

COURSE PLAN & COURSE DATA SHEET

PROGRAM: MCA	DEGREE: MCA
COURSE: Object Oriented Software Engineering	SEMESTER: 2 ND CREDITS: 4
COURSE CODE: MCA-124 REGULATION:	COURSE TYPE: CORE
COURSE AREA/DOMAIN: Computer Applications	CONTACT HOURS: 56
CORRESPONDING LAB COURSE CODE (IF ANY): -	LAB COURSE NAME (IF ANY): -

PROGRAM EDUCATIONAL OBJECTIVES:

Program Educational Objectives (PEOs) for a curriculum in Object-Oriented Software Engineering should reflect the desired outcomes and accomplishments that graduates of the program are expected to achieve in their professional careers. Here are some suggested Program Educational Objectives for Object-Oriented Software Engineering:

- Proficient Problem Solvers:** Graduates should be able to analyze complex problems and design effective solutions using object-oriented principles and methodologies. They should demonstrate proficiency in applying design patterns and best practices to address real-world software engineering challenges.
- Effective Software Designers:** Graduates should be capable of creating robust and scalable software systems by employing object-oriented design principles. They should have a deep understanding of software architecture and be able to design modular and maintainable software solutions.
- Competent Software Developers:** Graduates should be proficient in implementing software solutions using various object-oriented programming languages and tools. They should demonstrate the ability to write high-quality code, conduct thorough testing, and adhere to coding standards.
- Adaptable Team Members:** Graduates should be effective collaborators in software development teams. They should possess strong communication skills and be able to contribute productively to team projects. They should also understand the importance of version control, documentation, and collaboration tools.

SYLLABUS:

UNIT	DETAILS	HOURS
I	Software Engineering: Software related problems, software engineering, concepts, development activities. Modelling: Concepts, Modelling with UML.	12
II	Project Organization & Communication: Project Organization & communication concepts and their activities. Requirements: Requirement's elicitation & its activities and managing requirements elicitation. Analysis: Analysis overview, concepts, activities and managing analysis.	10
III	System Design: Decomposing the System: System Design overview, System design concepts, and System design Activities, and managing System Design. System design: Addressing design goals: An overview of system design activities and concepts UML Development diagram, System design goals, Managing system design.	12
IV	Object Design: Reusing Pattern Solutions: An overview of object design Reuse Concepts, Solution objects, inheritance and design patterns. An Object Design: Specifying Interfaces: An overview of interface specification, interface specifications concepts & its activities and Managing object design.	11
V	Testing: Testing concepts, activities and managing testing. Project Management -Introduction, An overview of project management, Project Management Concepts, Project Management Activities.	11
TOTAL HOURS		56

Teacher Centric Approach

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TC1: Chalk and Talk, Blended learning	TC2: PPT,	TC3: Video Lectures	TC4:
Learner Centric Approach:			
LC1: Assignment.	LC2: Mini project.	LC3: Quiz/Class test.	LC 4: Seminar on recent trends.
LC5: Group Task.	LC6: Others		

DETAILED SESSION PLAN

Lecture session/ Number	Topics to be covered	CO addressed	Teacher Centric Approach	Learner Centric Approach	References	Relevance with POs and PSOs
1	Introduction to Software Engineering, Definition of Software Engineering, Software Components		TC1, TC2	LC1,LC3	T1/T2/W1	PO1,PO2,PO3, PSO1,PSO2
2	Software Characteristics, Software Crisis, Software Engineering Processes		TC1,TC2	LC1,LC3	T1/R3/W1	PO1,PO3, PSO1,PSO2
3	Software related problems		TC1,TC2	LC1,LC3	T1/R2	PO1,PO2,PO3
4	Software engineering concepts		TC1,TC2	LC1,LC3	T2/W3	PO1,PO4,PO5, PSO1,PSO2
5	Developmental activities		TC1,TC2	LC1,LC3	T1/R2/W3	PO2,PO3,PO4, PSO1,PSO3
6	Modelling		TC1	LC3	T1/T3/W2	PO1,PO2,PSO2,PSO3
7	Concepts of modelling		TC1,TC2	LC1,LC3	T1/R2	PO4,PO5, PSO1,PSO3
8	Modelling with UML		TC1,TC2	LC1,LC3	T1/R2	PO1,PO2
9	Project organisation and communication		TC1,TC2	LC1,LC3	T2/R2/W3	PO1,PO2,PO3,PO4,PO5, PSO1,PSO2,PSO3

10	Concepts and its activities	TC1,TC2	LC1,LC3	T1/R2/W1	PO2,PO3,PO4,PO5, PSO1,PSO2,PSO3
11	Requirements and elicitation	TC1,TC2	LC1,LC3	T1/R1/W1	PO1,PO2,PO4,PO5, PSO1,PSO3
12	Managing requirements	TC1,TC2	LC1,LC3	T2/W1	PO4,PO5, PSO2,PSO3
13	Managing analysis	TC1,TC2	LC1,LC3	T1/W1	PO1,PO2,PO5, PSO1,PSO2
14	Analysis overview	TC1,TC2	LC1,LC3	T1/R2	PO1,PO2,PO3,PO4,PO5,PSO1,PSO2,PSO3
15	Concept of analysis	TC1,TC3	LC1,LC3	T1/T2/W3	PO4,PO5,PSO2,PSO3
16	Analysis activities	TC1,TC2	LC1,LC3	T1/T2/W1	PO2,PO3,PO4,PO5,PSO1,PSO2,PSO3
17	System design	TC1,TC2	LC1,LC3	T1/R2/W1	PO1,PO2,PO4,PSO1,PSO2,PSO3
18	Decomposing the system	TC1,TC2	LC1,LC3	T1/R1	PO1,PO2,PO4,PSO1,PSO2,PSO3
19	Overview and concepts	TC1,TC2	LC1,LC3	T1/W1	PO1,PO2,PO4,PSO1,PSO2,PSO3
20	System design activities	TC1,TC2	LC1,LC3	T2/W3	PO1,PO2,PO4,PSO1,PSO2,PSO3
21	Management of these activities	TC1,TC2	LC1,LC3	T1/T2/W1	PO1,PO2,PO4,PSO1,PSO2,PSO3
22	Addressing design goal	TC1,TC2	LC1,LC3	T1/W1	PO1,PO2,PO4,PSO1,PSO2,PSO3
23	Concept of UML development	TC1,TC2	LC1	T2/W3	PO1,PO2,PO4,PSO1,PSO2,PSO3
24	System design goals	TC1,TC2	LC1,LC3	T1/W1	PO1,PO2,PO4,PSO1,PSO2,PSO3
25	Reusing pattern solutions	TC1,TC2	LC1,LC3	T2/R1/W1	PO2,PO3,PO4,PSO2,PSO3
26	An overview of object design Reuse Concepts, Solution objects, inheritance and design patterns	TC1,TC2	LC1,LC3	T1/R1/W3	PO1,PO2,PO3,PO4 PSO1,PSO2

27	Specifying Interfaces: An overview of interface specification, interface specifications concepts & its activities and Managing object design.	TC1,TC2	LC1,LC3	T1/R2	PO1,PO2
28	Testing concepts, activities and managing testing.	TC1,TC2	LC1,LC3	T1/R1/W3	PO1,PO2,PO3,PO4 PSO1,PSO2
29	An overview of project management, Project Management Concepts	TC1,TC2	LC1,LC3	T1/W1	PO1,PO2,PO3,PO4 PSO1,PSO2
30	Project Management Activities	TC1, TC2	LC1,LC3	T1/T2/W1	PO1,PO2,PO3, PSO1,PSO2
31	Cyclomatic Complexity	TC1,TC2	LC1,LC3	T1/R3/W1	PO1,PO3, PSO1,PSO2
32	Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration	TC1,TC2	LC1,LC3	T1/R2	PO1,PO2
33	Estimation of Various Parameters	TC1,TC2	LC1,LC3	T2/W3	PO1,PO4,PO5, PSO1,PSO2
34	Constructive Cost Models (COCOMO), Resource Allocation Models	TC1,TC2	LC1,LC3	T1/R2/W3	PO2,PO3,PO4, PSO1,PSO3
35	Constructive Cost Models	TC1	LC3	T1/T3/W2	PO1,PO2,PSO2,PSO3
36	Software Risk Analysis and Management. , Quality Assurance, Quality Control, Software Quality Attributes	TC1,TC2	LC1,LC3	T1/R2	PO4,PO5, PSO1,PSO3

37	Software Quality Assurance (SQA): Verification and Validation		TC1,TC2	LC1,LC3	T1/R2	PO1,PO2,PO3,PO4,PO5,PSO1
38	SDLC implications		TC1,TC2	LC1,LC3	T2/R2/W3	PO1,PO2,PO3,PO4,PO5, PSO1,PSO2,PSO3
39	Characteristics and significance of software engineering in recent times		TC1,TC2	LC1,LC3	T1/R2/W1	PO2,PO3,PO4,PO5, PSO1,PSO2,PSO3
40	Agile software development		TC1,TC2	LC1,LC3	T1/R1/W1	PO1,PO2,PO4,PO5, PSO1,PSO3
41	Design pattern		TC1,TC2	LC1,LC3	T2/W1	PO4,PO5, PSO2,PSO3
42	Software development		TC1,TC2	LC1,LC3	T1/W1	PO1,PO2,PO5, PSO1,PSO2
43	Software architecture		TC1,TC2	LC1,LC3	T1/R2	PO1,PO2,PO3,PO4,PO5,PSO1,PSO2,PSO3
44	Object oriented programming and SDLC		TC1,TC3	LC1,LC3	T1/T2/W3	PO4,PO5,PSO2,PSO3
45	Algorithms and data structures		TC1, TC2	LC1,LC3	T1/T2/W1	PO1,PO2,PO3, PSO1,PSO2
46	Implication of database management systems		TC1,TC2	LC1,LC3	T1/R3/W1	PO1,PO3, PSO1,PSO2
47	Web development		TC1,TC2	LC1,LC3	T1/R2	PO1,PO2,PO3
48	Mobile application development		TC1,TC2	LC1,LC3	T2/W3	PO1,PO4,PO5, PSO1,PSO2
49	Software testing		TC1,TC2	LC1,LC3	T1/R2/W3	PO2,PO3,PO4, PSO1,PSO3
50	Quality assurance		TC1	LC3	T1/T3/W2	PO1,PO2,PSO2,PSO3
51	Continuous integration		TC1,TC2	LC1,LC3	T1/R2	PO4,PO5, PSO1,PSO3
52	Continuous development		TC1,TC2	LC1,LC3	T1/R2	PO1,PO2
53	Cloud computing and its structure		TC1,TC2	LC1,LC3	T2/R2/W3	PO1,PO2,PO3,PO4,PO5, PSO1,PSO2,PSO3
54	Cyber ethics and security		TC1,TC2	LC1,LC3	T1/R2/W1	PO2,PO3,PO4,PO5, PSO1,PSO2,PSO3
55	Revision class		-	-	-	-
56	Final assessment		-	-	-	-

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
1	Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education Asia.
2	Object-Oriented Software Engineering: Practical software development using UML and Java Timothy C. Lethbridge and Robert Laganier , McGraw-Hill Higher education.
3	An Introduction to Object Oriented Systems Analysis and Design with UML and the Unified Process, Stephen R Schach, Tata McGraw-Hill
4	Jalote Pankaj, "An Integrated Approach to Software Engineering", 3rd edition, Narosa, 2005.
5	Sommerville Ian, Pearson Education, "Software Engineering", 5th edition, Addison Wesley, 1999

WEB SOURCE REFERENCES (W):

1	Geeksforgeeks
2	www.coursera.com
3	www.simplilearn.com

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
-	Knowledge of computer programming	-	-
-	Principles of management	-	-

COURSE OBJECTIVES:

- Ethical and Social Responsibility:** Graduates will recognize the ethical implications of IoT technologies and demonstrate a commitment to responsible and ethical practices in the design, implementation, and use of IoT systems. They will also consider the societal impact of IoT applications.
- Lifelong Learning:** Graduates will have a foundation for continuous learning and professional development in the rapidly evolving field of IoT. They will stay informed about emerging technologies, standards, and best practices throughout their careers.
- Entrepreneurship and Leadership:** Graduates will have the skills and mindset to explore entrepreneurial opportunities in the IoT ecosystem. They will also exhibit leadership qualities, capable of guiding teams and making informed decisions in the dynamic IoT landscape.
- Global and Cultural Awareness:** Graduates will understand the global implications of IoT technologies and be aware of cultural considerations when developing and deploying IoT solutions in diverse international settings.
- Environmental Sustainability:** Graduates will consider environmental sustainability in IoT design and implementation. They will be conscious of energy efficiency, resource utilization, and the environmental impact of IoT solutions.

COURSE OUTCOMES:

S.NO	DESCRIPTION	PO(1..12) MAPPING	PSO(1..3) MAPPING
CO1	To learn the basic concepts of software engineering.	PO1,PO2,PO3,PO11	PSO1
CO2	To know about the requirements and process to engineer the software.	PO1,PO2,PO3,PO11	POS1,PSO2
CO3	To learn how to design a software & what are its strategies.	PO1,PO2,PO11	PSO2,PSO3
CO4	To aware about the coding, testing & maintenance of software	PO1,PO2 ,PO11	PSO1,PSO3

CO5	To know about different metrics used for software evaluation.	PO1,PO2,PO11	PSO3
COURSE OVERALL PO/PSO MAPPING:			

COURSE OUTCOMES VS POs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

S.NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	-	2	-	2	-	-
CO2	1	1	1	-	-	-	-	-	-	-	1	-	1	2	-
CO3	2	1	-	-	-	-	-	-	-	-	1	-	-	1	1
CO4	1	1	-	-	-	-	-	-	-	-	1	-	1	-	1
CO5	1	1	-	-	-	-	-	-	-	-	1	-	-	-	1

* For Entire Course, PO & PSO Mapping

POs & PSO REFERENCE:

PO1	Engineering Knowledge	PO7	Environment & Sustainability	PSO1	To equip the students with theoretical and implementation knowledgebase in all the latest areas of Computer Science & Engineering for a successful career in software industries, pursuing higher studies, or entrepreneurial establishments.
PO2	Problem Analysis	PO8	Ethics	PSO2	To nurture the students with the critical thinking abilities for better decision making by offering them a socially acceptable solutions to real life problems through computing paradigm.
PO3	Design & Development	PO9	Individual & Team Work	PSO3	To nurture the students with the comprehensive analytical and design abilities by offering them techno-commercially feasible solutions of real business problems through computing.
PO4	Investigations	PO10	Communication Skills		
PO5	Modern Tools	PO11	Project Mgt. & Finance		
PO6	Engineer & Society	PO12	Life Long Learning		

COs VS POs MAPPING JUSTIFICATION:

S.NO	PO/PSO MAPPED	LEVEL OF MAPPING	JUSTIFICATION
Cxxx.1			
Cxxx.2			
Cxxx.3			
Cxxx.4			
Cxxx.5			
Cxxx*			

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS, POs & PSOs:

SNO	DESCRIPTION	PROPOSED ACTIONS
1	Edge Computing: Explore edge computing concepts and the role of edge devices in processing and analyzing data locally, reducing latency and bandwidth usage in IoT applications.	Need to be Covered in extra

		session
2	Fog Computing: Understand fog computing as an extension of cloud computing that brings computation closer to the data source, enabling real-time processing and analysis in distributed IoT environments.	Need to be Covered in extra session
3	Blockchain and IoT Security: Investigate how blockchain technology can enhance security in IoT applications, ensuring data integrity, authentication, and secure transactions in decentralized IoT networks.	Need to be Covered in extra session
4	5G and IoT Connectivity: Study the impact of 5G networks on IoT connectivity, including increased data rates, low latency, and the ability to connect a massive number of devices simultaneously.	Need to be Covered in extra session
5	Digital Twins: Explore the concept of digital twins, which involves creating virtual models of physical objects or systems in the IoT, enabling monitoring, analysis, and simulation for improved decision-making.	Need to be Covered in extra session

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

1	Explore edge computing concepts and the role of edge devices in processing and analyzing data locally, reducing latency and bandwidth usage in IoT applications.
2	Understand fog computing as an extension of cloud computing that brings computation closer to the data source, enabling real-time processing and analysis in distributed IoT environments.
3	Investigate how blockchain technology can enhance security in IoT applications, ensuring data integrity, authentication, and secure transactions in decentralized IoT networks.
4	Study the impact of 5G networks on IoT connectivity, including increased data rates, low latency, and the ability to connect a massive number of devices simultaneously.
5	Explore the concept of digital twins, which involves creating virtual models of physical objects or systems in the IoT, enabling monitoring, analysis, and simulation for improved decision-making.

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

<input type="checkbox"/> CHALK & TALK	<input type="checkbox"/> STUD. ASSIGNMENT	<input type="checkbox"/> WEB RESOURCES	<input type="checkbox"/> NPTEL/OTHERS
<input type="checkbox"/> LCD/SMART BOARDS	<input type="checkbox"/> STUD. SEMINARS	<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> WEBINARS

ASSESSMENT METHODOLOGIES-DIRECT

<input type="checkbox"/> ASSIGNMENTS	<input type="checkbox"/> STUD. SEMINARS	<input type="checkbox"/> TESTS/MODEL EXAMS	<input type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS



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NAAC ACCREDITED

Approved by MHRD / AICTE / PCI / BCI / COA / NCTE

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<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		
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ASSESSMENT METHODOLOGIES-INDIRECT

<input type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

INNOVATIONS IN TEACHING/LEARNING/EVALUATION PROCESSES:

- Technology Integration:** Embrace and integrate technology tools in the classroom to enhance the learning experience. This can include interactive whiteboards, educational apps, virtual reality, and online collaboration platforms. Utilizing technology allows for more dynamic and interactive lessons, catering to diverse learning styles.
- Personalized Learning Paths:** Implement personalized learning approaches that cater to individual student needs and pace of learning. Adaptive learning platforms and data analytics can help tailor educational content, assignments, and assessments based on the strengths and weaknesses of each student, promoting a more customized learning experience.
- Active Learning Strategies:** Move away from traditional lecture-based approaches and incorporate active learning strategies. This involves engaging students in hands-on activities, group discussions, problem-solving exercises, and real-world projects. Active learning fosters critical thinking, collaboration, and practical application of knowledge.
- Blended Learning Models:** Adopt blended learning models that combine face-to-face instruction with online resources. This allows for flexibility in learning, enabling students to access materials at their own pace outside the classroom. Flipped classrooms, where students learn new concepts online and engage in discussions and activities during class, are an example of a blended learning approach.
- Assessment Innovation:** Rethink assessment methods to go beyond traditional exams and quizzes. Explore alternative forms of assessment, such as project-based assessments, portfolios, presentations, and peer assessments. Additionally, incorporate formative assessments and feedback throughout the learning process to help students track their progress and make improvements.

Prepared by
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Approved by
(HOD)