

SCHEME
&
SYLLABUS FOR
MASTER IN COMPUTER APPLICATION



SUBMITTED BY
Board Of Studies In Master In Computer Application



SUBMITTED TO
Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur-440033
PG Curriculum: NEP- Master In Computer Application

Master In Computer Application

MISSION

- 1. To provide quality education in computer applications through a modern, industry-oriented curriculum.**
- 2. To develop students' technical, analytical, problem-solving, and programming skills.**
- 3. To encourage innovation, research, entrepreneurship, and lifelong learning in the field of computing.**

VISION

- 1. "To become a center of excellence in Computer Applications by imparting quality education, promoting innovation, research, and ethical values, and developing competent IT professionals capable of meeting global technological challenges and contributing to society."**
- 2. "To develop skilled, innovative, and ethically responsible computer professionals who excel in software development, research, and emerging technologies for the benefit of society."**

Master In Computer Application

Program Outcomes:

- Able to identify, formulate and implement complex computing solutions using principles of mathematics, computing and relevant domain knowledge.
- Able to design, analyze and evaluate solutions for complex computing problems taking into account cultural, societal and environmental aspects.
- Able to design and conduct experiments, analyze and interpret data to provide valid conclusion.
- Able to apply current techniques, skills and appropriate tools in various domains in the field of IT.
- Able to understand professional ethics, legal and social issues along with the cyber regulations.
- Able to engage in life-long learning and continuing professional development.
- Able to apply the understanding of management principles with computing knowledge to manage the projects in multidisciplinary environments as a dedicated team.
- Able to inculcate an ability to communicate effectively in written and verbal form to a variety of audiences about complex computing activities.
- Able to understand the impact of local and global computing on individuals, organizations and society.
- Able to apply the principles of teamwork, leadership and collaborations to function productively and professionally.
- Able to develop oneself as an entrepreneur in the software domain through innovative approach to benefit the society at large.

Master In Computer Application

Master in Computer Application (MCA) - Program Specific Outcome

On completion of the Master in Computer Applications degree, the graduates will be able to

- Design, develop and implement interdisciplinary application software projects to meet the demands of industry requirements using modern tools and technologies.
- Analyze the societal needs to provide novel solutions through technological based research.

Master In Computer Application

Programme Educational Objectives

□ Technical Competence and Professional Growth:

To prepare graduates with strong fundamental and advanced knowledge in core computing, software development, and modern technologies, enabling them to build successful professional careers in the IT industry.

□ Problem-Solving and Innovation:

To develop analytical and critical thinking skills that allow individuals to analyze complex commercial or technical problems and design scalable, innovative software solutions.

□ Adaptability to Emerging Technologies:

To equip students with the capacity to continuously learn and adapt to fast-changing digital environments, including domains like Artificial Intelligence, Machine Learning, Cloud Computing, and Data Analytics.

□ Leadership, Teamwork, and Ethics:

To foster effective communication, multidisciplinary teamwork, and a strong sense of professional and ethical responsibility toward society and the corporate world.

□ Higher Education and Research:

To encourage a mindset for continuous learning, lifelong professional development, and advanced research or higher studies in computer science and related disciplines.



SANMARG SHIKSHAN SANSTHA'S
SMT. RADHIKATAI PANDAV COLLEGE OF ENGINEERING
 Near Dighori Naka, Umrer Road, Nagpur-441204
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 Affiliated to Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
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 Email: admin@srpce.ac.in Website: www.srpce.ac.in



AN AUTONOMOUS INSTITUTE

COMPOSITION OF BOARD OF STUDIES

Master In Computer Application

Board of Studies – Master In Computer Application has proposed following members from Academic Year 2026-27 onwards.

Sr.No		Name & Designation	Sign
1	Chairperson	Head of the department (Chairperson). 1) Prof. Yamini B. Laxane Assistant Professor yamini.laxane@srpce.ac.in , 9359310114	
2	Faculty Members of MCA Department	1. Prof. Bhagyashree D. Kumbhare bhagyashree.kumbhare@srpce.ac.in , 9422145671 2. Prof. Neha D. Wandhare neha.wandhar@srpce.ac.in , 9021796082 3. Prof. Pranali V. Meshram pranali.meshram@srpce.ac.in , 8999082197 4. Prof. Pranali A. Sarve pranali.sarve@srpce.ac.in , 8080123916 5. Prof. Mohini R. Gayki mohinigayki@srpce.ac.in , 9595768730 6. Prof. Aishwarya B. Kale aishwarya.kale@srpce.ac.in , 8468877851	
3	Two Subject Experts from outside the parent University	1) Dr. Swati Adekar Associate Professor Dept of MCA J.D College of Engineering and Management, Nagpur ssadekar@jdcoem.ac.in , 8329375635 2) Dr. Akansha Budholiya Assistant Professor Science And Technology Department. GH Rasoni SkillTech University, Nagpur dubeakansha14@gmail.com 9420487402	

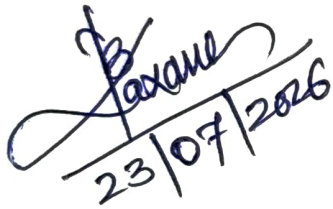
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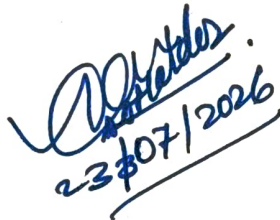
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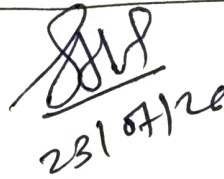
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4	One Expert is to be nominated by the vice-chancellor	1)Dr. Amitabh Halder Associate..Professor Department of Computer Science Sri. Shivaji Science College, Congress Nagar, Nagpur amitabhhalder@gmail.com ,09175128636	
5	One Representative from Industry/Corporate/Allied Areas	Mrs.Meenakshi Kose, Director Blue Vision Softtech Pvt.Ltd,Nagpur bluevisionsofttech@gmail.com , 9765108856	
6	One Member of the college Alumni to be nominated by the principal.	Prof. Apeksha Dipawale. Batch 2023 apeksha.dipawale@srpce.ac.in ,7558658414	


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MEETING -1

Meeting on Finalization of Subject & Credit Scheme of MCA

Date: 10/6/26 **Time:** 12.00pm **Venue:** MCA Department

Members Present

1. Dean (Academics)
 2. Faculty Members (Head and all faculties of MCA)
 3. Other Invitee (Dean Examination)
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Agenda

1. Review of semester-wise credit distribution.
 2. Finalization of MCA course structure and subject scheme.
 3. Approval of the final credit scheme.
 4. Discussion on implementation and further course of action.
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Proceedings

The meeting commenced with the Dean Academics welcoming all members and highlighting the importance of maintaining uniformity in the credit framework across postgraduate programs in accordance with the Autonomous Regulations and NEP guidelines.

Agenda Item 1: Review of Subject Structure

- Semester-wise core, elective, skill enhancement, internship / project, and value-added courses were reviewed.
- Subject duplication was eliminated.
- The sequence and progression of courses were examined to ensure logical learning continuity.
- Necessary modifications in course titles and credit allocation were incorporated.

Resolution:

The revised subject structure was approved for all semesters.

Agenda Item 2: Finalization of Credit Scheme

The committee finalized the following:

- Total program credits.
- Semester-wise credit distribution.
- Credits assigned to Core Courses.
- Credits assigned to Elective Courses.

- Credits for Skill Enhancement Courses.
- Credits for Internship/Project Work/Practical work..

Resolution:

The final subject and credit scheme was unanimously approved.

Agenda Item 3: Implementation of discussed and planned syllabus.

It was resolved that:

- The finalized curriculum shall be placed before the Board of Studies (BoS) for approval.
- After BoS approval, it shall be forwarded to the Academic Council for ratification.
- The approved curriculum shall be implemented from the Academic Year 2026-27

Conclusion

The Dean Academics thanked all members for their valuable suggestions and active participation. The meeting concluded on the subject structure and credit scheme of the MCA programme under the autonomous curriculum framework.

Dean Academics

Dean Examination

HOD (MCA)

Faculty of MCA

- 1 Bhagyashree D. Kumbhar
- 2 Ms Neha D. Wadhare
- 3 Ms. Pramali V. Meshram
- 4 Ms. Pramali A. Sarve
- 5 Ms Aishwarya B Kale
- 6
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MEETING -2

Meeting on Alignment of MCA Credits with MBA and Finalization of Subject & Credit Scheme

Date: 2/7/26 & 6/7/26 **Time:**12.00pm **Venue:** MCA Department

Members Present

1. Dean (Academics)
2. Faculty Members(Heads and all faculties of MBA and MCA)
3. Other Invitee (Dean Examination)

Agenda

1. Alignment of MCA credit structure with MBA programme under the Autonomous Framework.
2. Review of semester-wise credit distribution.
3. Finalization of MBA and MCA course structure and subject scheme.
4. Approval of the final credit scheme.
5. Discussion on implementation and further course of action.

Proceedings

The meeting commenced with the Dean Academics welcoming all members and highlighting the importance of maintaining uniformity in the credit framework across postgraduate programmes in accordance with the Autonomous Regulations and NEP guidelines. Since discussion was taken more time than planned it was continued on second available date i.e. on 6-7-26

Agenda Item 1: Alignment of MCA Credits with MBA

- The existing credit structure of the MCA programme was compared with that of the MBA programme.
- Members discussed the need for maintaining consistency in semester-wise credit distribution and total programme credits.
- After detailed deliberations, it was agreed that the MCA credit structure would be aligned with the MBA framework wherever academically appropriate while preserving the unique learning outcomes of the MCA programme.

Resolution:

The proposed credit alignment between the MBA and MCA programs was approved by principle.

Agenda Item 2: Review of Subject Structure

- Semester-wise core, elective, skill enhancement, internship / project, and value-added courses were reviewed.
- Subject duplication was eliminated.
- The sequence and progression of courses were examined to ensure logical learning continuity.
- Necessary modifications in course titles and credit allocation were incorporated.

Resolution:

The revised subject structure was approved for all semesters.

Agenda Item 3: Finalization of Credit Scheme

The committee finalized the following:

- Total program credits.
- Semester-wise credit distribution.
- Credits assigned to Core Courses.
- Credits assigned to Elective Courses.
- Credits for Skill Enhancement Courses.
- Credits for Internship/Project Work/Practical work..

Resolution:

The final subject and credit scheme was unanimously approved.

Agenda Item 4: Implementation

It was resolved that:

- The finalized curriculum shall be placed before the Board of Studies (BoS) for approval.
- After BoS approval, it shall be forwarded to the Academic Council for ratification.

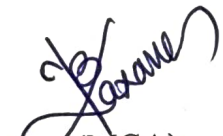
The approved curriculum shall be implemented from the Academic Year 2026-27

Conclusion

The Dean Academics thanked all members for their valuable suggestions and active participation. The meeting concluded with a unanimous agreement on the finalized MBA subject structure and credit scheme aligned with the MCA programme under the autonomous curriculum framework.

Dean Academics

Dean Examination


HOD (MCA)


HOD (MBA)

Faculty of MCA and MBA

1 Ms. Bhagyashree D. Kumbhar

Bumbhar
6/7/26

2 Ms. Neha D. Wadhare

N
6/7/26
Prashant
16/7/26.

3 Ms. Pramali V. Meshram

4 Ms. Pramali A. Sarve

Sarve
26/07/26

5 Ms. Aishwarya B. Kale

Ashale
6/7/26.

6 Mrs. Amit Narayane.

Amit
06/07/26

7 Ms. Alka B. Manule

Alka
06/07/26.

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Teaching and Examination Scheme for

Master In Computer Application MCA-I Sem-I(Two Years PG Course Level 6.0)NEP(Choice Based Credit System)

Sr. No.	Course Category	Course Code	Name of Course	BoS	Teaching Scheme(hrs./ Week)			Total Hrs per Week	Total Credits	Examination Scheme						
					L	T	P			Exam. Hrs.	Theory		Practical		Min. Pass. Marks	Total Marks
											CIE	ESE	CIE	ESE		
1	Theory (Mandatory)	1MCA01T	Basic Concept of Java Programming	MCA	3			3	3	3	40	60			50	100
2	Practical (Mandatory)	1MCA01P	Basic Concept of Java Programming Lab	MCA			4	4	2	3			50	50	50	100
3	Theory (Mandatory)	1MCA02T	Advance DBMS Administration	MCA	3			3	3	3	40	60			50	100
4	Practical (Mandatory)	1MCA02P	Advance DBMS Administration Lab	MCA			4	4	2	3			50	50	50	100
5	Theory (Mandatory)	1MCA03T	PHP Prgramming using HTML and CSS	MCA	3			3	3	3	40	60			50	100
6	Practical (Mandatory)	1MCA03P	PHP Prgramming using HTML and CSS Lab	MCA			4	4	2	3			50	50	50	100
7	Theory (Mandatory)	1MCA04T	Software Engineering and Design	MCA	2			2	2	2	20	30			25	50
8	Theory (Mandatory)	1MCA05T	Research Methodology	MCA	2			2	2	2	20	30			25	50
9	Theory (Optional)	1MCA06T	Elective-I	MCA	3			3	3	3	40	60			50	100
Total					16		12	28	22		200	300	150	150		800

Total Credits MCA-I Sem-I = 22

SRPCE.Master In Computer Application

VERSION:-1.0

Effective From:- 2026-27

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Elective-I (Theory)				
Course Category	Course Code	Name of Subject	Credits	Semester
Elective -I	1MCA06T1	Data Communication Networking	3	Sem-I
	1MCA06T2	Operating System	3	
	1MCA06T3	Fundamentals of Programming	3	

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M. Haldar
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An Autonomous Institute

Teaching and Examination Scheme for

Master In Computer Application MCA-I Sem-II(Two Years PG Course Level 6.0)NEP(Choice Based Credit System)

Master In Computer Application MCA-I Sem-II (Two Years PG Course Level 6.0) NEP (Choose Based Credit)																
Sr. No.	Course Category	Course Code	Name of Course	BoS	Teaching Scheme(hrs./ Week)			Total Hrs per Week	Total Credits	Examination Scheme						
					L	T	P			Exam. Hrs.	Theory		Practical		Min. Marks	Total Marks
											CIE	ESE	CIE	ESE		
1	Theory (Mandatory)	2MCA01T	C# & ASP.NET	MCA	3	1		4	4	3	40	60			50	100
2	Practical (Mandatory)	2MCA01P	C# & ASP.NET Lab	MCA			4	4	2				50	50	50	100
3	Theory (Mandatory)	2MCA02T	Android	MCA	3	1		4	4	3	40	60			50	100
4	Practical (Mandatory)	2MCA02P	Android Programming Lab	MCA			4	4	2				50	50	50	100
5	Theory (Optional)	2MCA03T	Elective-II	MCA	3			4	3	3	40	60			50	100
6	Practical (Optional)	2MCA03P	Elective-II Lab	MCA			4	4	2				50	50	50	100
7	Theory (Mandatory)	2MCA04T	Cloud Computing	MCA	2			2	2	2	20	30			25	50
8	Mini Project (Mandatory)	2MCA05P	Mini Project	MCA			4		2				50	50	50	100
9	Research Project (Mandatory)	2MCA06P	Research Project Wo	MCA	2				2				50		25	50
Total					13	2	16	29	23		140	210	250	200		800

Total Credits MCA-I Sem-II = 23

NOTE: Research Project Work- National or International peer reviewed paper is Mandatory.

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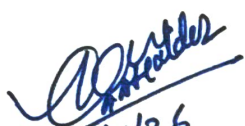
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Elective-II (Theory)

Course Category	Course Code	Name of Subject	Credits	Semester
Elective -II	2MCA03T1	Data Mining & Warehousing	3	Sem-II
	2MCA03T2	Internet of Things	3	
	2MCA03T3	Computer Architecture & Organization	3	


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Teaching and Examination Scheme for

Master In Computer Application MCA-II Sem-III(Two Years PG Course Level 6.5) NEP (Choice Based Credit System)

Sr. No.	Course Category	Course Code	Name of Course	BoS	Teaching Scheme(hrs./Week)			Total Hrs per Week	Total Credits	Examination Scheme						
					L	T	P			Exam. Hrs.	Theory		Practical		Min. Passing Marks	Total Marks
											CIE	ESE	CIE	ESE		
1	Theory (Mandatory)	3MCA01T	AI Techniques	MCA	3			3	3	3	40	60			50	100
2	Practical (Mandatory)	3MCA01P	AI Techniques LAB	MCA			4	4	2				50	50	50	100
3	Theory (Mandatory)	3MCA02T	Big Data Analytics Using R Language	MCA	3			3	3	3	40	60			50	100
4	Practical (Mandatory)	3MCA02P	Big Data Analytics Using R Language LAB	MCA			4	4	2				50	50	50	100
5	Theory (Mandatory)	3MCA03T	Programming Using Python	MCA	3	1		4	4	3	40	60			50	100
6	Practical (Mandatory)	3MCA03P	Programming Using Python LAB	MCA			4	4	2				50	50	50	100
7	Theory (Optional)	3MCA04T	Elective-III	MCA	3			3	3	3	40	60			50	100
8	Theory (Mandatory)	3MCA05T	Computer Forensic	MCA	3			3	3	3	40	60			50	100
9	Mini Research Project (Mandatory)	3MCA06P	Mini Research Project	MCA					2							
			Total		15	1	12	28	24		200	300	150	150		800

Total Credits MCA-II Sem-III = 24

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Elective-III (Theory)

Course Category	Course Code	Name of Subject	Credits	Semester
Elective -III	3MCA04T1	Network Security	3	Sem III
	3MCA04T2	Soft Computing	3	
	3MCA04T3	Mobile Communications	3	

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Teaching and Examination Scheme for

Master In Computer Application MCA-II Sem-IV(Two Years PG Course Level 6.5)NEP(Choise Based Credit System)

Sr.No	course Code	Course Name	Credit	Examination scheme				
				Maximun Marks			Minimum Marks	Total
				Exam Hrs	ESE	CIE		
1	4MCA01P	Internship Project	17		200	200	200	400
2	4MCA02S	Seminar	4		100	100	100	200
		Total	21		300	300		600

Total Marks Sem IV = 600

Total Credits till MCA-II Sem-IV = 21

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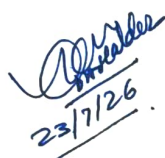
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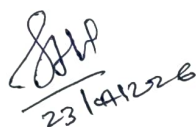
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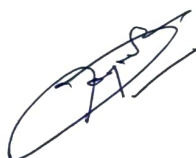
Semester	Marks	Credits
Sem-I	800	22
Sem-II	800	23
Sem-III	800	24
Sem-IV	600	21
Total	3000	90


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FACULTY OF SCIENCE & TECHNOLOGY
MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Paper-I		
Sem: I	Total Hours Distribution per week		
Total Credit: 03	Lecture (L): 3 Hrs	Tutorial/Activity(T/A): Hr.	
Subject Code	1MCA01T (Th)	Basic Concept of Java Programming	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE) Marks	Minimum Passing Marks	Examination Duration
40	60	50	03 Hours

Course Objectives

To understand the fundamentals of Java programming, its features, syntax, data types, operators, and program structure.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Understand core Java concepts, data types, operators, and fundamental OOP principles for program development.
CO2	Apply class design concepts including constructors, methods, memory management, and command-line handling in Java programs.
CO3	Implement inheritance, packages, interfaces, and abstraction concepts to build reusable and modular Java applications.
CO4	Develop robust Java applications using exception handling mechanisms for error detection and control.
CO5	Design multithreaded programs with synchronization, interthread communication, and efficient string handling techniques.

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SYLLABUS	
Contents	No. of hours
Unit I Java and Internet, Features of java: security, portability, multithreading, etc, Byte code, Datatypes, access modifier, variables and Arrays, Operators. OOP's concept:- classes, object, encapsulation, Abstraction, Polymorphism, inheritance.	6
Unit II Classes : declaring objects, methods, constructor, overloading constructor, garbage collection, finalize() method, static variable and method, final variable, command line argument.	7
Unit III Inheritance: Types of Inheritance, single inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance, multiple inheritance. super keyword, final with inheritance. Packages and Interfaces, Wrapper classes. Abstraction and encapsulation.	7
Unit IV Exception & Exception handling : Overview, types, Uncaught exception, try - catch block, multiple catch, nested try, throw, throws, finally, built-in and user- defined exception.	8
Unit V Multithreading : Life Cycle, Thread class and Runnable Interface, isAlive(), join(), Priorities, Synchronization : sleep() , run(). Interthread communication : wait(), notify(), notifyAll(), deadlock. String Handling.	7

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References

Text Books Recommended:

1. Java: The Complete Reference – Herbert Schildt
2. Programming with Java – E. Balagurusamy
3. Introduction to Java Programming – Y. Daniel Liang
4. Core Java Fundamentals – Cay S. Horstmann
5. The Java Programming Language – James Gosling et al.

Reference Books Recommended:

1. Java How to Program – Deitel & Deitel
2. Java Black Book – Steven Holzner
3. Thinking in Java – Bruce Eckel

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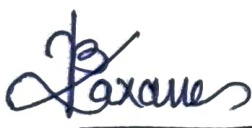
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FACULTY OF SCIENCE & TECHNOLOGY
MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Lab-I		
Sem: 1	Total Hours Distribution per week		
Total Credit: 02	Practical (P): 04 Hrs	Tutorial/Activity(T/A): __Hr.	
Subject Code	1MCA01P (Lab)	Basic Concept Of Java Programming Lab	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE) Marks	Minimum Passing Marks	Examination Duration
50	50	50	03 Hours

Course Outcomes	
After successful completion of this course the student will be able to:	
CO1	Apply core Java programming concepts such as operators and constructors to develop basic Java applications.
CO2	Demonstrate the use of static members and command-line arguments in Java.
CO3	Implement inheritance and interfaces in Java.
CO4	Apply exception handling techniques in Java programs.
CO5	Apply multithreading and string handling concepts in Java.


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List of Practical's
Minimum Eight out of the following practical's shall be performed:

Sr. No.	List of Practical's
01	Write a program to demonstrate the use of Arithmetic operators .
02	Write a program to demonstrate constructor overloading.
03	Write a program to demonstrate the use of static variables and static methods.
04	Write a program to accept and process command-line arguments.
05	Write a program to demonstrate multilevel inheritance.
06	Write a program to demonstrate multiple inheritance using interfaces.
07	Write a program to handle <code>ArrayIndexOutOfBoundsException</code> and <code>NumberFormatException</code> .
08	Write a program to demonstrate nested try-catch blocks.
09	Write a program to create a thread by extending the <code>Thread</code> class.
10	Write a program to perform string operations.

Note:

1. Conduct minimum 08 practical's out of above list and practical no. 1 is mandatory.
2. Viva-voce question should be included in each of the practical.
3. During Continuous Internal Evaluation (CIE) practical Marks, regular performance of practicals for 10 marks, 05 Marks for Journal submission and 10 Marks for internal viva-voce examination.
4. During Semester End Exam (SEE) practical Marks, external practical examination performance must be conducted for 15 marks and 10 Marks for viva.
5. For Eligibility of SEE Practical examination, Internal submission of Journal (Practical File) is mandatory.

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FACULTY OF SCIENCE & TECHNOLOGY
MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Paper - II		
Sem: I	Total Hours Distribution per week		
Total Credit:03	Lecture (L):03Hrs	Tutorial/Activity(T/A):__Hr.	
Subject Code	1MCA02T (Th)	Advanced Database Management System	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE) Marks	Minimum Passing Marks	Examination Duration
40	60	50	03 Hours

Course Objective

Understand the relational database design principles. Familiar with the basic issues of transaction processing, concurrency control and database storage structures. A general understanding of database design and dependency.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Ability to apply functional dependencies and Normalization techniques in relational database and understand the basics of query processing.
CO2	Understand the concept of transaction processing and concurrency control.
CO3	Understand the roles of Oracle database architecture and familiarize with password security, privileges, roles, storage structure.
CO4	Understand the concept of client/server database and backup & recovery strategies.
CO5	Familiarize with the basic concept of the Oracle tuning & troubleshooting.

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SYLLABUS	
Contents	No. of hours
Unit I: Relational database design: Functional dependencies and Normalization (Normal Forms). Query processing : Query processing stages, equivalence of expressions, query execution plan, structure of a query optimizer, Methods for joining tables (nested loop, multiple join).	6
Unit II: Transaction Processing: Concept of transaction, ACID properties, serializability, states of transaction, types of failure, schedules & recoverability, deadlocks. Concurrency control: Locking techniques, techniques based on time-stamp ordering. Crash recovery: Failure classification, recovery concept based on deferred update & immediate update, database backup, crash recovery techniques.	8
Unit III: Oracle database architecture & administration: Oracle database architecture, management of oracle database, data dictionary views, maintaining control & redo log files, managing - tablespaces, data files, rollback segment, indexes, data integrity, password security, users, privileges and roles, storage structure.	5
Unit IV: Clients/Server database: Evolution of clients concept, characterization of clients & server, functions of clients & server, two-layer & three-layer architectures, communication between clients & server. Oracle backup and recovery strategies: Oracle recovery structure and processes, physical backup, complete recovery of an oracle database, oracle export/import utilities.	7
Unit V: Oracle tuning & troubleshooting: Oracle performance tuning methodology, tuning shared pool, buffer cache, redo log buffer, database configuration and I/O issues, rollback segment tuning, monitoring & detecting lock contention, introduction to database, security issues.	5

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References

Text Books Recommended:

1. Oracle 9i performance tuning, Joseph C. Johnson
2. Database system concept, Korth

Reference Books Recommended:

1. Fundamental of database system, R. Elmasri S. Navathe Benjamin Cummings
2. DBA handbook oracle press, Loney

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FACULTY OF SCIENCE & TECHNOLOGY
MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Lab-II		
Sem: I	Total Hours Distribution per week		
Total Credit: 02	Practical(P): 04 Hrs	Tutorial/Activity(T/A): __Hr.	
Subject Code	1MCA02P (Lab)	Advance Database Management System Lab	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE)Marks	Minimum Passing Marks	Examination Duration
50	50	50	03 Hours

Course Outcomes	
After successful completion of this course the student will be able to:	
CO1	Facilitates in creation of Data Structures and effective management of Database
CO2	Ability to normalize the database & understand the internal data structure
CO3	To implement Software prototyping for better software development
CO4	To acquire skills to think about problems and solution using appropriate method
CO5	Create database using attributes and elements, Implement queries based on nested queries, Execute queries using array, structured type in SQL.

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List of Practicals

Minimum Eight out of the following practicals shall be performed:

Sr. No.	List of Practicals
01	Write the Queries for Normalization concept.
02	Find the details of all employees who work in any department (nested loop).
03	Write a SQL query to perform multiple Join method.
04	Write a SQL query using 'using' , 'on' keyword for joining the two tables.
05	Write a SQL query to perform the commands transaction control language (TCL).
06	Write a sql query to perform the operations of Alter command.
07	Write a SQL query for creating Indexes.
08	Write the DDL, DML queries for system privileges & object privileges.
09	Write a SQL query to find Rollback Segment.
10	Write a SQL query to recover of an oracle database.

Note:

1. Conduct minimum 08 practical's out of above list and practical no. 1 is mandatory.
2. Viva-voce question should be included in each of the practical.
3. During Continuous Internal Evaluation (CIE) practical Marks, regular performance of practicals for 10 marks, 05 Marks for Journal submission and 10 Marks for internal viva-voce examination.
4. During Semester End Exam (SEE) practical Marks, external practical examination performance must be conducted for 15 marks and 10 Marks for viva.
5. For Eligibility of SEE Practical examination, Internal submission of Journal (Practical File) is mandatory.

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FACULTY OF SCIENCE & TECHNOLOGY MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Paper -III		
Sem: I	Total Hours Distribution per week		
Total Credit:03	Lecture (L): 3 Hrs	Tutorial/Activity(T/A): __Hr.	
Subject Code	1MCA03T (Th)	PHP Programming Using HTML & CSS	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE)Marks	Minimum Passing Marks	Examination Duration
40	60	50	03 Hours

Course Objectives

To provide students with a strong foundation in HTML, CSS, PHP, MySQL, XML, and web application development, enabling them to design, develop, secure, and optimize dynamic, database-driven web applications using modern web technologies.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Understand the basic concepts of HTML & CSS properties for web page styling and Introduction to PHP Language basics.
CO2	Develop PHP programs using functions and string handling techniques to solve basic programming problems.
CO3	Understand the concept of arrays in PHP and Understand the basics of graphics handling in PHP.
CO4	Understand object-oriented programming concepts in PHP & Use regular expressions in PHP.
CO5	To Understand the use of PDF extensions in PHP & Develop efficient and reliable PHP applications

SYLLABUS	
Contents	No. of hours
Unit I: Introduction to HTML: What is HTML, HTML Documents, Basic Structure of an HTML document, creating an HTML documents, Mark up tags, Heading Paragraphs, Line Breaks, HTML Tags, Introduction to elements of HTML, Tables and Frames, Introduction of CSS: Properties of CSS, CSS Styling (Background, Text Format, Controlling Fonts) Introduction PHP: Lexical structure of PHP, A brief History of PHP, Installing and configuring PHP on Windows and Linux Platform, Data types, variables, expression operators, control statements including code, Embedding PHP in Web Pages	8
Unit II: Function: Defining functions, calling function, Function parameters, variable functions Anonymous Functions, Return values, Variable Scope strings: Quoting String Constant, printing strings, Cleaning strings, Comparing strings, Manipulating and searching strings,	5
Unit III Arrays: Identifying Elements of an Array, Storing Data in Arrays, Indexed Verses Associative Arrays, Multidimensional arrays, Converting Between Arrays and variables, Traversing Arrays, Sorting, Using Arrays Graphics: Embedding an Image in a page, The GD Extensions, Basic concept, Drawing Images, Images with Text, Dynamically generated Buttons, Scaling Images, Color Handling,	7
Unit IV Classes and Objects: Terminology, Creating an Objects, Accessing Properties and methods, Declaring a class, Introspection, Serialization, Web Techniques: HTTP Basics, Variables, Server Variables, Server Information, Processing Forms, Session, Cookies, files, SSI Using PHP to Access a Database: Relational Database and SQL, MySQL database Basics, Advance Database Techniques Regular Expression: POSIX-Style Regular Expression, PERL-Compatible Regular Expression.	8
Unit V PDF Extension, Documents and Pages, Images and Graphics, Other PDF features XML: Lighting Guide to XML, Generating XML, Parsing XML, Transforming XML with SLT, Security: Global Variables and Forms Data, Filenames, File Uploads, File Permissions, Application, Concealing PHP Libraries, PHP Code, Shell Commands, Security Redux, Application Techniques, Code Libraries, Error Handling, Performance Tuning.	6

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References

Text Books Recommended:

6. **PHP and MySQL Web Development**, Luke Welling and Laura Thomson
7. **Learning PHP,MySQL and JavaScript**, Robin Nixon
8. **Beginning PHP And MySQL**,
9. **Head First HTML and CSS**
10. **Modern PHP**

Reference Books Recommended:

1. **PHP 5.1 for beginners**, Evan Bayross and Sharman Shah, SPD Publications.
2. **Programming PHP**, Rasmus lerdorf and Kevin Tatroe, Orilly Publications.
3. **PHP: The Complete Reference**, by Steven Holzner, Indian Edition.
4. **Learn to Code HTML and CSS(English)(PaperBack)** by Rob Larsen.
5. **Head FIRST HTML AND CSS, 2/ED(UPDATED FOR HTML)**by ROBSON.

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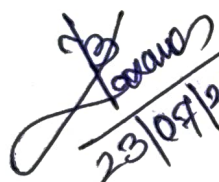
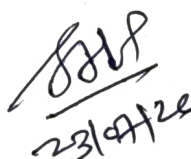
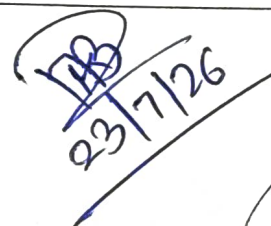
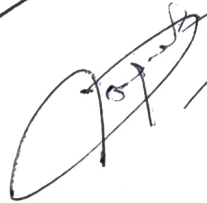
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FACULTY OF SCIENCE & TECHNOLOGY
MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Lab-III		
Sem: I	Total Hours Distribution per week		
Total Credit: 02	Practical(P): 04 Hrs	Tutorial/Activity(T/A): __Hr.	
Subject Code	1MCA03P (Lab)	PHP PROGRAMMING USING HTML AND CSS Lab	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE)Marks	Minimum Passing Marks	Examination Duration
50	50	50	03 Hours

Course Outcomes	
After successful completion of this course the student will be able to:	
CO1	Design HTML forms and develop PHP programs to process user input and perform arithmetic operations.
CO2	Develop dynamic web pages by embedding PHP code within HTML documents.
CO3	Implement user-defined (parameterized) functions to perform string manipulation and other operations.
CO4	Demonstrate the use of variable scope (local, global, and static) in PHP programs.
CO5	Create and manipulate arrays using PHP and apply looping constructs such as foreach to process array elements.

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List of Practical's

Minimum Eight out of the following practical's shall be performed:

Sr. No.	List of Practical's
01	Create a PHP program that accepts two numbers from an HTML form and performs arithmetic operations.
02	WAP for embedded PHP in web pages.
03	WAP to perform concatenation operation for two strings by using parameterized function.
04	WAP for show scope local variable.
05	WAP for show scope global variable.
06	WAP for show scope static variable.
07	WAP to create an integer array and fetch its value by using foreach loop and Display its value.
08	WAP to Add String type value in array and display it.
09	WAP for use explode() function.
10	WAP to display your favourite sports by using switch case.
11	WAP to display current time and also display greeting for specific time.
12	WAP to take first name, middle name, and last name from user and concatenate it and display it.

Note:

1. Conduct minimum 08 practical's out of above list and practical no. 1 is mandatory.
2. Viva-voce question should be included in each of the practical.
3. During Continuous Internal Evaluation (CIE) practical Marks, regular performance of practicals for 10 marks, 05 Marks for Journal submission and 10 Marks for internal viva-voce examination.
4. During Semester End Exam(SEE) practical Marks, external practical examination performance must be conducted for 15 marks and 10 Marks for viva.
5. For Eligibility of SEE Practical examination, Internal submission of Journal (Practical File) is mandatory.

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FACULTY OF SCIENCE & TECHNOLOGY
MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Paper-IV		
Sem: I	Total Hours Distribution per week		
Total Credit:02	Lecture (L): 02 Hrs	Tutorial/Activity(T/A): __Hr.	
Subject Code	1MCA04T (Th)	Software Engineering & Design	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE)Marks	Minimum Passing Marks	Examination Duration
20	30	25	02 Hours

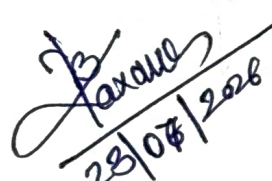
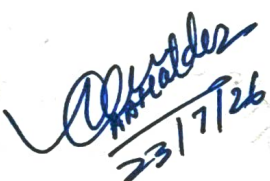
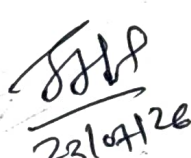
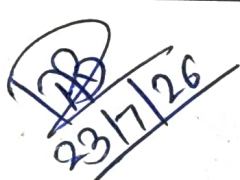
Course Objectives

To understand software engineering principles, development processes, design, testing, quality assurance, and project management.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Explain software engineering principles, process models, and requirements engineering.
CO2	Apply requirements analysis, software design, and architectural design techniques.
CO3	Design object-oriented systems, user interfaces, and perform software testing and quality measurement.
CO4	Apply software metrics, risk management, and quality assurance practices in software projects

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SYLLABUS	
Contents	No. of hours
Unit I Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process. Requirement Engineering: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.	
Unit II: Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. Design Engineering: Design process and Design quality, Design concepts, the design model. Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design	
Unit III Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution. Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation. Testing Strategies: A strategic approach to software testing, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.	
Unit IV Metrics for Process and Projects: Software Measurement, Metrics for software quality. Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan. Quality Management : Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.	

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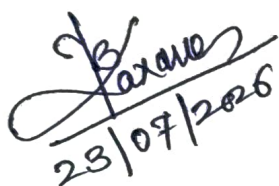
References

Text Books Recommended:

1. Roger S. Pressman, *Software Engineering: A Practitioner's Approach*, McGraw-Hill International Edition.
2. Ian Sommerville, *Software Engineering*, Pearson Education.
3. Rajib Mall, *Fundamentals of Software Engineering*, PHI Learning.
4. Pankaj Jalote, *An Integrated Approach to Software Engineering*, Springer.
5. Richard E. Fairley, *Software Engineering Concepts*, McGraw-Hill.

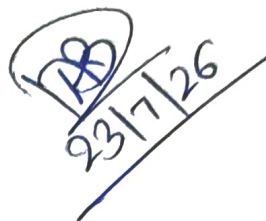
Reference Books Recommended:

1. Waman S. Jawadekar, *Software Engineering: Principles and Practice*, McGraw-Hill.
2. Carlo Ghezzi, Mehdi Jazayeri, and Dino Mandrioli, *Fundamentals of Software Engineering*, Pearson.
3. Watts S. Humphrey, *A Discipline for Software Engineering*, Addison-Wesley.


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FACULTY OF SCIENCE & TECHNOLOGY MASTER IN COMPUTER APPLICATION

CourseCategory	Paper-V		
Sem:I	TotalHoursDistributionperweek		
TotalCredit:02	Lecture(L):02Hrs	Tutorial/Activity(T/A):Hr.	
SubjectCode	1MCA05T (Th)	ResearchMethodology	
ExaminationScheme			
Continuous Internal Evaluation(CIE)Marks	Semester End Exam(SEE)Marks	Minimum PassingMarks	ExaminationDuration
20	30	25	02 Hours

Course Objectives

To develop students' knowledge of research methodology, literary and linguistic studies, and the effective use of computers and digital tools in academic research.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Understand the concept and nature of research.
CO2	Understand major modern literary trends & Demonstrate knowledge of the nature of creativity.
CO3	Understand the nature and scope of linguistics & Evaluate different language teaching methodologies.
CO4	Understand the evolution of computers & Apply data processing tools and techniques.

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SYLLABUS	
Contents	No. of hours
Unit I: Research Introduction: meaning of research, Characteristics & Functions, Type of Literature research, Literature Survey : The search for facts; the verification of facts; The analysis of evidence; truth & causation, Library reference scheme; Note making, Internet How to write dissertation/thesis?, Foot-notes, Bibliographies, glossary, Index, Quotation., Language in the thesis Preparation of manuscripts, Type scripts, proof-reading.	9
Unit II: Modern Literary Trends: Modernism & Postmodernism, Post colonialism, Feminist, Criticism, Marxism, Comparative Literature Nature of Creativity: Imagination & Invention, History of English Literature Literary Terms: Image, Metaphor, Symbol & Myth Literary Movements: Romanticism & Classicism, Realism,	8
Unit III: Nature & Scope of Linguistics Branches of Linguistics: Phonetics & Phonology, Lexis, Syntax, Semantics Fundamentals of Language Teaching: Aims, Objective Methods Major Approaches and Methods of language teaching	7
Unit IV: Brief history of computers, generation of computers, application of computers in research. Qualitative and Quantitative Analysis , Sampling Methods, Hypothesis. Introduction of hardware & software of computers Operating systems and types of operating systems Data processing tools & techniques. Security issue of computers, use of latex.	7

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References

Text Books Recommended:

6. G. Watson: **The Literary Thesis**
7. . F.W Batson: **The scholar Critic**
8. Altich: **The Art of Literary Research**

Reference Books Recommended:

1. Wellek & Warren: **The Theory of Literature**
2. Hans Breten: **Basics of Literary Theory**
3. . K. M Newton: **20th Century Literary Theory**

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MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Elective-I		
Sem: I	Total Hours Distribution per week		
Total Credit:03	Lecture (L):03 Hrs.	Tutorial/Activity(T/A):__Hr.	
Subject Code	1MCA06T1 (Th)	Data Communication & Networking	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE) Marks	Minimum Passing Marks	Examination Duration
40	60	50	3 Hours

Course Objective

To understand the basic concepts of data communication, layered model, protocols and interworking between computer networks.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	To understand and master the fundamentals of data communications through the knowledge of data transmission concepts, media used for data communication.
CO2	To know the different layer of OSI reference model.
CO3	To know the intrusion detection techniques and Authentication.
CO4	Students to understand the concepts of Data Link, Transport, Session Layer protocols.
CO5	To know the different network security algorithms.

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SYLLABUS		
UnitI:	Contents	No.ofhours
	Introduction: Network structure and architectures and services OSI reference model. The Physical Layer: theoretical basis for data communication, transmission media, Analog Transmission, Digital Transmission, Transmission and Switching, ISDN, Network Topology.	6
UnitII:	The Data Link Layer: Design issues, Error detection and correction, Elementary data link protocols, sliding window protocol, protocols performance, protocols specification and verification. Examples of the Data link layer. Network Layer: Design issues, routing algorithms, Congestion control algorithms, Internet working, Examples of the network layer.	5
UnitIII:	The Transport Layer: Design issues, Connection Management. The Session Layer: Design issues and remote procedure call.	5
UnitIV:	The Presentation Layer: Design issues, data compression techniques, cryptography. The Application Layer: Design issues, file transfer, access and management, virtual terminals, IP Address, IPV4, IPV6.	7
UnitV:	Network Security Fundamentals: Introduction, security Vulnerabilities and Threats, Classification of Security Services. Cryptography: Encryption principles, Conventional Encryption DES, IDEA, Algorithms, CBC, and Location of Encryption Devices key Distribution.	5

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References

Text Books Recommended:

1. Computer Networks, Andrew S. Tanenbaum, PHI
2. Network Security and Essentials: Application and Standards, William Stallings, Pearson

Reference Books Recommended:

1. Cryptography and Network Security, William Stallings, Pearson Education.
2. Data Communication and Networking, Behrouz A. Forouzan, TMH.

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MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Elective-I		
Sem: 1	Total Hours Distribution per week		
Total Credit: 03	Lecture (L): 03 Hrs.	Tutorial/Activity(T/A): __Hr.	
Subject Code	1MCA06T2 (Th)	Operating System	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE) Marks	Minimum Passing Marks	Examination Duration
40	60	50	03 Hours

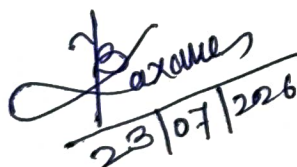
Course Objectives

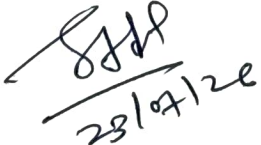
To understand the fundamentals of operating systems, including process, memory, file, and resource management.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Explain the evolution, types, structure, and core services of operating systems along with system calls and hardware support.
CO2	Analyze different OS architectures and evaluate disk scheduling and space allocation strategies.
CO3	Apply process management, scheduling algorithms, and multithreading concepts to improve system performance.
CO4	Implement memory management techniques such as paging, segmentation, and virtual memory to handle system resources efficiently.
CO5	Analyze synchronization mechanisms, file system organization, and deadlock handling methods for reliable system operation.

 Examinee





SYLLABUS	
Contents	No. of hours
Unit I Introduction: Evolution of OS, Types of OS, Batch operating System, Multi-Programming Operating System, Multi-tasking/Time-sharing Operating systems, Multi-Processing Operating System, Distributed Operating System , Network Operating System, Real-Time Operating System , Mobile Operating Systems. Basic h/w support necessary for modern operating systems, services provided by OS, system programs and system calls.	8
Unit II OS structure: Layered, Monolithic, Microkernel, Disk space management and space allocation strategies, disk arm scheduling algorithms. FCFS (First Come, First Serve), SSTF (Shortest Seek Time First), SCAN, C-SCAN, LOOK, C-LOOK, RSS (Random Scheduling), LIFO (Last-In First-Out), N-STEP SCAN, F-SCAN.	7
Unit III Process Scheduling: Process concept, Process control Block, Types of scheduler, context switch, threads, multithreading model, goals of scheduling and different scheduling algorithms, examples from WINDOWS 2000 & LINUX.	7
Unit IV Memory Management: Contiguous allocation, Relocation, Paging, Segmentation, Segmentation with paging, demand paging, page faults and instruction restart, page replacement algorithms, working sets, Locality, Thrashing, Garbage Collection.	6
Unit V Process Cooperation and Synchronization & File Systems: Concurrency conditions, Critical section problem, software and hardware solution, semaphores, conditional critical regions and monitors, classical inter process communication problems File concept, Access methods, directory structures, Recovery, Log-structured File System. Deadlocks & Protection: Deadlock characteristics, Prevention, Avoidance, Detection and recovery.	7

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References

Text Books Recommended:

1. Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall, India, 2000.
2. Operating System: Concepts and Design by Milan Milenkovic , McGraw Hill Higher Education.
3. Operating Systems, 3rd Edition by Gary Nutt, Pearson Education.
4. Modern Operating Systems – Andrew S. Tanenbaum and Herbert Bos.
5. Operating System Concepts – Abraham Silberschatz, Peter B. Galvin, and Greg Gagne

Reference Books Recommended:

1. Operating System, 3rd Edition by P. Balakrishna Prasad ,SciTech Publications.
2. Operating Systems: A Concept-Based Approach – D. M. Dhamdhare.
3. Operating System Design and Implementation – Andrew S. Tanenbaum and Albert S. Woodhull

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SMT. RADHIKATAI PANDAV COLLEGE OF ENGINEERING, NAGPUR
AN AUTONOMOUS INSTITUTE
AFFILIATED TO RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
MASTER IN COMPUTER APPLICATION (MCA)

Course Category	Elective-I		
Sem: I	Total Hours Distribution per week		
Total Credit: 03	Lecture (L): 03 Hrs	Tutorial/Activity(T/A): __Hr.	
Subject Code	1MCA06T3 (Th)	Fundamental Of Programming	
Examination Scheme			
Continuous Internal Evaluation (CIE)Marks	End Semester Exam(ESE) Marks	Minimum Passing Marks	Examination Duration
40	60	50	03 Hours

Course Objectives

To develop fundamental programming skills in C for problem-solving and building efficient software applications.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Understand the basic components of a computer system and develop problem-solving skills using algorithms and flowcharts.
CO2	Gain foundational knowledge of C language syntax, data types, operators, and decision-making constructs.
CO3	Apply control structures, functions, pointers, and memory concepts to develop efficient C programs.
CO4	Analyze and implement arrays, searching, sorting techniques, and structures for data organization.
CO5	Demonstrate file handling techniques in C for storing, retrieving, and managing data efficiently.

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SYLLABUS	
Contents	No. of hours
Unit I Introduction to components of a computer system: Input Devices: Keyboard, mouse, scanner, Output Devices: Monitor, printer Central Processing Unit (CPU): ALU (Arithmetic Logic Unit) ,Control Unit (CU) Memory Unit: Primary Memory, Secondary Memory , Algorithm and Flowchart for problem-solving.	7
Unit II Introduction to C language: Keywords, Constant, Variable, Data types, Operators, Types of Statements, Decision Control Statement- if and Conditional operators.	7
Unit III Switch case statement, Loops, Pre-processor Directives. Concept of functions, User defined and Library Functions, parameter passing, Recursion, Storage class, Pointers.	6
Unit IV Arrays: 1-D, 2-D, Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Pointers to the array, Command line arguments. Structures, Simple structures, Array of Structures.	7
Unit V File handling Streams in C, Types of Files, File Input/ Output Operations: Modes of file opening, Reading and writing the file, Closing the files, using fflush ().	7

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References

Text Books Recommended:

9. Programming in ANSI C – E. Balguruswamy, McGraw Hill
10. Let Us C – Yashwant Kanetkar, BPB Publications
11. C Programming: A Modern Approach – K. N. King, W. W. Norton & Company
12. C How to Program – H. M. Deitel & P. J. Deitel, Pearson
13. Expert C Programming: Deep C Secrets – Peter van der Linden, Prentice Hall

Reference Books Recommended:

1. The C Programming Language – B. W. Kernighan & D. M. Ritchie, Pearson
2. Programming in C – B. Gottfried, Schaum Outline Series, Tata McGraw Hill
3. Mastering C – K. R. Venugopal & S. R. Prasad, Tata McGraw Hill


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