assessment shall be	
defined by the course coordinator.	
• The formative assessments include Assignments/ Ouiz/	
seminars/case study/field survey/ report presentation/ course	
project/etc	
The assignment OP or Ouiz OP shall indicate marks of each	
• The assignment QF of Quiz QF shart indicate marks of each	
The philosophic for the other formed ecception to shall be	
• The rubrics required for the other formal assessments shall be	
defined by the departments along with mapping of relevant	
COs & POs.	
The final CIE marks will be 50:	
	(
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Kengeri. Bengal	uru-560060

Total Average of 2 tests and 1 formative assessment scaled down to 50 marks. The documents of all the assessments shall be maintained meticulously. 2. IPCC – Integrated with Theory & Practical (04 cm	redit courses)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.			
The minimum passing mark for the CIE is 50% of the maximum	The minimum passing mark for SEE is	The student is	
marks (25 marks out of 50).	40% of the maximum marks (20 out of	declared as a pass in	
Minimum eligibility of 50% marks shall be attained separately in	50 marks).	the course if he/she	
both the theory component and practical component.		secures a minimum	
	Semester-End Examination:	of 50% (50 marks	
Continuous Internal Evaluation:	Only theory SEE for duration of 03	out of 100) in the	
CIE will be conducted by the department and it will have 02	hours and total marks of 100.	sum total of the CIE	
component:		and SEE taken	
		together.	
I. Theory Component.	• The question paper will have ten		
II. Practical Component.	questions. Each question is set for 20		
	marks.		
	• There will be 2 questions from each		
	module. Each of the two questions		
I. Theory Component will consist of	under a module (with a maximum of 3		
A. Internal Assessment Test	sub-questions), should have a mix of		
B. Formative assessments - No formative assessment for IPCC.	topics under that module.		

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A. Internal Assessment Test:	• The laboratory content must be	
• There are 02 tests each of 50 marks conducted during 7 <sup>th</sup> week	included in framing the theory question	
& 14 <sup>th</sup> week, respectively.	papers.	
• The question paper will have four questions (max of 3 sub	• The students have to answer 5 full	
questions) from the notified syllabus. Each question is set for	questions, selecting one full question	
25 marks.	from each module.	
• It is suggested to include questions on laboratory content in	• Marks scored shall be proportionally	
the Internal Assessment test Question papers.	reduced to 50 marks.	
• The student have to answer 2 full questions (one from 1 <sup>st</sup> &		
$2^{nd}$ questions and another from $3^{rd} \& 4^{th}$ question).	No Practical SEE for Integrated	
• Internal Assessment Test question paper shall be designed to	Course.	
attain the different levels of Bloom's taxonomy as per the		
outcome defined for the course.		
B. Formative assessments:		
No formative assessment in theory.	and the second	
II. Practical Component:		
C. Conduction of each experiment/program should be		mussi - paint in the
evaluated for 50 marks and average of all the		
experiments/programs shall be taken. (rubrics will be		
published by the lab conduction committee)		
<b>D.</b> One laboratory Internal Assessment test will be conducted		
during the 14 <sup>th</sup> week for 50 marks. (rubrics will be		
published by the lab conduction committee)		
The final CIE marks will be 50 =		
Avg. {I [Avg. of (02 Internal assessment tests )] + II [Avg. of (C		
	$\bigcirc$	
		(S-
		10-0.

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& D)]}. The documents of all the assessments shall be maintained meticulously.	d	
3. PCCL: Laboratory course (02 credit course)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and	d for Semester End Exam (SEE) is 50%.	
<ul> <li>The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50).</li> <li>Continuous Internal Evaluation:</li> <li>CIE will be conducted by the department and it will have only 01 component:</li> <li>I. Theory Component. (Not required for Laboratory course)</li> <li>II. Practical Component.</li> </ul>	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). <b>Semester-End Examination:</b> Only laboratory SEE will be conducted jointly by the internal examiner and external examiner appointed by COE as per the scheduled timetable for duration of 03 hours.	The student is declared as a pass in the course if he/she secures a minimum of 50% (50 marks out of 100) in the sum total of the CIE and SEE taken together.
<ul> <li>II. Practical Component:</li> <li>C. Conduction of each experiment/program should be evaluated for 50 marks and average of all the experiments/program shall be taken (rubrics will be published by the lab conduction committee).</li> <li>D. One laboratory Internal Assessment test will be conducted for 50 marks (rubrics will be published by the lab conduction committee) during 14<sup>th</sup> week.</li> <li>The final CIE marks will be 50 = Avg. of (C &amp; D)</li> </ul>	<ul> <li>The examination shall be conducted for 100 marks and shall be reduced to 50 marks proportionately.</li> <li>All laboratory experiments/programs are to be included for practical examination.</li> <li>Breakup of marks (Rubrics) and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners (OR) based on the course requirement evaluation rubrics</li> </ul>	

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	shall be decided jointly by examiners.	
The documents of all the assessments shall be maintained	• Students can pick one question	
meticulously.	(experiment/program) from the	
	questions lot prepared by the internal	
	/external examiners jointly.	
	• Evaluation of test write-up/ conduction	
	procedure and result/viva will be	
	conducted jointly by examiners.	
	• General rubrics suggested for SEE:	
	writeup-20%, Conduction procedure and	
	results -60%, Viva-voce 20% of	
	maximum marks.	
	• Change of experiment is allowed only	
	once and shall be assessed only for 85%	
	of the maximum marks.	
4. AEC: Ability Enhancement Courses (2 credit courses)	urses)	Concert Manager Mart
The weightage of Continuous Internal Evaluation (CIE) is 50% and	for Semester End Exam (SEE) is 50%.	
The minimum passing mark for the CIE is 50% of the maximum	The minimum passing mark for SEE is	The student is
marks 50 marks out of 100).	40% of the maximum marks (20 out of 50	declared as a pass in
	marks).	the course if he/she
Continuous Internal Evaluation:		secures a minimum
CIE will be conducted by the department and it will have only 01	Semester-End Examination:	of 50% (50 marks
component:	Theory SEE will be conducted by COE	out of 100) in the
	as per the scheduled timetable for	sum total of the CIE
1. Theory Component.	duration of 2 hours and total marks of	and SEE taken
Theory Component will consist of		

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A. Internal Assessment Test	50.	together.
B. Formative assessments		
Internal Assessment Test:	Multiple Choice Question Paper	
• There are 02 tests each of 50 marks conducted during 7 <sup>th</sup> week & 14 <sup>th</sup> week, respectively.	• Student should answer all the questions.	
• The question paper will have Multiple Choice Questions (MCQ's)		
• The student have to answer all the questions.		
• Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the		
outcome defined for the course.		
A. Formative assessments:		
• 01 formative assessment of 50 marks shall be conducted by the Course Coordinator based on the dept. planning before 10 <sup>th</sup> week.		
• The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc.		
• The assignment QP shall indicate marks of each question and the relevant COs & RBT levels.		
• The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & POs.		
The final CIE marks will be 50 - Total Average of 2 tests and 1		
formative assessment scaled down to 50 marks. The documents		
of all the assessments shall be maintained meticulously.		
Z. Nagamani HOD-MCA	Abu SJ	B Institute of Techno
Dr. B Prof & A SJB Institu BGS Health	# 0 Academic Dean Ite of Technology & Education City	7, BOS Health & Education Dr. Vishnuvardhan Road Kengeri, Bengaluru - 560 (

The weightage is only for Continuous Internal Evaluation (CEE) for 50 marks.	N. G		
the minimum passing mark for the CIE is 50% of the maximum marks 50 marks	No Semester	End	declared as a pass in
	Examination.		the course if he/she
Continuous Internal Evaluation:			secures a minimum
CIE will be conducted by the department and it will have only 01 component:			of 50% (50 marks
I. Theory component.			out of 100 scaled
Theory Component will consist of			down to 50) in the
A. Internal Assessment Test			CIE.
B. Formative assessments			
Internal Assessment Test:			
• There are 02 tests each of 50 marks conducted during 7 <sup>th</sup> week & 14 <sup>th</sup> week, respectively.			1.
• The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks.			No. 19 and a second second
• The student have to answer 2 full questions (one from 1 <sup>st</sup> & 2 <sup>nd</sup> questions and another from 3 <sup>rd</sup> & 4 <sup>th</sup> question).			
• The student have to answer all questions.			
• Internal Assessment Test question paper shall be designed to attain the			
different levels of Bloom's taxonomy as per the outcome defined for the course			
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B. Formative assessments:	
•01 formative assessments of 50 marks shall be conducted by the faculty based on the dept. planning during random times.	
• The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc.	
• The assignment QP shall indicate marks of each question and the relevant COs & RBT levels.	
• The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & POs.	
The final CIE marks will be 50 - Total Average of 2 tests and 1 formative	
assessment scaled down to 50 marks.	
The documents of all the assessments shall be maintained meticulously.	

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