

(ವಿ.ಟಿ.ಯು. ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ)

BMS Institute of Technology and Management

(An Autonomous Institution, Affiliated to VTU, Belagavi) Approved by AICTE New Delhi, Accredited by NAAC with 'A' Grade Yelahanka, Bengaluru - 560064



Master of Computer Applications (MCA) (Accredited by NBA, New Delhi)



CURRICULUM Scheme of Teaching and Examination: 2022 - 23

1st to 2nd Semester MCA

BMS EDUCATIONAL TRUST, BENGALURU



Dharmaprakasha Rajakarya Prasaktha Late. Sri B. M. Sreenivasaiah Founder, BMSCE



Late Sri. B. S. Narayan Founder, BMS Educational Trust Founder Donor Trustee

Vision of BMS Educational Trust

"Promoting Prosperity of Mankind by Augmenting Human Resource Capital Through Quality Technical Education and Training"

Mission of BMS Educational Trust

"Accomplish Excellence in the Field of Technical Education Through Education Research and Service Needs of Society"

About BMS Educational Trust

The history of BMS educational institutions can be traced back to 1946, when a noted philanthropist Dharmaprakasha, Rajakarya Prasaktha late Sri. B.M. Sreenivasaiah established the first-ever private engineering college in the country named, BMS College of Engineering (BMSCE). He had a great vision of promoting the prosperity of mankind by augmenting human resource capital through quality education and training. After his sad demise, his illustrious son Late Sri B.S. Narayan strived hard to realize the vision set through the formation of BMS Educational Trust in 1953. He was instrumental in establishing several educational institutions under the Trust. After his passing away, his wife Dr. B.S. Ragini Narayan continued with unwavering devotion the tradition of contributing high-quality human resource to the society, the objective with which the Trust. The activities of BMS educational institutions are well guided by a Council of Trustees appointed by her. It has established a conducive academic environment in all its institutions to effectively realize the vision.

Presently, the Trust runs the following 10 high quality and reputed institutions.

- 1. BMS College of Engineering (BMSCE), Bengaluru
- 2. BMS College of Law (BMSCL), Bengaluru
- 3. BMS Pre-University College for Women (BMSPUCW), Bengaluru
- 4. BMS Degree college for Women (BMSCW), Bengaluru
- 5. BMS Evening College of Engineering (BMSECE), Bengaluru
- 6. BMS Institute of Technology and Management (BMSIT&M), Bengaluru
- 7. BMS School of Architecture (BMSSA), Bengaluru.
- 8. BMS Evening College of Arts and Commerce (BMSCE), Bengaluru
- 9. BMS College of Architecture (BMSCA), Bengaluru
- 10. BMS College of Commerce and Management (BMSCCM), Bengaluru

About BMS Institute of Technology and Management

BMS Institute of Technology and Management was established in 2002 to cater to the need for highquality technical education in India. The 18-acre lush green and serene campus of BMSIT&M is located in Northern Bengaluru closer to the Kempegowda International Airport(KIAL). Currently, there are eight UG programs, three PG programs and ten Ph.D programs catering to the educational needs of close to 4000 students. All the programs are being run as per the VTU guidelines for affiliated institutions. Now that BMSIT&M has been granted fresh autonomous status by the UGC and VTU from the academic year 2021-22, the curriculum design, delivery and assessment & evaluation with respect to the batch of students getting admitted w.e.f. 2021-22 will be responsibility of the institute. The high-quality faculty and staff members, excellent academic and support infrastructure, quality learning aids, productive collaborations with industry, research institutes and government have together created a highly conducive ambience for students to realize their full potential. With continuous improvement in all dimensions, BMSIT&M has become one of the preferred destinations for engineering education for students across the country and from neighboring countries too.

About the Department of MCA

The Department of Master of Computer Applications (MCA) was established during the academic year 2003-04, with an approved intake of 60, to develop quality IT professionals to meet the human resource demand. The department is accredited by NBA and obtained academic autonomy in the year 2021-22. The department is recognized as a Research Centre under Visvesvaraya Technological University in the academic year 2016-17. The Department has 8 qualified and dedicated teaching staff and 02 technical staff members who put in their best possible efforts to ensure that the students gain the knowledge along with other life-skills, which helps them to face the world confidently and with high self-esteem. Disciplined environment, conducive to Teaching-Learning, with rigorous academic monitoring is maintained.

VISION OF THE INSTITUTE

To emerge as one of the finest technical institutions of higher learning to develop professionals who are technically competent, ethical and environment friendly for betterment of society.

MISSION OF THE INSTITUTE

Accomplish stimulating learning environment through high quality academic instruction, innovation and industry-institute interface.

VISION OF THE DEPARTMENT

To develop quality professionals in Computer Applications who can provide sustainable solutions to the societal and industrial needs.

MISSION OF THE DEPARTMENT

Facilitate effective learning environment through quality education, state-of-the-art facilities, and orientation towards research and entrepreneurial skills.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Develop innovative IT applications to meet industrial and societal needs

PEO2: Adapt themselves to changing IT requirements through life-long learning

PEO3: Exhibit leadership skills and advance in their chosen career

PROGRAM OUTCOMES (POs)

- **PO1:** Apply knowledge of computing fundamentals, computing specialization, mathematics and domain knowledge to provide IT solutions.
- **PO2:** Identify, analyse and solve IT problems using fundamental principles of mathematics and computing sciences.
- **PO3:** Design, Develop and evaluate software solutions to meet societal and environmental concerns.
- **PO4:** Conduct investigations of complex problems using research based knowledge and methods to provide valid conclusions.
- **PO5:** Select and apply appropriate techniques and modern tools for complex computing activities.
- **PO6:** Understand professional ethics, cyber regulations and responsibilities.
- **PO7:** Involve in life-long learning for continual development as an IT professional.
- **PO8:** Apply and demonstrate computing and management principles to manage projects in multidisciplinary environments by involving in different roles.
- **PO9:** Comprehend& write effective reports and make quality presentations.
- **PO10:** Understand the impact of IT solutions on socio-environmental issues.
- **PO11:** Work collaboratively as a member or leader in multidisciplinary teams.
- **PO12:** Identify potential business opportunities and innovate to create value for the society and seize that opportunity.

Preamble:

Technical education, today, is faced with extremely complex challenges due to the pressing need for comprehensive, inclusive, optimal and sustainable solutions to global and local problems. Hence, there is a need for engineering colleges to utilize the academic autonomy granted to them in full measure to assess the gaps in the present system, review and redesign the curriculum, its delivery and evaluation processes to effectively meet all such challenges. Such an exercise should be broad based and take into consideration:

- > The ever-increasing influence of science and technology on human society.
- > The faster pace of new developments and the rapid obsolescence of prevailing practices.
- Penetration of Information and Communication Technology in all sectors of human activity and economic development.
- Service sector becoming a major avenue for the employment of technical professionals and economic gains.
- Increasing multicultural work environment and fading organizational boundaries
- > Very volatile, uncertain, complex and ambiguous business environment.

A higher education institute with academic autonomy should see opportunities in these challenges. From that perspective, these institutions are responsible for producing graduates who among others, will have:

- A strong foundation in the basics of science, technology, mathematics and engineering disciplines. The command over the chosen area of technical specialization.
- The capacity to apply the professional knowledge and skills acquired to solve complex engineering problems most optimally.
- > Ability to self-learn and for life-long learning.
- > The expertise in analysis, design, modeling and simulation of complex systems.
- > The ability for rational, logical and critical thinking.
- > The leadership qualities to inspire team members to achieve grand shared vision.

BMSIT&M intends to produce such graduates who strive to be complete engineers in all respects and to succeed in addressing the challenges posed by the modern world. BMSIT&M exercises the academic freedom given by the University:

- With a great sense of responsibility and accountability
- To enhance the visibility and credibility of the institute in the national and international Higher Education segment.
- > To demonstrate its research prowess, creativity, innovativeness and entrepreneurial capabilities.
- To gain the confidence and respect of all its stakeholders, especially students, alumni, parents and the society at large.

Program Information - MCA

Name of the Programme	Master of Computer Applications - MCA				
Scheme	Choice Based Credit System				
Duration of the course	2 years (4 Semesters)				
Duration of Semester	16 Weeks				
Total credits	100				
CIE : SEE	50:50				
Maximum duration of course completion	4 years				
10-12 hours of Teaching-Learning Process	1 credit				
2 hours Laboratory/Tutorial per week					
25 hours of Teaching-Learning Process	2 credits				
40 hours of Teaching-Learning Process	3 credits				
50 hours of Teaching-Learning Process	4 credits				
40 hours of Teaching-Learning Process	A credits (IPCC)				
with 10-12 laboratory sessions					

Semester-wise Credit Distribution

Sem	Core	Elective	Mini Project	Major Project	Internship	Mathematics	Humanities, Ethics & Management	Co- Curricul ar	Total
I	18	-	-	-	-	4	2	-	24
п	18	6	2	-	-	-	-	-	26
ш	16	6	2	-	-	-	-	2	26
IV	-	-	-	16	6	-	-	2	24
Total	52	12	4	16	6	4	2	4	100

1. MOOC assessments are based on the following:

Platforms – Swayam (NPTEL) Min 8 weeks duration followed by assessment and certificate

2. Coding Skills assessments are based on the following:

Platforms - Hackerrank / Hackerearth / CodeChef / LeetCode: Students will be assessed through one of the above platforms at the Department level.



(An Autonomous Institution, Affiliated to VTU, Belagavi) Scheme of Teaching and Examination: Effective from AY 2022 – 23

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

Total Marks

100

PG PF	ROGRAM: MA	STER OF COM	PUTER APPLICATIONS (MCA)					Semester: I			
				Teaching Hours				Examination			
S1. No	Course Category	Course Code	Course Title		Week		Credits			SEE	
-				L	Т	Р		Duration	CIE Marks	Marks	
1	BSC	22MCA101	Mathematical Foundation for Computer Applications	3	2	0	4	3	50	50	
2	IPCC	22MCA102	Operating Systems	3	0	2	4	3	50	50	
3	IPCC	22MCA103	Data Structures and Algorithms	3	0	2	4	3	50	50	
4	IPCC	22MCA104	Database Management Systems	3	0	2	4	3	50	50	
5	PCC	22MCA105	Computer Networks	3	0	0	3	3	50	50	
6	PCCL	22MCA106	Python Lab	0	3	3	3	3	50	50	
7	MCC	22MCA107	Research Methodology and IPR	2	0	0	2	3	50	50	
8	BC - Audit	22MCA1BC	Bridge Course*	3	0	0	0	3	50	50	
			TOTAL	20	5	9	24		400	400	



(An Autonomous Institution, Affiliated to VTU, Belagavi)

Scheme of Teaching and Examination: Effective from AY 2022 - 23

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

PG P	PG PROGRAM: MASTER OF COMPUTER APPLICATIONS (MCA)							Semester: II			
	-			Teaching Hours /Week Credits				Examination			
SI. No	Course Category	Course Code	Course Title				Credits	Duration	CIE	SEE	Total
					Т	Р		Duration	Marks	Marks	Marks
1	IPCC	22MCA201	Software Engineering	3	0	2	4	3	50	50	100
2	IPCC	22MCA202	Mobile Application Development	3	0	2	4	3	50	50	100
3	IPCC	22MCA203	Veb Technologies		0	2	4	3	50	50	100
4	IPCC	22MCA204	Java Programming	3	0	2	4	3	50	50	100
5	PEC	22MCA205 <mark>X</mark>	Elective Course – I	3	0	0	3	3	50	50	100
6	PEC	22MCA206X	Elective Course – II	3	0	0	3	3	50	50	100
7	PCCL	22MCA207	Software Testing Lab	0	1	3	2	3	50	50	100
8	MP	22MCA208	Mini Project - I	0	0	4	2	3	50	50	100
9	Audit	22MCA2AUD	Audit Course – Online Course	-	-	-	0	-	-	-	-
			TOTAL	15	26		400	400	800		

Elective Course - I							
Course Code	Course Title						
22MCA2051	Data Warehousing & Data Mining						
22MCA2052	Big Data Analytics						
22MCA2053	No SQL						
22MCA2054	Wireless Sensor Networks						
22MCA2055	Artificial Intelligence						

Elective Course - II								
Course Code	Course Title							
22MCA2061	Professional Communication and Ethics							
22MCA2062	Entrepreneurship & Mgmt.							
22MCA2063	Operations Research							
22MCA2064	Supply Chain Management							
22MCA2065	Digital Marketing							



(An Autonomous Institution, Affiliated to VTU, Belagavi)

Scheme of Teaching and Examination: Effective from AY 2022 - 23

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

PG P	PG PROGRAM: MASTER OF COMPUTER APPLICATIONS (MCA)									Semester: III			
	_			Teaching Hours /Week Credits			Onedite	Examination					
Sl. No	Course Category	Course Code	Course Title				Credits	Duration	CIE	SEE	Total		
					Т	Р		Duration	Marks	Marks	Marks		
1	IPCC	22MCA301	Machine Learning	3	0	2	4	3	50	50	100		
2	IPCC	22MCA302	Cloud Computing	3	0	2	4	3	50	50	100		
3	IPCC	22MCA303	Advanced Programing (C# .NET)	3	0	2	4	3	50	50	100		
4	IPCC	22MCA304	IOT	3	0	2	4	3	50	50	100		
5	PEC	22MCA305 <mark>X</mark>	Elective Course – III	3	0	0	3	3	50	50	100		
6	PEC	22MCA306 <mark>X</mark>	Elective Course – IV	3	0	0	3	3	50	50	100		
7	MP	22MCA307	Mini Project - II	0	0	4	2	3	50	50	100		
8	CC	22MCA308	Coding Skills	0	2	2	2	-	50	-	50		
9	SP	22MCA309	Societal Project	0	0	0	0	-	50	-	50		
			TOTAL	18	2	14	26	-	450	350	800		

Elective Course - III							
Course Code	Course Title						
22MCA3051	Robotic Process Automation						
22MCA3052	Augmented and Virtual Reality						
22MCA3053	Cyber Security						
22MCA3054	Advanced DBMS						
22MCA3055	Distributed OS						

Elective Course - IV							
Course Code	Course Title						
22MCA3061	User Interface Design & UX						
22MCA3062	Natural Language Processing						
22MCA3063	Cryptography and Network Security						
22MCA3064	Blockchain Technology						
22MCA3065	Social Network Analysis						



BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT (An Autonomous Institution, Affiliated to VTU, Belagavi) Scheme of Teaching and Examination: Effective from AY 2022 – 23 Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

PG F	PG PROGRAM: MASTER OF COMPUTER APPLICATIONS (MCA)						Semester: IV					
~1	-			Teaching Hours			ts	Examination				
SI. No	Course Category	Course Code	Course Title	le /Week		redi	Duration	CIE	SEE	Total		
			L	Т	Р	Ű	2 414000	Marks	Marks	Marks		
1	IN	22MCA401	Internship	0	0	0	4	3	50	-	50	
2	SEM	22MCA402	Seminar	0	0	2	2	-	50	-	50	
3	PW	22MCA403	Project Work	0	0	5	18	3	50	50	100	
4	CC	22MCA404	MOOC – Online Course	0	2	0	0	-	-	-	-	
	TOTAL 0 2 0						24	6	150	50	200	



(An Autonomous Institution Affiliated to VTU, Belagavi) Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

DEPARTMENT OF MCA

(Accredited by NBA, New Delhi)

CONTINUOUS INTERNAL EVALUATION(CIE) and SEMESTER END EXAMINATION(SEE) PATTERN - 2022-23 SCHEME

CONTINUOUS INTERNAL EVALUATION (CIE): IPCC Course (3-0-2)

					Max	. Marks: 50
Сот	mponents	Internal Assessments (IA)	Max. Marks	Average / Sum	Marks after scale- down	Final Marks
		IA-1 (1.5 Hr)	40			
Theory	IA Tests	IA-2 (1.5 Hr)	40	40	20	
Component (60% of CIE)		IA-3 (1.5 Hr)	40			
	Assignment	ASMT	10	00	10	
	AAT	AAT	10	20	10	20+
Practical	Cumulative Marks of Programs	10 Marks for each program (Execution-4, Viva-2, Record-4)	100 or 120	-	10	10+ 10+ 10= 50
(40% of CIE)	IA Tests	IA-1 (02 Hr)	50	100	10	
	IA TESIS	IA-2 (02 Hr)	50	100	10	
SEMESTER I	END EXAMINATION	(SEE): IPCC Courses (3	3-0-2)			
Examination	Duration: 03 Hrs				Max	. Marks: 50
			Max. Marks	Marks scale-	after down	Final Marks
	No. of Modules	05				
Theory	Questions/Modul e	02				
Component	Marks/Question	20				
(100% of SEE)	No. of Questions to be answered/ module	01	100	50)	50
	No. of Questions	05				

NOTE:

The minimum marks to be secured in CIE to appear for SEE shall be 25. (50% of maximum marks (30M) 1. under theory component i.e., 15M and 50% of maximum marks (20) under laboratory component i.e.,

05

2. A minimum of 40% in SEE is required i.e., 20M.

to be answered/

3. In addition to the minimum CIE and SEE requirements, an aggregate of 50% marks from CIE and SEE, put together, is required for passing the course i.e., 50M.



(An Autonomous Institution Affiliated to VTU, Belagavi) Avalahalli, Doddaballapur Main Road, Bengaluru – 560064

DEPARTMENT OF MCA

(Accredited by NBA, New Delhi)

CONTINUOUS INTERNAL EVALUATION(CIE) and SEMESTER END EXAMINATION(SEE) PATTERN - 2022-23 SCHEME

CONTINUOU	S INTERNAL EVAL	UATION (CIE): PCC	or PCE Co	urse (0:3:3	8) (0:1:3)		
					Max	. Marks: 50	
Con	nponents	Internal Assessments (IAs)	Max. Marks	Average/ Sum	Marks after scale-down	Final Marks	
	Cumulative Marks of Programs	10 Marks for each program (Execution-4, Viva-2, Record-4)	100/120	-	30		
Practical Component	IA Tests	IA-1 (02 Hr)	50			30+ 20=	
	IA TESIS	IA-2 (02 Hr)	50	200	20	20= 50	
	Open Ended	Prg 1	50	200			
	Programs	Prg 2	50				
SEMESTER I	END EXAMINATION	I (SEE): PCC or PCI	E Course (0):3:3) (0:1:	3)		
Examination	Duration: 03 Hrs				Max	. Marks: 50	
			Max. Marks - 100	Marl scale	ks after e-down	Final Marks	
	Write up	20%	20				
Practical	Conduction procedure and result	60%	60		50	50	
Component	Viva-Voce	20%	20			00	
	Change of experiment	-10% from marks allotted for procedure part	-6		-		
NOTE:							
1. The mir	nimum marks to be se	cured in CIE to appea	r for SEE sha	ll be 25.			
2. A minin	num of 40% in SEE is i	required i.e., 20M.					
3. In addit put tog	tion to the minimum (ether, is required for	CIE and SEE requireme passing the course i.e.	ents, an aggr ., 50M.	egate of 50	% marks from (CIE and SEE,	



(An Autonomous Institution Affiliated to VTU, Belagavi) Avalahalli, Doddaballapur Main Road, Bengaluru – 560064

DEPARTMENT OF MCA

(Accredited by NBA, New Delhi)

CONTINUOUS INTERNAL EVALUATION(CIE) and SEMESTER END EXAMINATION(SEE) PATTERN - 2022-23 SCHEME

CONTINUOUS INTERNAL EVALUATION (CIE): PCC or PCE Course (3:2:0) (2:0:0) (3:0:0)								
							Max	. Marks: 50
Coi	mponents	Internal Assessments (IAs)	Max. Marks	Ave:	rage/ um	Marks a scale-d	after own	Final Marks
		IA-1 (1Hr)	40					
	IA Tests	IA-2 (1Hr)	40	4	40	30		
		IA-3 (1Hr)	40					20+
Theory	Assignment	ASMT-1	10					20=
Component	Assignment	ASMT-2	10					50
	A A T	AAT-1	10	2	40	20		
	AAI	AAT-2	10					
SEMESTER B	END EXAMINATION (SEE): PCC or PCI	E Course (3:2:0)) (2:0:0	0) (3:0:0)	
Examination	Duration: 03 Hrs						Max	Marks: 50
			Ma Ma	ax. rks	Mark scale	s after e-down	Fi	nal Marks
	No. of Modules	05						
	Questions/Modul e	02						
Theory	Marks/Question	20						
Component								
Component	No. of Questions to be answered/ module	01	10	00		50		50
Component	No. of Questions to be answered/ module No. of Questions to be answered/	01 05	10	00		50		50
NOTE:	No. of Questions to be answered/ module No. of Questions to be answered/	01 05	10	00		50		50
NOTE: 1. The mir	No. of Questions to be answered/ module No. of Questions to be answered/	01 05 ared in CIE to appea	r for SEE sho	oo all be 2	25.	50		50
NOTE: 1. The mir 2. A minin	No. of Questions to be answered/ module No. of Questions to be answered/	01 05 ared in CIE to appea quired i.e., 20M.	r for SEE sho))) all be i	25.	50		50

put together, is required for passing the course i.e., 50M.



(An Autonomous Institution, Affiliated to VTU, Belagavi)

MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

. •

~

SEMESTER – I

Mathematical Foundations for Computer Applications				
Course Code	22MCA101	CIE Marks	50	
Contact Hours (L:T:P)	3:2:0	SEE Marks	50	
Total Number of Lecture Hours	42L 14T	Exam Hours	3	
Credits: 04				

Course objectives:

This course will enable students to

1. Understands the concepts of sets

2. Perform various basic operations on propositional logic

1 1

- 3. Solve problems using concepts of relations
- 4. Apply the abstract concepts of graph theory to solve problems
- 5. Compute statistical measures for the given set of data
- 6. Apply the concepts of probability distributions

Module – 1

Introduction: Implication and Scope of Mathematical Foundations for Computer Application and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

Set Theory: Sets, operations of Sets, Inclusion-exclusion principle, Pigeonhole principle. **Logic:** Propositional logic, propositional Equivalences, Introduction to proof.

(09 Hours)

Module – 2

Probability Distribution: Concept of Random variable, discrete probability distributions, continuous probability distributions, Mean and Variance of random variables. Binomial and normal distribution, Exponential and normal distribution with mean and variance and problems.

(08 Hours)

Module – 3

Relations: Relations and their properties, n-ary relations and their applications, Representing relations, Closures of Relations, Equivalence relations, Partial Orderings.

(08 Hours)

Module – 4

Graphs: Graphs and Graphs models, Graph Terminology and special types of graphs, Representing graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path problems, Planar Graphs, Graph Colouring.

(08 Hours)

Module – 5

Statistical methods and Curve Fitting: Correlation, Coefficient of Correlations, Lines of Regression – Principle of Least Square. Curve Fitting – Graphical Method, Principle of Least Square – to fit a straight line and parabola. Fitting of other curves of the form y=ax^b, y=ae^{bx}

Recap: Summary of MFCA concepts

(09 Hours)

Course outcomes:

The students will be able to:

CO1: Apply the concepts of set theory and propositional logic to solve problems.

CO2: Compute statistical measures of random variables and probability distributions.

CO3: Solve problems using concepts of relations.

CO4: Apply the abstract concepts of graph theory to solve problems.

CO5: Fit an appropriate curve for the given data.

CIE:

- 60% of CIE is based on Internal Assessment Tests
- 40% of CIE is based on Alternate Assessment Methods

SEE:

• SEE will be conducted for 100 marks.

Text Books:

- 1. Kenneth H Rosen, "Discrete Mathematics and its Applications", McGraw Hill publications,7thedition.
- 2. Dr. B. S. Grewal," Higher Engineering Mathematics", Khanna Publishers, 40th Edition **References:**
 - 1. Ralph P. Grimaldi and B V Ramana, Discrete and combinatorial Mathematics", 5th Edition, Pearson,2011.
 - 2. J K Sharma, "Discrete Mathematics", MacMillan Publishers India Ltd, 3rd Edition, 2011.
 - 3. J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill, 2017.
 - 4. Walpole Myers, "Probability and Statistics for Engineers and Scientists", Pearson, 8th Edition.



MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – I

Operating Systems				
Course Code	22MCA102	CIE Marks	50	
Contact Hours (L:T:P)	3:0:2	SEE Marks	50	
Total Number of Lecture Hours	42L 28P	Exam Hours	3	
Credits: 04				

Course objectives:

This course will enable students to

- 1. To understand the services of operating system
- 2. To know about various types of operating systems
- 3. To analyse and understand the need for processes, threads and their implementation models.
- 4. To learn CPU and Memory management technique.
- 5. To study the architecture of a Linux system

Module – 1

Introduction: Implication and Scope of operating system concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

Operating System Basics: Introduction to Operating System, Mainframe Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Clustered Systems, Real - Time Systems, Handheld Systems, Feature Migration, Computing Environments, System Components, Operating – System Services, System Calls, System Programs, System Structure. (09 Hours)

Module – 2

Process Management: Process Concept, Scheduling Criteria, Scheduling Algorithms. Process Synchronization: The Critical Section Problem, Semaphores, Readers-Writers Problem, Dining Philosopher's Problem using Semaphores

(08 Hours)

Module – 3

Deadlocks: System model, Deadlock Characterization, Methods for handling deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from deadlock. (08 Hours)

Module – 4

Memory Management: Memory Management Strategies, Basic hardware, Swapping, Contiguous Memory Allocation, Paging, Segmentation. Virtual Memory: Demand Paging, Page Replacement algorithms, problems.

(08 Hours)

Module – 5

File System: File System Implementation, File concepts, Access methods, Directory overview, Allocation methods, Free space management. Secondary Storage Structures Magnetic disks, Disk Management, Disk Scheduling.

Recap: Summary of Operating system concepts

(09 Hours)

Laboratory Following concepts have to be implemented in lab: 1. Basic Unix commands to deal with files 2. Pipe and Filter commands 3. Unix special files 4. Command-line arguments **5.** Pattern matching **6.** Linux administration 7. Advanced filters: sed and awk **Course outcomes:** The students will be able to: CO1: Explore operating system concepts CO2: Apply the suitable OS algorithm for any given use case CO3: Analyze the file concepts, memory management and disk scheduling techniques CO4: Explore Linux features and commands CO5: Build shell scripts using Linux commands and language constructs CIE: CIE is based on Theory and Laboratory Components of the course. • Theory component is evaluated for 60% of CIE i.e., 30 Marks and Laboratory component • is evaluated for 40% of CIE i.e., 20 Marks. CIE involves tests, assignments, case studies, reports etc. • SEE: SEE will be conducted for 100 marks. • Text Books: 1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating Systems Principles", 8th Edition, Wiley – India. **References:** 1. D M Dhamdhere, "Operating Systems – A Concept Based Approach", 2nd Edition, Tata McGraw – Hill, 2002.

2. Behrouz A Forouzan and Richard F Gilberg, "LINUX and Shell Programming", 1st Edition, Thomson Course Technology, 2005.



MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 SEMESTER – I

Data Structures and AlgorithmsCourse Code22MCA103CIE Marks50Contact Hours (L:T:P)3:0:2SEE Marks50Total Number of Lecture Hours42L 28PExam Hours3Credits: 04

Course objectives:

This course will enable students to

- 1. Understand the internal representation and perform operations on arrays, linked structures, stacks, queues, trees, and graphs
- 2. Describe common applications of various data structures
- 3. Demonstrate different methods for traversing trees
- 4. Implement dynamic and static data structures
- 5. Analyze the efficiency of various algorithms

Module – 1

Introduction: Implication and Scope of Data Structures and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

Basic Concepts: Introduction to Arrays, Pointers and Dynamic Memory Allocation, Dynamic Array representations, Structures and Unions.

(09 Hours)

Module – 2

Stacks: Operations on Stacks and its Applications. **Queues:** Queues, Circular Queues, Priority queues, Dequeue and Operations.

(08 Hours)

Module – 3

Linked Lists: Single Linked Lists, Double Linked Lists, Circular Linked Lists and Operations. **Trees:** Introduction, Binary Trees and traversals, Binary Search Trees.

(08 Hours)

Module – 4

Fundamentals of the Analysis of Algorithm Efficiency: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental data Structures, Analysis Framework, Asymptotic Notations and Basic efficiency classes, Brute-Force Algorithms - Bubble Sort, String search.

(08 Hours)

Module – 5

Algorithms: Divide and Conquer – Quick sort, Binary Search, Greedy method – Dijkstra's algorithm, Prim's and Kruskal algorithm, Decrease and Conquer – DFS, BFS.

Recap: Summary of the Data Structures covered

(09 Hours)

Laboratory
Lab Programs covering the following concepts using C:
1. Arrays
2. Operations on Stacks
3. Operations on Queues and Dequeues
4. Singly linked lists
5. Circular Linked Lists
6. Doubly linked lists
7. Binary search trees
8. Sorting and Searching Techniques
Course outcomes:
The students will be able to:
CO1: Explore various types of data structures
CO2: Implement different data structures in multiple scenarios
CO3: Compute the efficiency of algorithms with respect to different criteria
CO4: Analyse various algorithm implementation techniques
CO5: Develop solutions for real world problems using data structures and algorithms
• CIE is based on Theory and Laboratory Components of the course.
• Theory component is evaluated for 60% of CIE i.e., 30 Marks and Laboratory componen
IS evaluated for 40% of CIE i.e., 20 Marks.
• CIE involves tests, assignments, case studies, reports etc.
• SEE is conducted for 100 marks
Text Books:
1. Horowitz, Sahni, Anderson-Freed, "Fundamentals of Data Structures in C", 2nd Edition.
University Press, 2007.
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson, 2nd
Edition.
References:
1. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures A Pseudocode Approach with C", Thomson, 2005.
2. Robert Kruse & Bruce Leung, "Data Structures & Program Design in C", Pearson Education, 2007.

3. Debasis Samanta, "Classic Data Structures", 2nd Edition, PHI, 2009.



(An Autonomous Institution, Affiliated to VTU, Belagavi)

MASTER OF COMPUTER APPLICATIONS

Scheme of Teaching and Examination: 2022-23

SEMESTER – I

Database Management Systems				
Course Code	22MCA104	CIE Marks	50	
Contact Hours (L:T:P)	3:0:2	SEE Marks	50	
Total Number of Lecture Hours	42L 28P	Exam Hours	3	
Credits: 04				

Course objectives:

This course will enable students to

- 1. Understand the fundamental concepts of Database Management Systems
- 2. Compare between file systems and database systems
- 3. Design ER diagrams, schema and relational tables
- 4. Formulate SQL queries
- 5. Develop real-time database applications

Module – 1

Introduction: Implication and Scope of Database Management System concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

Overview: Characteristics of Database approach, Actors on the Scene, Workers behind the scene, Advantages of using DBMS approach, Data models, schemas and instances, Three - schema architecture and data independence, Entity-Relationship Model: Conceptual Database using high level conceptual data models for Database Design, A Sample Database Application, Entity types, Entity sets, Attributes and Keys Relationship types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types.

(09 Hours)

Module – 2

Relational Model: Relational vs Non-Relational DBMS, Relational Model Concepts, Relational Model Constraints and Relational Database Schema Update Operations, Transactions and Dealing with Constraint violations, Unary Relational operations, Relational Algebra Operations from Set Theory, Binary Relational Operations, JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra, Relational Database Design Using ER-to-Relational Mapping.

(08 Hours)

Module – 3

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic structure of SQL Queries, Additional Basic Operations, Null values, Aggregate Functions, Modification of the Database, Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization. Database programming issues and techniques, Embedded SQL.

(08 Hours)

Module – 4 Database Design: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms based on Primary Keys, General Definitions of 2nd and 3rd Normal Forms, Boyce Codd Normal Forms, Stored Procedures and functions, Triggers, Views.

(08 Hours)

(09 Hours)

Module – 5

Transaction Management: Transaction Concept, A Simple Transaction Model, Desirable properties of Transaction, Concurrency Control: Lock Based Protocols, Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Recap: Summary of DBMS concepts

Laboratory

Programs covering the following concepts:

- 1. Create a Database including primary key and foreign key concepts.
- 2. Create a database and demonstrate the usage of aggregate functions.
- 3. Create a database and demonstrate the usage of Group by / having clause.
- 4. Create a database and illustrate the usage of stored procedures / functions.
- 5. Demonstrate the usage of triggers.
- 6. Demonstrate the usage of views.
- 7. Build a database for any given application (Open Ended).

Course outcomes:

The students will be able to:

- CO1: Apply the basic concepts of database management
- CO2: Design entity-relationship diagrams for any given database use-case
- CO3: Formulate SQL queries for a given problem scenario
- CO4: Improve the database design by normalization
- CO5: Build database for any given application

CIE:

- CIE is based on Theory and Laboratory Components of the course.
- Theory component is evaluated for 60% of CIE i.e., 30 Marks and Laboratory component is evaluated for 40% of CIE i.e., 20 Marks.
- CIE involves tests, assignments, case studies, reports etc.

SEE:

• SEE will be conducted for 100 marks.

Text Books:

1. Elmasri and Navathe, "Fundamentals of Database Systems", 5th Edition, Addison - Wesley, 2011.

References:

- 1. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", 3rd Edition, McGraw-Hill, 2003.
- 2. Silberschatz, Korth and Sudarshan, "Data base System Concepts", 6th Edition, Tata McGraw Hill, 2011.



MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 SEMESTER – I

Computer NetworksCourse Code22MCA105CIE Marks50Contact Hours (L:T:P)3:0:0SEE Marks50Total Number of Lecture Hours42LExam Hours3Credits: 03

Course objectives:

This course will enable students to

- 1. Learn the Basic concepts of Computer Networking
- 2. Understand the concepts of OSI and TCP/IP model
- 3. Describe the functions of Physical and Data Link layers
- 4. Describe the functions of Network and Transport layers
- 5. Demonstrate the TCP/IP sockets in UNIX operating System.

Module – 1

Introduction: Implication and Scope of Computer Network concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

Overview: Networks, protocols and standards, layered tasks, the OSI model, layers in the OSI model, TCP/IP protocol suite, addressing.

(09 Hours)

Module – 2

Physical Layer and Media: Periodic analog signals, digital signals, transmission impairment, data rate limits, performance, Transmission Media.

Data Link Layer: Error Detection and Correction, Data Link Control, Multiple Access.

Module – 3

Network Layer: Logical Addressing, Internet Protocol, Address Mapping, Error Reporting and Multicasting, Delivery Forwarding and Routing

(08 Hours)

(08 Hours)

Module – 4

Transport Layer: Process-to-Process Delivery: UDP, TCP and SCTP, Congestion Control and Quality of Service.

Application Layer: Overlay networks in cloud deployment

(08 Hours)

Module – 5

Linux Networking: Introduction, The Transport Layer: TCP, UDP and SCTP, Elementary Sockets: Sockets Introduction, Elementary TCP Sockets, TCP Client/Server Example.

Recap: Summary of CN concepts

(09 Hours)

Course outcomes:

The students will be able to:

CO1: Explore the Basic Concepts of Computer Networking

CO2: Apply the concepts of OSI model and TCP/IP model on Computer Network

CO3: Analyze the functioning of various protocols of any given Network.

CO4: Implement Networking concepts in UNIX operating system.

CO5: Design a topology with router using any network simulator

CIE:

- 60% of CIE is based on Internal Assessment Tests
- 40% of CIE is based on Alternate Assessment Methods

SEE:

• SEE will be conducted for 100 marks.

Text Books:

- 1. Forouzan, "Data Communications and Networking 5E", McGraw Hill Education.
- 2. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, "UNIX Network Programming", Volume 1, 3rd Edition, PHI Learning Publication, 2010

References:

- 1. Andrew S. Tanenbaum, "Computer Networks", 5th Edition, Pearson Publication, 2011
- 2. Larry Peterson and Bruce Davie, "Computer Networks: A Systems Approach", Version 6.2, MK Publication.



MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 SEMESTER – I

Python Lab				
Course Code	22MCA106	CIE Marks	50	
Contact Hours (L:T:P)	0:3:3	SEE Marks	50	
Total Number of Lecture Hours	42T 42P	Exam Hours	3	
Credits: 03				

Course objectives:

This course will enable students to

- 1. Apply the basics of Python Programming.
- 2. Design GUI using Python basics
- 3. Develop real-time applications using Python.
- 4. Acquire the knowledge of programming constructs in Python
- 5. Apply Pre-processing techniques for real-time data.

Tutorial Syllabus

- 1. Python Basic Concepts Python Program Environment, Data types, Variables, Strings, Operators, Loops, Control statements.
- 2. Built-in Functions, Modules, Command Line Arguments, Keyword Arguments.
- 3. Python Collection Objects, Classes.
- 4. Strings, Files, I/O.
- 5. Data Wrangling using Numpy and Pandas.

Laboratory

- a. Program to find the power of a number.
 b. Program to compute the GCD of two numbers.
 c. Program to display prime numbers in a given range.
- a. Program to display palindrome numbers in a given range.
 b. Program to print a triangle of '*'.
 - c. Program to print a triangle with numbers.

3. a. Program to find maximum of a list of numbers.b. Program to find the sum of even and odd numbers separately in a list.c. Program to search for an element in a list.

- 4. a. Program to perform matrix multiplication.b. Program to perform Set operations.
- 5. Program to demonstrate String Operations.
- 6. a. Program to find the Mean, Median and Mode for a given set of numbers in a list with user-defined functions
 - b. Program to define a function that can find all duplicate values in a list.

- 7. Using the OOPs concepts, write a program for basic working of ATM Machine.
- 8. Demonstrate various graphs and plots that enable data visualization (Bar graph, Pie chart, Histogram, Box plot, Scatter plot).
- 9. Program related to comprehension- map, filter and reduce.
- 10. Program related to Image processing.

Course outcomes:

The students will be able to:

CO1: Demonstrate the fundamental concepts of Python Programming.

CO2: Implement OOP concepts in Python.

CO3: Perform various operations by importing suitable libraries.

CO4: Analyze the real-time data sets using Visualization packages.

CIE:

- 60% of CIE is based on Cumulative assessment of laboratory program conduction comprising Program execution, Viva and Record writing.
- 40% of CIE is based on IA Tests and Alternate Assessment Methods.

SEE:

• SEE will be conducted for 100 marks.

References:

- 1. Paul Gries, Jennifer Campbell, Jason Montojo, "Practical Programming: An introduction to Computer Science using Python", The Pragmatic Bookshelf.
- 2. Allen Downey, Jeffrey Elkner, "Learning with Python: How to think like a computer scientist paperback", 2015.
- 3. Hans Fangohr, "Introduction to Python for Computational Science and Engineering"
- 4. Timothy A Budd, "Exploring Python", McGraw Hill Education.



(An Autonomous Institution, Affiliated to VTU, Belagavi)

MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – I

Research Methodology and IPR				
Course Code	22MCA107	CIE Marks	50	
Contact Hours (L:T:P)	2:0:0	SEE Marks	50	
Total Number of Lecture Hours	27L	Exam Hours	3	
Credits: 02				

Course objectives:

This course will enable students to

- 1. Understand the objectives of scientific research
- 2. Understand the various research methods and methodologies of the given use case.
- 3. Understand the importance of literature study in the course of doing research.
- 4. Understand the research design and applying the suitable research design for the given problem.
- 5. Understanding the writing of research reports and articles.

Module – 1

Introduction: Implication and Scope of RM & IPR concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

Research Methodology: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Criteria of Good Research.

(06 Hours)

Module – 2

Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.

(05 Hours)

Module – 3

Reviewing the literature: Bringing clarity and focus to your research problem, improving research methodology, broadening knowledge base in research area, how to review the literature, searching the existing literature, reviewing the selected literature, developing a theoretical framework, developing a conceptual framework, writing about the literature reviewed.

(05 Hours)

Module - 4

Research Design: Important Concepts Relating to Research Design, Different Research Designs.

Data Collection: Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection.

(05 Hours)

Module – 5 Interpretation and Report Writing: Meaning, Technique and Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout. Mechanics and Precautions of Writing a Research Reports. Intellectual Property (IP) Acts: Different types of IPs and its importance in the present scenario, Patent Acts: Indian patent acts 1970. Design Act: Industrial Design act 2000. Copy right acts: Copyright Act 1957. Trademark Act, 1999 Recap: Summary of RM & IPR concepts (06 Hours) **Course outcomes:** The students will be able to: CO1: Explore the various research methodologies and IP Acts. CO2: Review the existing literature to narrow down the problem statement. CO3: Compile data from relevant sources to strengthen research problem. CO4: Write effective research article / report. CIE: 60% of CIE is based on Internal Assessment Tests • 40% of CIE is based on Alternate Assessment Methods • SEE: SEE will be conducted for 100 marks. • **Text Books**: 1. C.R. Kothari, Gaurav Garg, "Research Methodology: Methods and Techniques", New Age International 4th Edition, 2018. 2. Ranjit Kumar, "Research Methodology a step-by- step guide for beginners", SAGE Publications Ltd 3rd Edition, 2011 Study Material.

3. Debirag E. Bouchoux, "Intellectual property", Cengage learning, 2013.

References:

- 1. Trochim. "Research Methods: the concise knowledge base", Atomic Dog Publishing, 2005.
- 2. Fink A, "Conducting Research Literature Reviews: From the Internet to Paper", Sage Publications, 2009.



MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

ನಹಿ ಚ್ಞಾನೇನ ಸದ್ಯತಂ Sche	me of Teaching and Exami	nation: 2022-23	
	SEMESTER – I		
	Bridge Course - 1		
Course Code	22MCA1BC	CIE Marks	40
Contact Hours (L:T:P)	3:0:0	SEE Marks	60
Total Number of Lecture Hours	40L	Exam Hours	03
	Credits: 0		•
Course objectives:			
This course will enable students to	0		
1. Realize the functionality of	logic gates		
2. Apply Boolean axioms to si	implify Boolean expressions,	combinational and	sequential
circuits.			
3. Explain the basic principles	s and operations of different	components of a dig	gital
computer			
4. Apply C concepts to simple	e programs		
5. Obtain a thorough underst			
	Module - 1		
	Module – 2	omplement	(08 hours)
Computer Basics: Functional un	nits of computers, operationa	al concepts, byte add	dressability,
instruction types, sequencing, add	lressing modes.		-
			(08 hours)
	Module – 3		
Memory: Basic memory concepts	, Memory types, Semi-Condu	ctor RAM organizati	on, Memory
merarchy, cache memory, virtuar	memory, secondary storage	uevices	(08 hours)
	Module - 4		(00 110013)
C Basics: Data Types Operator	rs Control structures Arra	vs Procedures and	Functions
Parameter passing. Recursion.	is, control structures, filla	, s, i i occurres and	1 4110110113,
,			(08 hours)
	Module – 5		<u>(</u>
C Basics: Structures and Unions, I	Pointers, Memory allocation	functions, I/o forma	tting
			(08 hours)
Course outcomes:			
The students will be able to:			
CO1: Explore the functionality of	logic gates.		
CO2: Apply Boolean axioms to sin	nplify Boolean expressions, o	combinational and se	equential
circuits.	-		
CO3: Explore the basic principles	and operations of different of	components of a digi	tal
computer.			
CO4: Explore the basic programm	ning constructs		

CO5: Apply 'C' concepts to simple programs.

CIE:

- 60% of CIE is based on Internal Assessment Tests
- 40% of CIE is based on Alternate Assessment Methods

SEE:

• SEE will be conducted for 100 Marks.

Textbooks:

- 1. M.Morris Mano, "Digital Logic and Computer Design", Pearson, 2012.
- 2. Carl Hamacher, Zvonko Vranesic Safwat Zaky, "Computer Organization", 5th edition, TataMcGraw-Hill, 2011
- 3. Balaguruswamy, "Basics of C Programming"



MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – II

Software Engineering				
Course Code	22MCA201	CIE Marks	50	
Contact Hours (L:T:P)	3:0:2	SEE Marks	50	
Total Number of Lecture Hours	42L 28P	Exam Hours	3	
Credits: 04				

Course objectives:

This course will enable students to

- 1. Understand the software development process.
- 2. Analyse the system requirements
- 3. Design the system with UML tools
- 4. Explore the basic principles of software testing and debugging.
- 5. Apply different levels of testing, test case, test plan for any given project.

Module – 1

Introduction: Implication and Scope of Software Engineering and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

Overview: Introduction, Professional software development, case studies. Software Process: software process with models, process activities, coping with change, process improvement. Agile Software development: Agile methods, techniques, project management, scaling agile methods.

(09 Hours)

Module – 2

Requirements Engineering: Functional and non-functional requirements, requirements engineering process, requirements elicitation, requirements specification, requirements validation, requirements management.

System Modeling: Context models, interaction models, structural models, behavioral models, model-driven engineering.

(08 Hours)

Мо	dule	- 3
	~~~	

**Design and implementation**: Object- oriented design using the UML, Design patterns, implement issues, open-source development.

**Domain-Driven-Design:** Communication and use of the language, binding model and implementation.

(08 Hours)

Module – 4

**Software Evolution**: Evolution process, program evolution dynamics, software maintenance, Legacy system management.

**Software Testing**: Development testing, Test-driven development, Release testing, user testing.

**Sociotechnical systems**: Complex systems, systems engineering, system procurement, system development.

(08 Hours)

#### Module – 5

**Project Management**: Risk management, managing people, teamwork.

**Project planning:** Software pricing, plan-driven development, project scheduling, Agile planning, Estimation techniques.

**Quality Management**: Software quality, software standards, reviews and inspection, software measurements and metrics.

**Recap:** Summary of SE concepts

(09 Hours)

Laboratory

#### List of Programs:

Using UML tools implement the patterns with different types of modeling such as class diagram, sequence diagram, use case diagram, activity diagram etc. Implement using Java programming.

- 1. Publisher-Subscriber pattern
- 2. Command pattern
- 3. Client-dispatcher pattern
- 4. Proxy pattern
- 5. Forwarder-Receiver pattern
- 6. Polymorphism pattern

#### **Course outcomes:**

The students will be able to:

CO1: Explore the basic aspects of Software Engineering.

CO2: Analyze the requirements of a software systems

CO3: Perform testing for the software system.

CO4: Create different models for the given problem.

#### CO5: Evaluate the project in terms of risk and quality

#### CIE:

- CIE is based on Theory and Laboratory Components of the course.
- Theory component is evaluated for 60% of CIE i.e., 30 Marks and Laboratory component is evaluated for 40% of CIE i.e., 20 Marks.
- CIE involves tests, assignments, case studies, reports etc.

#### SEE:

• SEE will be conducted for 100 marks.

#### Text Books:

- 1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education Ltd, 2011.
- Eric Evans "Domain-Driven Design: Tackling Complexity in the Heart of Software", Wesley,2003.URL:<u>https://sd.blackball.lv/library/Domain-</u> Driven Design Tackling Complexity in the Heart of Software.pdf

#### **References:**

- 1. Pankaj Jalote: Software Engineering, Wiley India Pvt Ltd (2010)
- 2. Roger S Pressman: Software Engineering-A Practitioners approach, 6th Edition, McGraw-Hill, 2010.



(An Autonomous Institution, Affiliated to VTU, Belagavi)

#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

#### SEMESTER – II

Mobile Application Development				
Course Code	22MCA202	CIE Marks	50	
Contact Hours (L:T:P)	3:0:2	SEE Marks	50	
Total Number of Lecture Hours	42L 28P	Exam Hours	3	
Credits: 04				

#### **Course objectives:**

This course will enable students to

- 1. Understand the preliminary requirements to build mobile applications
- 2. Design the GUI based activity screens using one of the tools of mobile application
- 3. Analyze the flows of activities of mobile applications

1 .1

.

- 4. Apply the technologies to create mobile adaptive web applications.
- 5. Implement and Test Builds using one of the marketing tools of mobile.

#### Module - 1

**Introduction:** Implication and Scope of Mobile Application Development concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Overview**: Preliminary Considerations – Cost of Development – Importance of Mobile Strategies in the Business World – Effective use of Screen Real Estate – Understanding Mobile Applications: Understanding Mobile Applications Users – Understanding Mobile Information Design – Understanding Mobile Platforms – Using the Tools of Mobile Interface Design.

(09 Hours)

#### Module – 2

**Getting Started with Android Programming:** What is Android – Obtaining the required tools– Anatomy of an Android Application – Components of Android Applications – Activities – Fragments – Utilizing the Action Bar

(08 Hours)

#### Module – 3

**Android UI Design and Location Based Services:** Views and View Groups – Basic Views – Fragments – Displaying Maps – Getting Location Data – Publishing for Publishing – Deploying APK Files

(08 Hours)

#### Module – 4

**Android Messaging and Networking:** SMS Messaging – Sending Email – Networking – Downloading Binary Data, Text files – Accessing Web Services – Performing Asynchronous Call – Creating your own services – Communicating between a service and an activity – Binding, activities to services

(08 Hours)

#### Module – 5

**Feedback and Oscillator Circuits:** iOS – Obtaining the tools and SDK – Components of XCODE – Architecture of iOS – Building Derby App in iOS – Other useful iOS things. **Flutter:** Creating a basic app using flutter.

Recap: Summary of MAD concepts

(09 Hours)

#### **Course outcomes:**

The students will be able to:

- CO1: Explore the design features of mobile devices.
- CO2: Develop applications using views, intents, fragments and graphics.

CO3: Design an application using Internal and external database.

CO4: Design an application using image capturing and location based.

CO5: Develop a mobile application based on societal and environmental issues.

#### Laboratory

- 1. Views
- 2. Activities
- 3. Fragments
- 4. Intents
- 5. Layouts and Layout Managers
- 6. Graphics & Media
- 7. Internal & External Database
- 8. SMS Messaging
- 9. Image capturing and Location based applications
- 10. Notification
- 11. Flutter Framework

#### CIE:

- CIE is based on Theory and Laboratory Components of the course.
- Theory component is evaluated for 60% of CIE i.e., 30 Marks and Laboratory component is evaluated for 40% of CIE i.e., 20 Marks.
- CIE involves tests, assignments, case studies, reports etc.

SEE:

• SEE will be conducted for 100 marks.

#### **Text Books:**

- 1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", 1st Edition, 2012, ISBN: 978-1-118-20390-3
- 2. Wei-Meng Lee, "Beginning Android Application Development", Wiley 2011.
- 3. Marco L Napoli, "Beginning Flutter Hands on Guide to App Development", Wrox Publications 2020

#### **References:**

**1.** Reto Meier, "Professional Android 4 Application Development", Wrox Publications 2012.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

	SEMESTER – II		
	Web Technologies		
Course Code	22MCA203	CIE Marks	50
Contact Hours (L:T:P)	3:0:2	SEE Marks	50
Total Number of Lecture Hours	42L 28P	Exam Hours	3
Credits: 04			

#### **Course objectives:**

This course will enable students to

- 1. Explore the various web scripting technologies.
- 2. Use HTML/XHTML, CSS, and Bootstrap to Design and Decorate simple to complex web pages.
- 3. Validate the web page at client side, server side using either JavaScript / ES6 Script.
- 4. Build a societal related problem based web application.

Module – 1

**Introduction:** Implication and Scope of Web Technologies concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Responsive Web Page Design:** Concept of Bootstrap. Bootstrap file structure, basic HTML template. Global styles, Default Grid System. Basic Grid HTML, offsetting columns, nesting columns, fluid grid system, container layouts, responsive design, typography, emphasis classes, Lists, code, Tables, Optional Table classes, Table row classes, Forms, buttons, Images, Icons.

(09 Hours)

#### Module – 2

**JavaScript and DOM Model:** JavaScript primitives, operations, expressions, keyboard input and screen output, control statements, object creation and modification, Arrays, Functions, Constructors, Pattern Matching using regular expressions, Errors in scripts. Javascript execution environment, the document object model, Elements access in Javascript.

(08 Hours)

#### Module - 3

**Handling Events in JavaScript:** Events and Event Handling. Handling Events from Body Elements, Handling Events from Text Box and Password elements, the DOM2 Model, the navigator object, Dom Tree Traversal and Modification.

**Dynamic Documents with JavaScript:** Positioning elements, moving elements, element visibility, changing colors and fonts, dynamic content, stacking elements, locating the mouse cursor, reacting to a mouse click, slow movement of elements, dragging and dropping elements. (08 Hours)

#### Module – 4

**ECMAScript 6 (ES6):** Differences between ES5 and ES6, features, Source Maps, Block Scope, Default Parameters, Rest Parameters, Spread Operator, Destructuring, Arrow Functions, Enhanced Object Literals, Classes, Getters and Setters, New Math Functions, New Number Functions, Numeric Literals, New String Methods, Template Strings, New Array Functions and Methods, New Object Functions, Reflect Object, for-of Loops, Collections (Set, Map, WeakSet, WeakMap), Promises, Modules, jspm, Iterators and Iterables, Generators, Proxies, Tail Call Optimization, async and await, Type Annotations.

(08 Hours)

#### Module – 5

#### AJAX (Asynchronous JavaScript) Basics:

AJAX Principles, HTTP Primer, AJAX Communication Techniques, Cache Control, AJAX Patterns: Communication Control Patterns – Predictive Fetch, Page Preloading Example, Submission Throttling, Incremental Form and field validation example, Periodic refresh, Multi-stage Download. Fallback Patterns – Cancel Pending Requests, Try Again.

**Recap:** Summary of Web technologies concepts

(09 Hours)

Laboratory
1. Design a web page of Karnataka Tourism and apply appropriate CSS styles to the web page
using HTML/XHTML elements
2. Design an Entertainment portfolio and apply appropriate web contents
3. Design a web page of Complaint registration form and apply the following:
4. Design a Login web page to accept the username and password as input and perform modifications.
5. Design an attractive event registration web page to accept the name, primary contact, address, email, type of event to participate, gender, age-group and terms & conditions field and perform the various actions.
6. Design a simple 2D game web page, which uses XHTML, CSS and Dynamic Javascript.
7. Build a department web application page using AJAX.
8. Build a college single page web application using ReactJS.
Course outcomes:
The students will be able to:
CO1: Explore Basic Concepts and tools of web technologies.
CO2. Validate the such many at client eide common eide using suitable contrologies.
CO4. Apply the creativity in building web pages using suitable CIII code
CO4: Apply the creativity in building web pages using suitable GOI code.
CIF.
<ul> <li>CIF is based on Theory and Laboratory Components of the course</li> </ul>
<ul> <li>Theory component is evaluated for 60% of CIF i.e. 30 Marks and Laboratory component.</li> </ul>
is evaluated for 40% of CIE i.e. 20 Marks
<ul> <li>CIE involves tests, assignments, case studies, reports etc.</li> </ul>
SEE:
• SEE will be conducted for 100 marks.
Text Books:
1. Jake Spurlock, "Bootstrap – Responsive Web Development", O'Reilly, First Edition, 2013.
2. Nicholas C. Zakas, et.Al., "Professional Ajax", 2nd Edition, Wiley India Edition, 2010.
3. Mark Volkmann, "ECMAScript (ES) 6", Object Computing Inc, 2014.
References:
1. Robert W. Sebesta, "Programming the World Wide Web" 8th Edition, Pearson, 2014

- 2. DT Editorial Services,"HTML5 Black Book" Dreamtech Press, 2nd Edition,2016
- 3. Fabio Cimo, Bootstrap Programming Cookbook, Exelixis Media P. C., 2015



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 SEMESTER – II

# JAVA PROGRAMMINGCourse Code22MCA204CIE MarksContact Hours (L:T:P)3:0:2SEE Marks

42L 28P

Credits: 04

#### **Course objectives:**

This course will enable students to

**Total Number of Lecture Hours** 

- 1. Understand the basic constructs of Java programming.
- 2. Solve any given problem by applying various OOP concepts.
- 3. Understand the concepts of Multithreading to develop complex applications.
- 4. Design web applications using Servlets and JSP.
- 5. Develop applications using JDBC and EJB.

Module – 1

**Introduction:** Implication and Scope of Java and Advanced Java Programming concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Java Programming Fundamentals:** Java Programming Fundamentals, Introducing Data Types and Operators, Program Control Statements, Introducing Classes, Objects and Methods. **Methods, Classes and Inheritance:** Controlling Access to Class Members, Pass Objects to Methods, How Arguments are passed, Returning Objects, Method Overloading, Overloading Constructors, Recursion, Constructors and Inheritance, using super to Call Superclass constructors, using super to Access Superclass Members, creating a Multilevel Hierarchy, Superclass References and Subclass Objects, Method Overriding, Overridden Methods, Polymorphism, Using Abstract Classes, Using final.

(09 Hours)

50

50

3

**Exam Hours** 

#### Module – 2

**Interfaces, Packages, and Exception Handling:** Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References, Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces, Package Fundamentals, Packages and Member Access, Importing Packages, The Exception Hierarchy, Exception Handling Fundamentals, the Consequences of an Uncaught Exception, Exceptions Enable you to handle errors gracefully, using Multiple catch clauses, Catching subclass Exceptions, Throwing an Exception, Throwable, using finally, using throws.

(08 Hours)

#### Module – 3

**Multithreaded Programming and Enumerations:** Multithreading fundamentals, The Thread Class and Runnable Interface, Creating Thread, Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, using Synchronization Methods, The Synchronized Statement, Thread Communication using notify(), wait() and notify All(), suspending, Resuming and stopping Threads, Enumerations, The Values() and Valueof() Methods, Instance variables and enumerations.

(08 Hours)

Module – 4 Servlets: Servlet Structure, Packaging, Lifecycle, HTTP Request and response, Handling client request, Form data, HTTP status request headers, HTTP Status codes, HTTP response headers, Handling cookies, Session tracking. Java Server Pages: Need of JSP, Basic syntax, Scripting elements, Limiting Java code in JSP, JSP expression, JSP directives, JSP attributes. (08 Hours) Module – 5 **JDBC:** Steps to connect to the database, Connectivity with Oracle or MySQL, DriverManager, Connection, Statement, ResultSet interfaces, PreparedStatement, ResultSetMetaData, DatabaseMetaData. Server Side Component Types: The Stateless Session Bean, the Stateful Session Bean, the Singleton Session Bean, Message Driven Bean, Entity Bean. **Recap:** Summary of Java and Advanced Java Programming concepts (09 Hours) LABORATORY Lab Programs covering the Concepts: 5. Servlets 1. Constructor Overloading and Method 6. JSP directives and attributes Overloading 7. JDBC 2. Classes and Objects 8. Entity Beans 3. Inheritance 4. Packages and Interfaces **Course outcomes:** The students will be able to: CO1: Demonstrate the basic programming constructs of Java and OOP concepts to develop Java applications. CO2: Illustrate the concepts of generalization and run time polymorphism to develop reusable components. CO3: Exemplify the usage of Multithreading in building efficient applications. CO4: Build web applications using Servlets and JSP. CO5: Design applications using JDBC and Enterprise Java Beans. CIE: • CIE is based on Theory and Laboratory Components of the course. Theory component is evaluated for 60% of CIE i.e., 30 Marks and Laboratory component ٠ is evaluated for 40% of CIE i.e., 20 Marks. CIE involves tests, assignments, case studies, reports etc. • SEE: • SEE will be conducted for 100 marks Text Books: 1. Herbert Schildt, Dale Skrien, "Java Fundamentals: A comprehensive Introduction", Tata McGraw Hill Edition 2013. 2. Marty Hall, Larry Brown, "Core Servlets and Java Server Pages", Volume 1, Core Technologies. 2nd Edition. 3. Andrew LeeRubinger, Bill Burke, "Developing Enterprise Java Components: Enterprise JavaBeans 3.1", O'Reilly. **References:** 1. Hari Mohan Pandey, "Java Programming", Pearson Education, 2012. 2. "Java 6 Programming: Black Book", Dreamtech Press, 2012. 3. Michael Sikora, "EJB 3 Developer Guide, A practical guide for developers and architects to the Enterprise Java Beans Standard", SPD, 2008



#### Master of Computer Applications Scheme of Teaching and Examination: 2022-23

SEMESTER – II			
Data Warehousing and Data Mining			
Course Code	22MCA2051	CIE Marks	50
Contact Hours (L:T:P)	3:0:0	SEE Marks	50
Total Number of Lecture Hours	42L	Exam Hours	3
Credits: 03			

#### **Course objectives:**

This course will enable students to

- 1. Be familiar with mathematical foundations of data mining tools.
- 2. Implement classical models and algorithms in data warehouses and data mining
- 3. Discover interesting patterns using association rule mining, classification and clustering
- 4. Apply data mining techniques to societal, scientific and environmental use cases.
- 5. Develop skill in selecting the appropriate data mining algorithm for solving practical problems

#### Module - 1

**Introduction:** Implication and Scope of Data Warehousing and Data Mining concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Data warehousing and OLAP:** Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube and OLAP: Characteristics of OLAP systems, Multidimensional view and Data cube, Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Software.

(09 Hours)

#### Module – 2

**Data Mining and its applications:** Introduction, What is Data Mining?, Motivating Challenges, Data Mining Tasks, Which technologies are used for data mining, Kinds of pattern that can be mined, Data Mining Applications, Data Preprocessing, Data cleaning, data integration, data reduction and data transformation.

(08 Hours)

#### Module – 3

**Association Analysis**: Basic Concepts and Algorithms, Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm

(08 Hours)

#### Module – 4

**Classification:** Methods, Improving accuracy of classification, Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers. Bayesian Classifiers, Estimating Predictive accuracy of classification methods, Improving accuracy of classification methods, Evaluation criteria for classification methods, Multiclass Problem.

(08 Hours)

Module – 5
Clustering Techniques: Overview, Features of cluster analysis, Types of Data and Computing
Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods,
Density Based Methods, Quality and Validity of Cluster Analysis.
Recap: Summary of Data Warehousing and Data Mining concepts(09 Hours)
Course outcomes:
The students will be able to:
CO1: Identify the scope and necessity of Data Warehousing and Data Mining.
CO2: Apply data mining techniques and methods to data sets
CO3: Analyze the frequent patterns using association analysis algorithms.
CO4: Design various algorithms based on data mining tools.
CO5: Compare and contrast the various classifiers
CIE:
<ul> <li>60% of CIE is based on Internal Assessment Tests</li> </ul>
<ul> <li>40% of CIE is based on Alternate Assessment Methods</li> </ul>
SEE:
SEE will be conducted for 100 marks.
Text Books:
1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining",
Addison-Wesley, 2005.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", 3 rd Edition, PHI, New Delhi,
2009.
References:
1. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition,
Morgan Kaufmann Publisher, 2006.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 SEMESTER – II

Big Data Analytics			
Course Code	22MCA2052	CIE Marks	50
Contact Hours (L:T:P)	3:0:0	SEE Marks	50
Total Number of Lecture Hours	42L	Exam Hours	3
Credits: 03			

#### **Course objectives:**

This course will enable students to

- 1. Understand the basics of analytics process model and its requirements.
- 2. Solve any given analytics problem by applying various algorithms for handling large volumes of data.
- 3. Understand the HDFS architecture and Map-Reduce techniques for solving the big data problems.
- 4. Explore Spark architecture and its APIs.
- 5. Use Hive Query Language against large datasets.

#### Module – 1

**Introduction:** Implication and Scope of Big Data Analytics concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Big Data and Analytics:** Example Applications, Basic Nomenclature, Analysis Process Model, Analytical Model Requirements, Types of Data Sources, Sampling, Types of Data Elements, Data Exploration, Exploratory Statistical Analysis, Missing Values, Outlier Detection and Treatment, Standardizing Data Labels, Categorization.

(09 Hours)

#### Module – 2

**Predictive and Descriptive Analytics:** Target Definition, Linear Regression, Logistic Regression, Decision Trees, Neural Networks, Support Vector Machines, Ensemble Methods, Multiclass Classification Techniques, Evaluating Predictive Models; Association Rules, Sequence Rules, Segmentation.

(08 Hours)

#### Module – 3

**The Hadoop Distributed File system:** The Design of HDFS, HDFS Concepts, Blocks, Namenodes and Datanodes, HDFS Federation, HDFS High-Availability, Anatomy of a File Read, Anatomy of a File Write.

**Map Reduce:** A Weather Dataset, Data Format, Analyzing the Data with Hadoop, Map and Reduce, Java MapReduce, Scaling Out, Data Flow, Combiner functions, Running a Distributed MapReduce Job.

(08 Hours)

#### Module – 4

**Big Data and Spark:** What is Apache Spark? Spark's Architecture, it's language API, Data Frames, Partitions, Lazy Evaluation, Spark's Toolset, Overview of Structured API Execution.

(08 Hours)

Module – 5
<b>Programming Hive:</b> Hive in the Hadoop Ecosystem, Data Types and File Formats, HiveQL:
Data Definition, Databases in Hive, Alter Database, Creating Tables, External Tables,
Partitioned Tables, External Partitioned Tables, Dropping Tables, Alter Tables, HiveQL: Data
Manipulation, Queries (till GROUP BY Clauses).
Recap: Summary of BDA concepts(09 Hours)
Course outcomes:
The students will be able to:
CO1: Identify the business problem for a given context and frame the objectives to solve it
using data analytics tools.
CO2: Differentiate various types of analytics algorithms and context of their application.
CO3: Illustrate the architecture of HDFS and MapReduce.
CO4: Explore Spark architecture and its language APIs
CO5: Write Hive queries against large datasets on clusters
CIE:
<ul> <li>60% of CIE is based on Internal Assessment Tests</li> </ul>
• 40% of CIE is based on Alternate Assessment Methods
SEE:
SEE will be conducted for 100 marks
Text Books:
1. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its
Applications" Wiley.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
3. Bill Chambers, Matei Zaharia, "Spark: The Definitive Guide", O'reilly, 2018.
4. Jason R, Dean W, Edward C, "Programming Hive", O'reilly, 2012.
References:
<ol> <li>Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley.</li> </ol>

2. Chris Eaton, Dirk Deroos et al., "Understanding Big data", McGraw Hill, 2012.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER - II			
NoSQL			
Course Code	22MCA2053	CIE Marks	50
Contact Hours (L:T:P)	3:0:0	SEE Marks	50
Total Number of Lecture Hours	42L	Exam Hours	3
Credits: 03			

#### **Course objectives:**

This course will enable students to

- 1. Understand the significant properties and potential uses of NoSQL
- 2. Compare between structured and unstructured data
- 3. Work with key-value and document databases
- 4. Write Map-Reduce programs for analysis
- 5. Explain about key-value, document, and graph databases

Module – 1

**Introduction:** Implication and Scope of NoSQL and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Introduction to NoSQL**: Definition of NoSQL, History of NoSQL, and Different NoSQL products. **Exploring NoSQL**: Exploring Mongo DB Java/Ruby/Python, Interfacing, and Interacting with NoSQL.

(09 Hours)

Module – 2

**NoSQL Basics**: NoSQL Storage Architecture, CRUD operations with Mongo DB, Querying, Modifying and Managing.

**Data Storage in NoSQL**: NoSQL Data Stores, Indexing and ordering datasets (MongoDB/CouchDB/Cassandra).

(08 Hours)

#### Module – 3

Advanced NoSQL: NoSQL in Cloud, Parallel Processing with MapReduce, Big Data with Hive. (08 Hours)

#### Module – 4

**Working with NoSQL**: Surveying Database Internals, migrating from RDBMS to NoSQL, Web Frameworks and NoSQL, using MySQL as a NoSQL.

(08 Hours)

#### Module – 5

**Developing Web Application with NoSQL and NoSQL Administration**: PHP and MongoDB, Python and MongoDB, Creating Blog Application with PHP.

Recap: Summary of NoSQL concepts

(09 Hours)

**Course outcomes:** 

The students will be able to:

CO1: Explore the characteristics of unstructured data.

CO2: Analyse CRUD operations

CO3: Apply map reduce programs to given data set.

CO4: Analyse the framework of NoSQL

CO5: Develop applications using NoSQL

CIE:

- 60% of CIE is based on Internal Assessment Tests
- 40% of CIE is based on Alternate Assessment Methods

SEE:

• SEE will be conducted for 100 marks.

#### Text Books:

1. Shashank Tiwari, "Professional NoSQL", WROX Press, 2011.

#### **References:**

- 1. Sadalage, P. & Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Pearson Addison Wesley, 2012.
- 2. Eelco Plugge, Peter Membrey and Tim Hawkins, "The Definitive Guide to MongoDB, The NoSQL Database for cloud and Desktop Computing", Apress, 2005.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – II			
Wireless Sensor Networks			
Course Code	22MCA2054	CIE Marks	50
Contact Hours (L:T:P)	3:0:0	SEE Marks	50
Total Number of Lecture Hours	42L	Exam Hours	3
Credits: 03			

#### **Course objectives:**

This course will enable students to

- 1. Understand the fundamentals of wireless networks.
- 2. Learn and analyze the different wireless technologies.
- 3. Evaluate Ad-hoc networks and wireless sensor networks.
- 4. Understand and evaluate emerging wireless technologies and standards.
- 5. Understand design considerations for wireless networks.
- 6 Analyse the security threats and related security standards.

#### Module-1

**Introduction:** Implication and Scope of Wireless Sensor Networks and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Basics of WSN:** The vision of Ambient Intelligence, Application examples, Types of Applications, challenges of WSNs, why sensor networks are different?

(09 Hours)

#### Module-2

**Single-node architecture:** Hardware components, Energy consumption of sensor nodes, operating systems and execution environment, examples of sensor nodes. **Network Architecture:** Sensor network scenarios, optimization goals and figures of

merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts.

(08 Hours)

#### Module-3

**Localization and Positioning:** Properties of localization and positioning procedures, possible approaches, single hop localization, positioning in multi-hop environments. **Topology:** motivation and basics ideas, controlling topology in flat networks, Hierarchical networks by dominating sets, Hierarchical networks by clustering, Combining hierarchical topologies and power control, adaptive node activity.

(08 Hours)

Module-4
Routing Protocols: Forwarding and routing, Gossiping and agent based unicast
forwarding, Energy-efficient unicast, Broadcast and multicast, Geographic routing,
mobile nodes.
Transport layer and quality of Service: the transport layer and QoS in WSNs, coverage
and deployment Reliable data transport, single packet delivery, Block delivery,
congestion control and rate control.
(08 Hours)
Module-5
Sensor Network Databases: Sensor database challenges, Querying the physical
environment, Query interfaces, High-level Data Organization, In-Network Aggregation,
Data centric storage, data indices and Range queries, Distributed Hierarchical
Aggregation, Temporal Data.
Recap:Summary of Wireless Sensor Networks concepts(09 Hours)
Course outcomes:
The students will be able to:
CO1: Explore the WSN architecture for various applications.
CO2: Apply suitable WSN routing protocols for a given network.
CO3: Analyze the organization of network nodes and their topology.
CO4: Evaluate the various QoS parameters of WSN.
CO5: Design appropriate database for WSN applications.
CIE:
<ul> <li>60% of CIE is based on Internal Assessment Tests</li> </ul>
• 40% of CIE is based on Alternate Assessment Methods
SEE:
SEE will be conducted for 100 marks.
Text Books:
1. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor
Networks", John Wiley & Sons Limited, 2008. [Chapters-1,2,3,9,10,11,13]
2. Felig ZHAO allu Leolliuas GOIDAS, WIFeless Sellsor Networks, Morgan Kaufmann Publisher [Chanter-6]
References:
1. Wilson, "Sensor Technology handbook", Elsevier publications, 2005.

 Anna Hac, "Wireless Sensor Networks Design", John Wiley& Sons Limited Publications, 2003



(An Autonomous Institution, Affiliated to VTU, Belagavi)

#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 **SEMESTER – II**

# **Artificial Intelligence**

Course Code	22MCA2055	CIE Marks	50	
Contact Hours (L:T:P)	3:0:0	SEE Marks	50	
Total Number of Lecture Hours	42L	Exam Hours	3	
Credits: 03				

#### **Course objectives:**

This course will enable students to

- 1. Create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.
- 2. Introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems
- 3. Review the different stages of development of the AI field from human like behaviour to Rational Agents.
- 4. Impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.
- 5. Create an understanding of the basic issues of knowledge representation and Logic and blind and heuristic search, as well as an understanding of other topics such as minimal, resolution, etc. that play an important role in AI programs.

#### Module - 1

Introduction: Implication and Scope of AI concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Overview**: What is Artificial Intelligence: The AI problems, the underlying assumption, what is an AI Technique? The Level of the model, Criteria for success, some general references, One final word and beyond. Problems, problem spaces, and search: Defining, the problem as a state space search, Production systems, Problem characteristics, Production system characteristics. (09 Hours)

#### Module - 2

Heuristic search techniques: Generate-and-test, Hill climbing, Best-first search, Problem reduction, Constraint satisfaction, Mean-ends analysis. Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem.

(08 Hours)

#### Module – 3

Predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates, Resolution, Natural Deduction.

Symbolic Reasoning Under Uncertainty: Introduction to non-monotonic reasoning, Logic for non-monotonic reasoning.

(08 Hours)

#### Module - 4

Implementation: Depth-first search, Implementation: Breadth-first search. Statistical Reasoning: Probability and Bayes Theorem, Certainty factors and rule-based systems, Bayesian Networks, Fuzzy logic.

(08 Hours) Module – 5 Weak Slot-and-filter structures: Semantic Net Frames, Strong slot-and -filler structures: Conceptual dependency, scripts, CYC. (09 Hours) **Recap:** Summary of AI concepts **Course outcomes:** The students will be able to: CO1: Analyze searching techniques, constraint satisfaction problem and example problemsgame playing techniques. CO2: Apply these techniques in applications which involve perception, reasoning and learning. CO3: Analyze AI technique to any given concrete problems. CO4: Use different machine learning techniques to design AI machine and enveloping applications for real world problems. CO5: Analyze and design a real world problem for implementation and understand the dynamic behavior of a system. CIE: 60% of CIE is based on Internal Assessment Tests • 40% of CIE is based on Alternate Assessment Methods • SEE: SEE will be conducted for 100 marks. Text Books: 1. Elaine Rich, Kevin Knight, Shivashankar B Nair, "Artificial Intelligence", Tata McGraw Hill, 3rd Edition, 2013. 2. Stuart Russel, Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson 3rd Edition. 2013. **References:** 1. Nils J. Nilsson, "Principles of Artificial Intelligence", Elsevier.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 SEMESTER – II

# SEMESTER - IIProfessional Communication and EthicsCourse Code22MCA2061CIE Marks50Contact Hours (L:T:P)3:0:0SEE Marks50Total Number of Lecture Hours42LExam Hours3Credits: 03

#### **Course Objectives:**

This course will enable students to

- 1. Realize the importance of ethics in organizations.
- 2. Acquire knowledge of ethical practices for effective management
- 3. Make effective presentations
- 4. Acquire knowledge on team creation and management

#### Module – 1

**Introduction:** Implication and Scope of Professional Communication Ethics and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Basics of Technical Communication:** Introduction, Importance of Technical Communication, General and Technical Communication, Objectives and Characteristics of Technical Communication, Process of Communication, Levels of Communication, Flow of Communication, Visual Aids in Technical Communication.

(09 Hours)

#### Module – 2

**Communication Barriers:** Introduction, Classification of Barriers, Non-verbal Communication: Introduction, Kinesics, Proxemics, Chronemics, Correlating Verbal and Non-verbal, Communication, Cross-cultural, Classroom activity.

(08 Hours)

#### Module – 3

**Active Listening:** Introduction, Meaning and Art of Listening, Importance of Listening and Empathy in Communication, Reasons for Poor Listening, Listening versus Hearing, Poor Listening Habits, Traits of a Good Listener, Listening Modes, Active versus Passive Listening, Types of Listening.

(08 Hours)

Module – 4

**Verbal Communication:** Introduction, Planning, Outlining and Structuring, Nuances of Delivery, Modes of Delivery, Guidelines for Effective Delivery, Introduction to Group Discussion, Use of Body Language in Group Communication, GD Technique, Class activity on GD.

(08 Hours)

Module – 5
Ethics Overview: What is ethics? Ethics for business world, Including Ethical Considerations
in Decision Making, Ethics in Information Technology, Ethics for IT Workers & IT users: IT
Professionals, IT Users. Privacy: Privacy protection & laws, Key privacy & anonymity issues,
Social networking ethical issues, Online Social Networks.
<b>Becar</b> : Summary of Professional Ethics and Management concents (00 Hours)
Recap: Summary of Professional Etnics and Management concepts     (09 Hours)       Course outcomes:     (09 Hours)
Course outcomes:
The students will be able to:
CO2. D. ild and C.u. a Disc. spin as a lill
CO2: Build good Group Discussions skill
CO3: Develop good presentation skill
CO4: Imbibe professional ethics
CO5: Explore protection and privacy laws
CIE:
<ul> <li>60% of CIE is based on Internal Assessment Tests</li> </ul>
<ul> <li>40% of CIE is based on Alternate Assessment Methods</li> </ul>
SEE:
• SEE will be conducted for 100 marks.
Text Books:
1. Meenakshi Raman and Sangeeta Sharma, "Technical Communication -Principles and
Practices", 3rd Edition, Oxford University Press.
2. George W Reynolds, "Ethics in Information Technology", 5th Edition, Cengage
References:
1. L N Prasad, "Principles of Management".
2. R. Subramanian, "Professional Ethics", Oxford University Press, 2013.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – II			
Entrepreneurship and Management			
Course Code	22MCA2062	CIE Marks	50
Contact Hours (L:T:P)	3:0:0	SEE Marks	50
Total Number of Lecture Hours	42L	Exam Hours	3
Credits: 03			

#### **Course objectives:**

This course will enable students to

1. Explain fundamentals management functions of a manager. Also explain planning and decision making processes

2. Explain the organizational structure, staffing and leadership process

3. Describe the understanding of motivation and different control systems in management

4. Explain understanding of Entrepreneurships and Entrepreneurship development process

5. Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur

#### Module – 1

**Introduction:** Implication and Scope of entrepreneurship concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Management:** Introduction - Meaning - nature and characteristics of Management, Scope and Functional areas of management - Management as art or science, art or profession -Management & Administration - Roles of Management, Levels of Management, Development of Management Thought - early management approaches - Modem management approaches. Planning: Nature, importance and purpose of planning process objectives - Types of plans (meaning only) - Decision making, Importance of planning - steps in planning & planning premises - Hierarchy of plans.

(09 Hours)

#### Module – 2

**Organizing and staffing:** Nature and purpose of organization, Principles of organization – Types of organization-Departmentation, Committees-Centralization Vs Decentralization of authority and responsibility - Span of control - MBO and MBE (Meaning only) Nature and importance of staffing- Process of Selection & Recruitment.

**Directing**: Meaning and nature of directing Leadership styles, Motivation, Theories, Communication - Meaning and importance - coordination, meaning and importance and Techniques of coordination.

(08 Hours)

Module – 3

**Entrepreneur:** Meaning of Entrepreneur; Evolution of the Concept; Functions of an Entrepreneur, Types of Entrepreneur, Entrepreneur - an emerging. Class. Concept of Entrepreneurship - Evolution of Entrepreneurship, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship - its Barriers.

(08 Hours)

#### Module – 4

**Small scale industries:** Definition; Characteristics; Need and rationale; Objectives; Scope; role of SSI in Economic Development. Advantages of SSI, Steps to start an SSI - Government policy towards SSI; Different Policies of SSI; Government Support for SSI during 5 year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GA TT Supporting Agencies of Government for SSI, Meaning

**Institutional support:** Different Schemes; TECKSOK, KIADB, KSSIDC, KSIMC, DIC Single Window Agency, SISI, NSIC, SIDBI, KSFC.

(08 Hours)

Module – 5

**Preparation of project:** Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of. Business Opportunities: Market Feasibility Study; Technical Feasibility Study, Financial Feasibility Study & Social Feasibility Study.

**Industrial ownership:** Definition and meaning of Partnership, Characteristics of Partnership, Kinds of Partners, Partnership Agreement or Partnership Deed, Registration of Partnership Firm, Rights, Duties and Liabilities of Partners, Advantages and Disadvantages of Partnership, Sole proprietorship, Features, Scope Advantages and Disadvantages of Sole Proprietorship.

(09 Hours)

#### **Course outcomes:**

The students will be able to:

CO1: Learn the context of Digital Marketing and Traditional Marketing

CO2: Design a Digital Marketing Plan to promote a product/service

CO3: Develop various strategies for Digital Marketing

CO4: Evaluate various communication tools and Digital media to promote a product/service CO5: Prepare a budget for digital marketing campaign

CIE:

- 60% of CIE is based on Internal Assessment Tests
- 40% of CIE is based on Alternate Assessment Methods

#### SEE:

• SEE will be conducted for 100 marks.

#### Textbooks:

- 1. P. C. Tripathi, P.N. Reddy," Principles of Management", Tata McGraw Hill.
- 2. Vasant Desai, "Dynamics of Entrepreneurial Development & Management", Himalaya Publishing House.
- 3. Poornima. M. Charantimath, "Entrepreneurship Development, Small Business Enterprises", Pearson Education 2006 (2 & 4).

#### **References:**

- 1. Robers Lusier, "Management Fundamentals Concepts, Application, Skill Development" Thomson.
- 2. S. S. Khanka, "Entrepreneurship Development", S. Chand & Co. New Delhi.
- 3. Stephen Robbins, "Management", Pearson Education/PHI 17thEdition, 2003.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23 **SEMESTER – II**

Operations Research				
Course Code	22MCA2063	CIE Marks	50	
Contact Hours (L:T:P)	3:0:0	SEE Marks	50	
Total Number of Lecture Hours	42L	Exam Hours	3	
Credits: 03				

#### **Course objectives:**

This course will enable students to

- 1. Analyse managerial problems in industry so that they are able to use resources more effectively.
- 2. Formulate mathematical models for quantitative analysis of managerial problems in industry.
- 3. Analyse the mathematical models of real problems in Operations Research
- 4. Frame LP Problems with solutions to solve them.
- 5. Improve decision making and develop critical thinking.

Module -	-
----------	---

Introduction: Implication and Scope of Operations Research concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Overview:** Operations Research – A Quantitative approach to Decision making, Features of OR, OR Approaches to problem solving, Methodology of Operations Research.

**Linear Programming:** Introduction, Structure of Linear Programming Model, Advantages, General Mathematical Model of LPP, Examples of LP Model Formulation, Graphical Solution methods of LP Problem.

(09 Hours)

#### Module - 2

Linear Programming: The Simplex Method, Two-Phase Method, Big M Method.

(08 Hours)

#### Module – 3

**Duality**: Primal-Dual Relationship, Solving the Dual given the primal, Interpreting the results of Dual and Primal, Dual Simplex Method.

PERT and CPM: Network Representation, Critical Path (CPM) computations - Steps and procedures, Problems based on CPM computation, PERT networks - Introduction, Steps and procedure involving PERT networks, Problems based on PERT networks.

(08 Hours)

#### Module – 4

Assignment Problem: Mathematical model of Assignment Problem, Hungarian method for solving assignment problem.

**Transportation Problem:** Transportation problem, Mathematical model of Transportation problem, Methods of finding initial solution (North-West corner rule, Least cost method, Vogel's Approximation method), Test for Optimality in TP using MODI method (uv-method).

(08 Hours)

#### Module – 5 Theory of Games: Introduction, Two-person zero-sum game, pure strategies (Minimax and Maximin principles), Mixed strategies, Dominance Rule, Algebraic method to solve games without saddle point, Graphical method to solve the games, Solving games using LPP method. Sequencing Problems: Processing n jobs through two machines (Johnson's Procedure). (09 Hours) **Recap:** Summary of Operations Research concepts **Course outcomes:** The students will be able to: CO1: Explore the importance of Operations Research CO2: Apply the different approaches of OR to problem solving CO3: Formulate a LPP for a given problem CO4: Obtain optimal solutions for any given problem CO5: Compute the critical path in any given network. CIE: 60% of CIE is based on Internal Assessment Tests • 40% of CIE is based on Alternate Assessment Methods SEE: SEE will be conducted for 100 marks. • Text Books: 1. S D Sharma "Operation Research", Kedarnath, Ramnath and Co, 2002 2. J K Sharma, "Operations Research Theory and Applications", 5th Edition, McMillan Publication, India. **References:**

1. Taha H A, "Operations Research – An Introduction", 7th Edition, 2006.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – II			
Supply Chain Management			
Course Code	22MCA2064	CIE Marks	50
Contact Hours (L:T:P)	3:0:0	SEE Marks	50
Total Number of Lecture Hours	42L	Exam Hours	3
Credits: 03			

#### **Course objectives:**

This course will enable students to

- 1. Understand the basic concepts of Supply Chain Management and identify SC drivers.
- 2. Discuss the role of each SC drivers play and their impact on SC performance.
- 3. Take simple SC and analyze it using concepts of SCM.

Module – 1

**Introduction:** Implication and Scope of Supply Chain Management concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**Overview:** Supply chain basics (Definition of SC, Objectives of SC, SC stages, SC flows, SC Examples), decision phases in a supply chain (SC Strategy or Design, SC Planning and SC Operation), supply chain efficiency and responsiveness. Process view of a supply chain (Cycle view, Push/Pull View), Supply Chain Macro Processes in a firm, drivers of supply chain performance (Facilities, Inventory, Transportation, Information and Sourcing), Supply Chain performance: Competitive and supply chain strategies, achieving strategic fit.

(09 Hours)

#### Module – 2

**Planning and Managing Inventories in a Supply Chain**: Review of inventory concepts, Role of cycle inventory in a SC, Economies of scale to exploit fixed costs, Economics of scale to exploit quantity discounts, short-term discounting (Trade promotions). Role of safety inventory in a SC, safety inventory determination, Impact of supply uncertainty, aggregation and replenishment policies on safety inventory.

(08 Hours)

#### Module – 3

**Designing distribution networks in a SC:** Role of distribution in the SC, factors influencing distribution network design, Design options for distribution network, E-Business and the distribution network.

**Transportation in a SC:** Role of Transportation in a SC, Modes of transportation and their performance characteristics, Design options for a transportation network, tailored transportation, Trade-offs in transportation design, Risk management in transportation.

(08 Hours)

#### Module – 4

**Sourcing decisions in a SC:** Role of sourcing in a SC, In-house and Outsource, supplier scoring & assessment, Supplier selection – Auctions and Negotiations, Contracts, Role of IT in sourcing. Pricing and Revenue.

**Management in a SC:** Role of Pricing and Revenue Management in a supply chain, Pricing and Revenue management for Multiple customer segments, perishable assets, seasonal demand, bulk and spot contracts, Role of IT in pricing and revenue management.

(08 Hours)

#### Module – 5

**Information Technology in a SC:** The role of IT in a Supply Chain, The Supply Chain IT framework, CRM, ISCM, SRM, Transaction Management Foundation (TMF), Future of IT in 24 SC. The role of E-business in a supply chain, E-business framework, E-business in practice. Case discussion.

**Co-ordination in a SC:** Lack of SC Co-ordination and the Bullwhip effect, effect on performance of lack of co-ordination, Obstacles to Co-ordination in a SC. Managerial levers to achieve co-ordination.

Recap: Summary of Supply Chain Management concepts

#### Course outcomes:

The students will be able to:

CO1: Explore the basic concepts of Supply Chain Management.

CO2: Analyze the importance of Supply Chain drivers and their performance.

CO3: Apply the Supply Chain Management principles on real time use cases.

#### CIE:

- 60% of CIE is based on Internal Assessment Tests
- 40% of CIE is based on Alternate Assessment Methods

#### SEE:

• SEE will be conducted for 100 marks.

#### **Text Books:**

1. Supply Chain Management – Strategy, Planning & Operation. Sunil Chopra & Peter Meindl; Pearson Education Asia, ISBN: 9788120331587.

#### **References:**

- Supply Chain Redesign Transforming Supply Chains into Integrated Value Systems Robert B Handfield, Ernest L Nichols - Jr., 2002, Pearson Education Inc, ISBN: 81-297-0113-8.
- 2. Modelling the Supply Chain -Jeremy F Shapiro, Duxbury -Thomson Learning -2002, ISBN 0-534-37363.
- 3. Designing & Managing the Supply Chain -David Simchi Levi, Philip Kaminsky & Edith Simchi Levi -McGraw Hill

(09 Hours)



# MASTER OF COMPUTER APPLICATIONS

#### Scheme of Teaching and Examination: 2022-23

#### SEMESTER – II Digital Markoting

Digital Marketing			
Course Code	22MCA2065	CIE Marks	50
Contact Hours (L:T:P)	3:0:0	SEE Marks	50
Total Number of Lecture Hours	42L	Exam Hours	3
Credits: 03			

#### **Course objectives:**

This course will enable students to

1. Explore the basics of Marketing and types.

2. Prepare a plan to run a digital campaign.

3. Conduct market research and analyze the trends.

4. Learn to manage e-marketing.

5. Evaluate various strategies to select a cost effective e-marketing strategy.

#### Module - 1

**Introduction:** Implication and Scope of MARTEK concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.

**E-Marketing in Context:** Past, Present, and Future, E-Marketing Landscape, What Works? Internet, E-Marketing Is Bigger Than the Web, E-Marketing Is Bigger Than Technology, E-Marketing's Past: Web 1.0, E-Marketing Today: Web 2.0, The Future: Web 3.0: Appliance Convergence, Traditional and Social Media Lose Their Distinction, Wireless Networking Increases, Semantic Web, What Will Characterize Web 3.0?

(09 Hours)

#### Module – 2

**E-Marketing Plan**: Overview of the E-Marketing Planning Process, Creating an E-Marketing Plan, The Napkin Plan, The Venture Capital E-Marketing Plan, A Seven-Step E-Marketing Plan.

(08 Hours)

#### Module – 3

**E-Marketing Research:** Data Drive Strategy, Marketing Knowledge Management; The Electronic Marketing Information System: Source 1: Internal Records, Source 2: Secondary Data, Source 3: Primary Data; Monitoring the Social Media, Other Technology-Enabled Approaches: Client-Side Data Collection, Server-Side Data Collection.

**Segmentation and Targeting Strategies:** Segmentation and Targeting Overview, Three Markets: Business Market, Government Market, Consumer Market; Market Segmentation Bases and Variables, Geographic Segments, Important Geographic Segments for E-Marketing. (08 Hours)

Module – 4
E- Marketing Management: Product: The Online Offer: Many Products Capitalize on Internet
Properties, Creating Customer Value Online, Product Benefits, Product Benefits, Attributes,
Branding, Support services, Labeling.
Pricing: The Online Value: The Internet Changes Pricing Strategies, Buyer and Seller
Perspectives, Payment Options, Pricing Strategies: Fixed, Dynamic and Renting software.
(08 Hours)
Module – 5
E-Marketing Communication Tools: E-Marketing Communication, Internet Advertising,
Marketing Public Relations, Sales Promotion Offers, Direct Marketing. New Digital Media-
Marketing Communication Media, Media Characteristics, Digital Media- Search Engines as
Reputation Aggregators, Online Communities, Blogs, Social Networks; Branding Goals in Digital
and Physical Media, Which Media to Buy?
<b>Recap:</b> Summary of Digital Marketing concepts. (09 Hours)
Course outcomes:
The students will be able to:
CO1: Learn the context of Digital Marketing and Traditional Marketing
$CO_2$ : Design a Digital Marketing Plan to promote a product/service
CO3: Develon various strategies for Digital Marketing
COA: Evaluate various communication tools and Digital media to promote a product/service
CO5: Propare a budget for digital marketing campaign
CIE.
CIE:
• 60% of CIE is based on Internal Assessment Tests
• 40% of CIE is based on Alternate Assessment Methods
SEE:
SEE will be conducted for 100 marks.
Textbooks:
1. Judy Strauss and Raymond Frost, E-Marketing, Pearson Education International, 5th
Edition.
Reterences:
1. Godfrey Parkin, "Digital Marketing: Strategies for Online Success", New Holland
Publishers, 2009.

- 2. Damian Ryan, "Understanding Digital Marketing- Marketing Strategies for Engaging the Digital Generation", Kogan Page, 3rd Edition, 2014.
- 3. Deepak Bansal, "A Complete Guide to Search Engine Optimization", B.R Publishing Corporation, 1st Edition, 2009.



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – II			
Software Testing Lab			
Course Code	22MCA207	CIE Marks	50
Contact Hours (L:T:P)	0:1:3	SEE Marks	50
Total Number of Lecture Hours	14T 42P	Exam Hours	3
	Credits: 02		
Course objectives:			
This course will enable students to	)		
1. Learn the basic concepts of	testing.		
2. Apply Boundary, Equivaler	ce class testing.		
3. Analyse the path, data flow	testing concepts.		
4. Analyse quality process in	testing.		
5. Implement testing concept	using Selenium.		
Tutorial Syllabus			
1. Basics of Software Testing, B	asic Principles, Test case selec	tion and Adequacy	7.
2. A perspective on Testing.			
3. Boundary value testing, Equ	valence class testing, Decision	table based testin	g.
4. Path Testing, Data flow testing, Levels of Testing, Integration Testing.			
5. Fault Based Testing, Plannin	g and Monitoring the Process.		
	Laboratory		
11. Create Software Testing Te	est case format using Microsof	t Excel. Take an E	xample and
try to fill out in the format	specified.		
12. Write Test cases for Phone	field- Apply Specification base	d techniques.	
13. Write a program and test c	ases for Decision Table.		
14. Write a program and test c	ases for Equivalence Portionin	ıg	
15. Write a program and test c	ases for Boundary Value Exerc	ise.	
16. Using Test Techniques Wr	ite Test cases for Login page- I	Page consists of T	wo editable
fields ("User Name", "Passv	vord") and Two Buttons ("Sign	In", "Clear").	
17. Track Bugs in Mantis/Bugz	illa.	_	
18. Selenium installation, reco	rd and run any standard websi	te using selenium	IDE.
19. Using Selenium IDE, w rite	a test suite containing minimu	m 4 test cases.	
20. Test Web Application using	g Selenium Webdriver.		
21. Using Selenium Webdri	ver implement automation	testing for nev	w account
creation/registration form			
Course outcomes:			
The students will be able to:	<b>C C · · · ·</b>		
CO1: Explore the basic principles	of software testing.		
CO2: Apply different levels of testi	ng for a given project.		
CO3: Test any given web page for	bug tracking.		

CO4: Develop test cases for any given application.

CO5: Validate any real-time application using Selenium.

#### CIE:

- 60% of CIE is based on Cumulative assessment of laboratory program conduction comprising Program execution, Viva and Record writing.
- 40% of CIE is based on IA Tests and Alternate Assessment Methods.

#### SEE:

• SEE will be conducted for 100 marks.

#### **References:**

- 1. Adithya P. Mathur "Foundations of Software Testing Fundamental Algorithms and Techniques", Pearson Education India, 2011
- 2. Mauro Pezze, Michael Young, Software testing and Analysis- Process, Principles and Techniques, Wiley India, 2012
- 3. Selenium Testing Tools Cookbook by Unmesh Gundecha
- 4. Kshirasagara Naik, Priyadarshi Tripathy: Software Testing and Quality Assurance, Wiley India 2012 2. M.G.Limaye: Software Testing-Principels, Techniques and Tools – McGraw Hill, 2009



#### MASTER OF COMPUTER APPLICATIONS Scheme of Teaching and Examination: 2022-23

SEMESTER – II Mini Project - 1			
Contact Hours (L:T:P)	0:0:2	SEE Marks	60
Total Number of Lecture Hours	28P	Exam Hours	3
	Credits: 02		

#### **Course Objectives:**

This course will enable students to

- 1. Apply knowledge of mathematics and fundamentals of computer science to meet the given requirements.
- 2. Analyze and design models that are consistent with the requirements.
- 3. Implement and test using modern tools and technologies.
- 4. Follow ethical principles do impartial evaluation and draw conclusions.
- 5. Work on applications that provide solutions in industrial, societal and environmental context.

#### **Project Guidelines**

Develop an application using appropriate tools and technologies with suitable user interface. **Guidelines:** 

- 1. A team of maximum two students must develop the project.
- 2. The project can be implemented any time during the duration of 1st and 2nd sem. It should be completed before the end of 2nd semester.
- 3. Project has to be demonstrated in the examination individually by each student at the end of  $2^{nd}$  semester.

4. The team must submit a brief project report (20-30 pages) that may include the following template:

- Introduction
- Requirement Analysis
- Software Requirement Specification
- Analysis and Design
- Implementation
- Testing
- Conclusion

#### **Course outcomes:**

The students will be able to:

- CO1: Analyse the given requirements.
- CO2: Design a suitable system model.
- CO3: Develop the solution using appropriate tools.
- CO4: Prepare effective documentation.

CO5: Involve in team work.

CIE:

- 50% of CIE is based on Internal Assessments
- 50% of CIE is based on Alternate Assessment Methods
- **SEE:** SEE will be conducted for 50 marks.



(An Autonomous Institution, Affiliated to VTU, Belagavi)

#### MASTER OF COMPUTER APPLICATIONS

Scheme of Teaching and Examination: 2022-23

#### SEMESTER – II

Audit Course – Online Course				
Course Code	22MCA2AUD	CIE Marks	-	
Contact Hours (L:T:P)	0:0:0	SEE Marks	-	
Credits: 0				

#### Guidelines

1. Each student has to register and complete any online technical / professional course of their choice individually in any online Platform.

2. The course can be registered and completed anytime during the entire span of duration between 1st semester to 2nd semester.

3. Online Course is a mandatory head of passing for the award of degree.

4. The chosen MOOC course duration must be for a minimum of 25 hours.

5. This course does not have any CIE or SEE; however, student must produce the completion certificate for the course taken up at the end of 2nd semester.

#### **Course outcomes:**

The students will be able to:

CO1: Acquire knowledge on cutting-edge technologies

CO2: Involve in self-learning