CMS COLLEGE KOTTAYAM (AUTONOMOUS)

UNDERGRADUATE VOCATIONAL PROGRAMMES (HONOURS) SYLLABUS

CMS-B.VOC. (Honours)

(2025 Admission Onwards)

Faculty: Technology & Applied Sciences
BoS: Information Technology
Programme: Bachelor of Vocation (Honours) Information Technology

CMS COLLEGE KOTTAYAM (AUTONOMOUS)
CMS College Road
Kottayam – 686001, Kerala, India.

PREFACE

CMS College has a rich history as a pioneer of modern higher education in India. With a legacy spanning over two centuries, the institution continues to uphold its commitment to academic excellence and societal relevance. In alignment with this vision, the B.Voc. in Information Technology was launched in 2018 with funding from the University Grants Commission (UGC) to meet the growing demand for skill-based and industry-aligned education.

As a vocational degree programme, the B.Voc. in Information Technology aims to provide students with a unique blend of theoretical knowledge and practical expertise. Designed to bridge the gap between academia and industry, the programme offers a curriculum that is responsive to the dynamic needs of the IT sector. From software development and cybersecurity to data analytics and artificial intelligence, students are equipped to explore diverse career opportunities and excel in a highly competitive global landscape.

The IT field continues to be at the forefront of technological advancement, driving innovation and transformation across industries. With this in mind, CMS College is proud to implement the B.Voc. Information Technology programme as a four-year undergraduate programme starting in 2025. This upgrade offers students enhanced academic flexibility, deeper specialization options, and greater career readiness. It also reflects the institution's dedication to staying ahead of educational trends and empowering students with future-ready skills.

Following the regulations prescribed under **MAHATMA GANDHI UNIVERSITY**

UNDERGRADUATE VOCATIONAL PROGRAMMES (HONOURS) REGULATIONS, 2025 (MGU-B.VOC (HONOURS)), the Board of Studies in Information Technology has proposed a comprehensive curriculum for the B.Voc. programme, meticulously designed to meet academic standards and maintain industry relevance. With this new curriculum, we eagerly look forward to guiding students through the diverse and enriching landscapes of Information Technology. May this syllabus serve as a gateway to a transformative and fulfilling educational experience, laying the foundation for a lifelong pursuit of knowledge and a meaningful contribution to the ever-evolving world of technology. We are confident that our students will not only master the fundamental concepts but also develop critical thinking, problem-solving skills, and a passion for exploration – all essential ingredients for success in a rapidly advancing digital era.

Ms. Resmi Cherian
Chairperson
Board of Studies in Information Technology
CMS College Kottayam (Autonomous)

BOARD OF STUDIES

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   CMS College Kottayam (Autonomous).

8. Ms. Sarika G Nair (Member)
   Assistant Professor
   CMS College Kottayam (Autonomous).

Programme Outcomes (PO)

PO1: Critical thinking and Analytical reasoning

Capability to analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories to develop knowledge and understanding; critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

PO2: Scientific reasoning and Problem solving

Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective; capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non- familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO3: Multidisciplinary/interdisciplinary/transdisciplinary Approach

Acquire interdisciplinary/ multidisciplinary/ transdisciplinary knowledge base as a consequence of the learning they engage with their programme of study; develop a collaborative-multidisciplinary/ interdisciplinary/ transdisciplinary - approach for formulate constructive arguments and rational analysis for achieving common goals and objectives.

PO4: Communication Skills

Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and

concise manner to different groups.

PO5: Leadership Skills

Ability to work effectively and lead respectfully with diverse teams; setting direction, formulating an inspiring vision, building a team that can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO6: Social Consciousness and Responsibility

Ability to contemplate of the impact of research findings on conventional practices, and a clear understanding of responsibility towards societal needs and reaching the targets for attaining inclusive and sustainable development.

PO7: Equity, Inclusiveness and Sustainability

Appreciate equity, inclusiveness and sustainability and diversity; acquire ethical and moral reasoning and values of unity, secularism and national integration to enable to act as dignified citizens; able to understand and appreciate diversity (caste, ethnicity, gender and marginalization), managing diversity and use of an inclusive approach to the extent possible.

PO8: Moral and Ethical Reasoning

Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior.

PO9: Networking and Collaboration

Acquire skills to be able to collaborate and network with educational institutions,

research organisations and industrial units in India and abroad.

PO10: Lifelong Learning

Ability to acquire knowledge and skills, including “learning how to learn”, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of workplace through knowledge/skill development/reskilling.

Course Page Index

Course Code	Title of the Course	Semester
CMSIT25111101	Office Automation and Creative Design	1
CMSIT25111102	Programming in C	1
CMSIT25111103	Computer Architecture and Organization	1
CMSIT25114101	Information Security	1
CMSIT25110101	On-the-Job Training	1
CMSIT25121104	Data Structures and Algorithms	2
CMSIT25121105	Database Management Systems	2
CMSIT25121106	Introduction to IT	2
CMSIT25124102	Smart Farming using IOT	2
CMSIT25120102	On-the-Job Training	2
CMSIT25131207	Web Technologies	3
CMSIT25131208	Object Oriented programming with Java	3
CMSIT25131209	Software Engineering and Testing	3
CMSIT25134203	Principles of Data Science	3
CMSIT25132201	Foundations of Web Design	3

CMSIT25132202	**Design and Visualization with 3DS MAX**	**3**
CMSIT25130203	**On-the-Job Training**	**3**
CMSIT25141210	**Programming with Python**	**4**
CMSIT25141211	**Web Application Development with PHP**	**4**
CMSIT25141212	**Computer Networks**	**4**
CMSIT25145201	**Professional Competence and Life Skills for IT Industry**	**4**
CMSIT25149201	**Discrete Structures for Computer Science**	**4**
CMSIT25142203	**Creative Computing with Python**	**4**
CMSIT25142204	**Smart Web Design with PHP**	**4**
CMSIT25140204	**Summer Internship**	**4**
CMSIT25151313	**Mobile Application Development with Flutter**	**5**
CMSIT25153301	**Data Analytics with R**	**5**
CMSIT25153302	**Embedded Systems and IOT**	**5**
CMSIT25151314	**Operating Systems**	**5**
CMSIT25155302	**Artificial Intelligence**	**5**
CMSIT25159302	**Virtual and Augmented Reality**	**5**
CMSIT25152305	**Digital Marketing**	**5**

CMSIT25152306	**Fundamentals of Cloud Computing**	**5**
CMSIT25161315	**Data Science with Python**	**6**
CMSIT25163303	**Data Visualization**	**6**
CMSIT25163304	**Building Applications with MongoDB**	**6**
CMSIT25165303	**Generative AI**	**6**
CMSIT25169303	**BigData Analytics**	**6**
CMSIT25162307	**Cyber Security**	**6**
CMSIT25162308	**Computer Networking**	**6**
CMSIT25160305	**Project**	**6**
CMSIT25170406	**Apprenticeship**	**7 & 8**
CMSIT25170407	**Research Internship**	**7 & 8**

Syllabus Index

Name of the Major**: Information Technology**

Semester 1

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25111101	**Office Automation and Creative Design**	**SDC**	**4**	**5**	**3**	**2**	**0**
CMSIT25111102	**Programming in C**	**SDC**	**4**	**5**	**3**	**2**	**0**
CMSIT25111103	**Computer Architecture and Organization**	**SDC**	**4**	**4**	**4**	**0**	**0**
CMSIT25114101	**Information Security**	**MDC**	**3**	**3**	**3**	**0**	**0**
CMSIT25110101	**On-the-Job Training**	**SDC**	**2**	**5**	**0**	**0**	**5**

Semester 2

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25121104	Data Structures and Algorithms	SDC	4	5	3	2	0
CMSIT25121105	Database Management Systems	SDC	4	5	3	2	0
CMSIT25121106	Introduction to IT	SDC	4	4	4	0	0
CMSIT25124102	Smart Farming using IOT	MDC	3	4	2	2	0
CMSIT25120102	On-the-Job Training	SDC	2	5	0	0	5

Semester 3

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25131207	Web Technologies	SDC	4	5	3	2	0
CMSIT25131208	Object Oriented Programming with Java	SDC	4	5	3	2	0
CMSIT25131209	Software Engineering and Testing	SDC	4	4	4	0	0
CMSIT25134203	Principles of Data Science	MDC	3	3	3	0	0
CMSIT25132201	Foundations of Web Design	MPC	4	5	3	2	0
CMSIT25132202	Design and Visualization with 3DS MAX	MPC	4	5	3	2	0
CMSIT25130203	On-the-Job Training	SDC	2	5	0	0	5

Semester 4

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25141210	Programming with Python	SDC	4	5	3	2	0
CMSIT25141211	Web Application Development with PHP	SDC	4	5	3	2	0
CMSIT25141212	Computer Networks	SDC	4	4	4	0	0
CMSIT25145201	Professional Competence and Life Skills for IT Industry	SEC	3	3	3	0	0
CMSIT25149201	Discrete Structures for Computer Science	VAC	3	3	3	0	0
CMSIT25142203	Creative Computing with Python	MPC	4	5	3	2	0
CMSIT25142204	Smart Web Design with PHP	MPC	4	5	3	2	0
CMSIT25140204	Summer Internship	INT	2	-	-	-	2

Semester 5

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25151313	Mobile Application Development with Flutter	SDC	4	5	3	2	0
CMSIT25153301	Data Analytics with R	SDE*	4	5	3	2	0
CMSIT25153302	Embedded Systems and IOT		4	5	3	2	0
CMSIT25151314	Operating Systems	SDC	4	4	4	0	0
CMSIT25155302	Artificial Intelligence	SEC	3	4	2	2	0
CMSIT25159302	Virtual and Augmented Reality	VAC	3	3	3	0	0
CMSIT25152305	Digital Marketing	MPC	4	4	4	0	0
CMSIT25152306	Fundamentals of Cloud Computing	MPC	4	4	4	0	0

*** Opt any one from SDE**

Semester 6

Course Code	Title of the Course	Type of the Course	Credit	Hours / Week	Hour Distribution/ week		
					L	P	O
CMSIT25161315	Data Science with Python	SDC	4	5	3	2	0
CMSIT25163303	Data Visualization	SDE*	4	5	3	2	0
CMSIT25163304	Building Applications with MongoDB		4	5	3	2	0
CMSIT25165303	Generative AI	SEC	3	3	3	0	0
CMSIT25169303	BigData Analytics	VAC	3	3	3	0	0
CMSIT25162307	Cyber Security	MPC	4	4	4	0	0
CMSIT25162308	Computer Networking	MPC	4	4	4	0	0
CMSIT25160305	Project	PRJ	4	8	0	8	0

*** Opt any one from SDE**

Semester 7 & 8

B.Voc. Honours

Course Code	Type of the Course	Methodology	Number of days	Credits	Hour Distribution		
					L	P	O
CMSIT25170406	APP	Apprenticeship	280	28	0	0	28
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-

Semester 7 & 8

B.Voc. Honours with Research

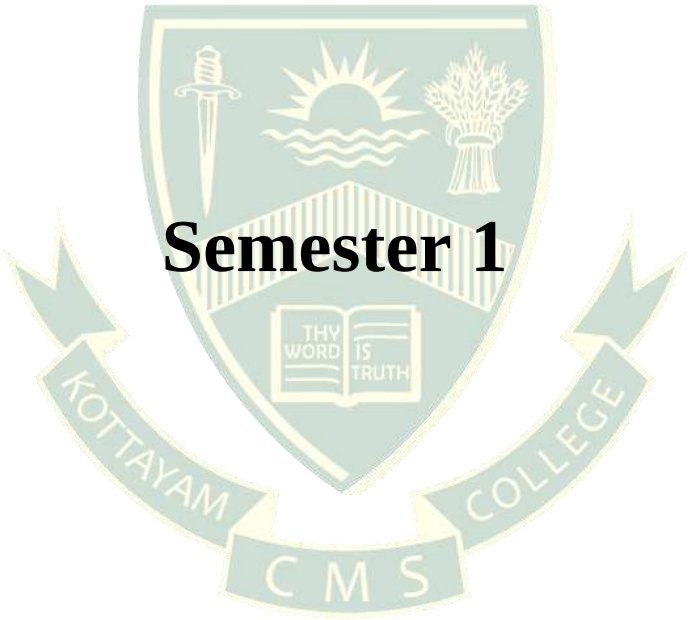
Course Code	Type of the Course	Methodology	Number of days	Credits	Hour Distribution		
					L	P	O
CMSIT25170407	RIN	Research Internship	200	20	0	0	20
Not Applicable	SDC	Online	NA	4	-	-	-
Not Applicable	SDC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-

L - Lecture, P - Practical/Practicum, O - On-the-Job Training

Job Roles and Qualification Packs

IT-ITeS Sector Skill Council		
	Job Roles	**Qualification Packs**
UG Certificate	Junior Software Developer	QG-4.5-IT-01802-2024-V1-NASSCOM - IT Software Solutions for Business
Diploma	Web Developer	NM-05-IT-02695-2024-V1-HCL - Getting started with Web Development
	Software Developer	SSC/Q0504 – Software Developer, Media Developer
	Application Development	S QG-05-IT-03651-2025-V2-NASSCOM - Software Product Developer
Bachelors	Mobile Application Developer	SSC/Q8403 – Mobile Application Developer
	Full Stack Developer	SSC/Q0504 – Full Stack Developer
Honours	Application Development	SSC/Q6702 - Software Developer
	Cloud Computing	SSC/Q8301 - Cloud Consultant
	Web and Mobile Development	SSC/Q8403 - Application developer - Web & Mobile

Semester 1



Semester 1

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25111101	Office Automation and Creative Design	SDC	4	5	3	2	0
CMSIT25111102	Programming in C	SDC	4	5	3	2	0
CMSIT25111103	Computer Architecture and Organization	SDC	4	4	4	0	0
CMSIT25114101	Information Security	MDC	3	3	3	0	0
CMSIT25110101	On-the-Job Training	SDC	2	5	0	0	5

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Office Automation and Creative Design**					
Type of Course	**SDC**					
Course Code	**CMSIT25111101**					
Course Level	**100-199**					
Course Summary	This course provides hands-on training in essential office productivity and graphic design tools. It covers the creation, formatting, and printing of professional documents using Microsoft Word, and the design of impactful presentations with Microsoft PowerPoint. Students will learn to manage data, perform calculations, and analyze information using Microsoft Excel features such as functions, pivot tables, and macros. The course also introduces Adobe Photoshop for image editing, applying filters, and designing web layouts, equipping learners with basic graphic design skills for digital media.					
Semester	**1**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		

1	Understand and apply various features of Microsoft Word for document creation, formatting, and printing.	A	1,2,4
2	Develop effective presentations using Microsoft PowerPoint with multimedia elements, animations, and proofing tools.	A	1,4
3	Perform data entry, formatting, analysis, and automation using Microsoft Excel functions, charts, pivot tables, and macros.	An	1,2,10
4	Design, edit, and export digital graphics using Adobe Photoshop tools, effects, and filters for basic web and print media	A	1,3,4,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Microsoft Word and PowerPoint**		
	1.1	**Microsoft Word**:- Creating and Formatting Documents, Working with text, Font and Styles, Document Layout, Page setting, Adding images, Header and footer	1	**15**
	1.2	Border, Bullets, Mail Merge, Table, Proofing and printing technique.	1	
	1.3	**Microsoft PowerPoint:** Introduction and applications of PowerPoint, Create new presentation, Adding slides, Working with objects.	2	
	1.4	Animation effects, Links and Action buttons, Slide show, Proofing and Printing.	2	
2		**Microsoft Excel**		**15**
	2.1	Introduction to Excel, Formatting Excel work book.	3	
	2.2	Perform calculations with functions, Sorting and filtering, *What if* analysis tool	3	
	2.3	Creating charts, Analyzing data using pivot table	3	

	2.4	Using Macros, Excel Forms, Proofing and Printing	3	
3		**Photoshop**		**15**
	3.1	Introduction, Setting up the document, Interface Layout, Palettes, Toolbox	4	
	3.2	Filters in photoshop, Rollover, Animation	4	
	3.3	Designing a webpage with photoshop, Saving and Exporting Images	4	
4		**Practical**		**30**
	1	Basic operations of Word Processing Package	1	
	2	Basic operations of Presentation Package	2	
	3	Basic excel functions	3	
	4	Sorting and Filtering	3	
	5	Creating Charts	3	
	6	Pivot table	3	
	7	Macro	3	
	8	Excel Forms	3	
	9	Prepare a visiting card	4	
	10	Prepare a Photo frame	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**	
	Lecture, Tutorial, Presentations, Programming sessions.	
Assessment Types	**MODE OF ASSESSMENT**	
	A	**Continuous Comprehensive Assessment (CCA)**

	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. A Conceptual Guide to Open Office
2. Microsoft Office Bible - John
3. Microsoft Office Excel –Torben Lage Frandsen
4. Adobe Photoshop CC help - Adobe

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Programming in C**					
Type of Course	**SDC**					
Course Code	**CMSIT25111102**					
Course Level	**100-199**					
Course Summary	This course offers a comprehensive introduction to the C programming language, equipping students with both foundational and advanced programming skills. Beginning with the core elements of the C language including its character set, tokens, keywords, and data types, students learn how to write efficient and structured C programs. The course progresses through essential programming constructs such as operators, expressions, input/output operations, and various control structures. Emphasis is placed on practical application through the use of arrays, strings, functions (including recursion). In the advanced modules, students explore complex features such as structures, unions, and file management. By the end of the course, students will have developed the skills needed to write modular, memory-efficient C programs, and understand low-level programming concepts that form the foundation for system-level development. This course is suitable for beginners and serves as a strong foundation for further study in systems programming, embedded systems, or algorithmic problem solving.					
Semester	**1**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the structure and components of C programs and perform computational, logical, and data interaction tasks.	U,A	1,2,4,10
2	Develop programs using control flow constructs such as conditionals, loops, and jump statements.	A	1,2,10
3	Implement array-based and string-based data structures and perform common operations on them.	A	2,10
4	Design modular programs using user-defined functions with proper parameter passing and recursion.	A	1,2,10
5	Apply structures, unions, and pointers to handle complex data types and memory access and manage data files using file handling techniques	A	2,6,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**C Character Set, Data types and Operators**		
	1.1	Character Set, C Tokens, Keywords, Identifiers, Constants, Variables	1	**15**
	1.2	Data types, Declaration of variables, Storage class, Assigning values to variables, symbolic constants, declaring as constant	1	
	1.3	Operators: Arithmetic, Relational, Logical, Assignment, Increment and Decrement operators, Conditional operator, Bitwise, Special operators.	1	

	1.4	Expressions: Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions.	1	
	1.5	Managing Input and Output operations- Reading and Writing a character	1	
2		**Control Structures**		
	2.1	if statements, switch statement, Conditional operator, goto statement, while, do, for statement, Jumps in loops	2	**15**
	2.2	Arrays: Introduction, One dimensional arrays- declaration, initialization, Two dimensional arrays: Initialization	3	
	2.3	Character arrays and Strings: Introduction, Declaring and initializing string variables, Reading strings, Writing strings	3	
	2.4	Arithmetic operations on strings, String comparison, concatenation, string handling functions	3	
	2.5	User defined functions: declaration, definition, return values, function calls, function declaration, category of functions, Recursion	4	
3		**Advanced Features**		
	3.1	Structures and Unions: Defining, declaring, accessing structure, structure initialization	5	
	3.2	Copying and comparing structure variables, operations on elements, arrays of structures, arrays within structures, Unions	5	**15**
	3.3	Pointers: Accessing address, declaring and initializing a pointer variable, accessing a variable using its pointer, pointer expressions	5	
	3.4	File Management: Defining, opening and closing a file, Input/output operations on files	5	
4		**Practical**		
	1	Find the factorial of a number	2	

	2	Generate a Fibonacci series	2	**30**
	3	Check if a number is prime	2	
	4	Check if a number is an Armstrong number	2	
	5	Reverse a number	2	
	6	Find the sum of digits of an integer	2	
	7	Implement a calculator using a switch statement	2	
	8	Find the sum and average of elements in an array	3	
	9	Sort an array	3	
	10	Find the sum of two matrices	3	
	11	Find the product of two matrices	3	
	12	Count the vowels, consonants, digits, and whitespaces in a string	3	
	13	Check whether the given string is a palindrome	3	
	14	Calculate the area of various shapes using functions	3	
	15	Find the minimum and maximum elements, and search for a given element in an array using functions	3	
	16	Find the sum of two distances (in feet and inches) using structures	4	
	17	Store and display information of five employees(empid, name, salary) using an array of structures	4	
	18	Create a structure student with members: name, rollno and marks for five subjects. Calculate the total and average marks	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**
	Lecture, Tutorial, Presentations, Programming sessions.

<table>
<tr><td rowspan="9">Assessment Types</td><td colspan="3">MODE OF ASSESSMENT</td></tr>
<tr><td>A</td><td colspan="2">Continuous Comprehensive Assessment (CCA)</td></tr>
<tr><td rowspan="4">Theory</td><td>Components</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">25</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">Practical</td><td>Lab Involvement</td><td rowspan="2">15</td></tr>
<tr><td>Viva</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
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<tr><td>Practical</td><td>2 hrs</td><td>35
(Exam-30, Record-5)</td></tr>
</table>

Text Books for Reference:

1. E.Balaguruswamy, Programming in ANSI C, McGrawhill
2. Ashok N. Kamthene, Programming in C, Pearson Education
3. P. K. Sinha&PritiSinha, Computer Fundamentals,BPB Publications

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Computer Architecture and Organization**					
Type of Course	**SDC**					
Course Code	**CMSIT25111103**					
Course Level	**100-199**					
Course Summary	This course introduces the basic concepts of computer architecture and organization, focusing on the internal working of a computer system. It covers the fundamental functional units, the Von-Neumann architecture, and the instruction cycle. Students learn about memory organization, including memory hierarchy, cache, RAM, ROM, and virtual memory concepts. The course also explains the structure and functions of the CPU, its registers, instruction formats, ALU, and basic pipelining. The final part deals with input/output organization, covering I/O devices, interfaces, data transfer techniques such as programmed I/O, interrupt-driven I/O, DMA, and the role of buffers and I/O processors.					
Semester	**1**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Describe the basic structure and functional units of a	K	1

	computer system.		
2	Discuss the concepts of memory organization, hierarchy, and cache memory.	U	1,2
3	Illustrate the structure and functions of the CPU, registers, ALU, and instruction formats.	U	1,2
4	Demonstrate various input/output organization techniques and data transfer mechanisms.	U	1,2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to Computer Organization**		
	1.1	Overview of Computer Organization and Architecture, Basic Functional Units: Input, Output, Storage, Processing.	1	**15**
	1.2	Basic operational concepts, Bus structures	1	
	1.3	Instruction Cycle: Fetch, Decode, Execute, Addressing modes	1	
2		**Memory Organization**		**15**
	2.1	Cache Memory: Mapping functions, Replacement Algorithms, Performance considerations	2	
	2.2	Virtual Memory: Address translation. Memory management requirements	2	
3		**Central Processing Unit (CPU) Organization**		**15**
	3.1	Fundamental concepts, Register transfer	3	
	3.2	Performing an arithmetic or logic operation, Fetching a word in memory	3	

	3.3	Execution of a complete instruction, Branch instruction, Hardwired control, Microprogrammed Control	3	
4		**Input/Output Organization**		**15**
	4.1	Accessing I/O Devices, Interrupts, Enabling and disabling interrupts	4	
	4.2	Handling multiple devices, Direct Memory Access (DMA), Bus Arbitration	4	
	4.3	Interface circuit, Standard I/O interfaces (PCI, SCSI, USB)	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	30
		Quiz/Viva voce	
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	2 hrs	70

Textbooks for Reference:

1. Hamacher Vranesic Zaky, ComputerOrganisation, McGraw Hill(Fifth edition)
2. M.Morris Mano-Computer Systems Architecture, Third Edition, Pearson Education

CMS College Kottayam (Autonomous)

Programme						
Course Name	**Information Security**					
Type of Course	**MDC**					
Course Code	**CMSIT25114101**					
Course Level	**100-199**					
Course Summary	This course provides a comprehensive introduction to the principles and practices of information security. It begins with foundational concepts such as the definition of security, models for analyzing security, types of attacks and payloads, and the essential concepts of threats, vulnerabilities, risks, and risk management. The course then explores core mechanisms for protecting systems and data, including identification, authentication, authorization, access control, and accountability. Students will gain insights into auditing practices, intrusion detection and prevention systems, and security assessment methodologies. The course further covers essential cryptographic techniques, including symmetric and asymmetric encryption, hash functions, digital signatures, and digital certificates, along with an overview of physical security controls aimed at safeguarding people, data, and equipment. Students are introduced to network and application security, addressing methods for securing networks, mobile devices, and various application environments such as web and database systems. Throughout the course, emphasis is placed on practical tools and strategies for mitigating security risks in real-world computing environments.						
Semester	**1**	**Credits**			**3**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	0	0	0	**45**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamental concepts of information security, security models, types of attacks, threats, vulnerabilities, and principles of risk management.	U	1,2,10
2	Discuss the mechanisms of identification, authentication, authorization, access control, auditing, accountability, and physical security in secure systems.	U	2,5
3	Understand symmetric and asymmetric cryptographic techniques, hash functions, digital signatures, and evaluate their role in maintaining confidentiality, integrity, and authenticity.	U	2,4
4	Understand risk management and security techniques to safeguard networks, mobile devices, and applications from various security threats and vulnerabilities.	U	2,3
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	What is security? Models for discussing security, Attacks: Type of attack payloads, Threats, Vulnerabilities, and Risk, Risk management	1	**20**
	1.2	Identification and Authentication: Introduction, Identification, Authentication	2	

	1.3	Authorization and Access Control: Authorization, Access control, Access control lists, Access control methodologies	2	
	1.4	Auditing and Accountability: Accountability: Security benefits of accountability, Intrusion detection and prevention, Auditing: Logging, Monitoring, Assessments	2	
2		**Cryptographic Techniques and physical security**		**13**
	2.1	Introduction, Caesar cipher, Cryptographic machines	3	
	2.2	Symmetric cryptography, Asymmetric cryptography, Hash functions, Digital signatures, Certificates	3	
	2.3	Physical Security: Physical security controls, Protecting people, Protecting data, Protecting equipment	2	
3		**Network and Application Security**		**12**
	3.1	Network security: Protecting networks, Protecting network traffic	4	
	3.2	Mobile device security, Network security tools	4	
	3.3	Application security: Software development vulnerabilities, Web security, Database security, Application security tools	4	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

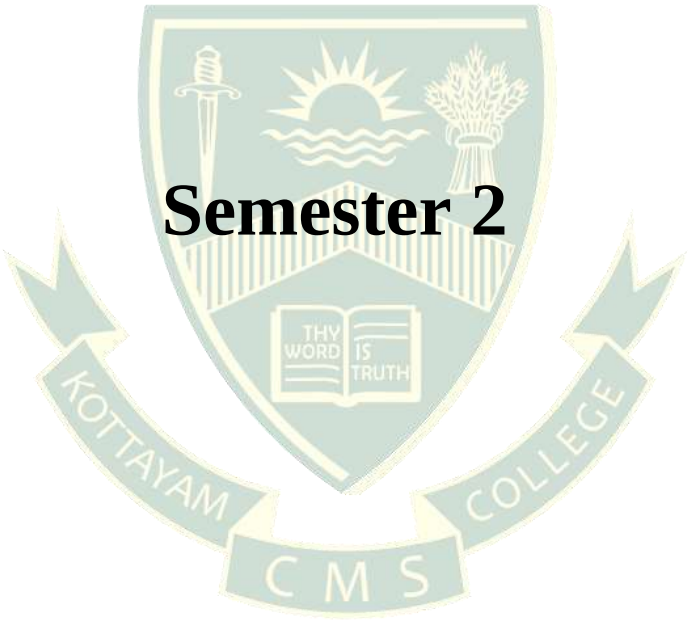
Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	

		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50

Textbooks for Reference:

1. The Basics of Information Security, Second Edition, Jason Andress
2. Information Security Management, Michael Workman
3. Principles of Information Security (7th Edition), Michael E. Whitman, Herbert J. Mattord
4. Information Security: Principles and Practices, Merkow, Mark; Breithaupt, Jim

Semester 2



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Semester 2

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25121104	Data Structures and Algorithms	SDC	4	5	3	2	0
CMSIT25121105	Database Management Systems	SDC	4	5	3	2	0
CMSIT25121106	Introduction to IT	SDC	4	4	4	0	0
CMSIT25124102	Smart Farming using IOT	MDC	3	4	2	2	0
CMSIT25120102	On-the-Job Training	SDC	2	5	0	0	5

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Data Structures and Algorithms**
Type of Course	**SDC**
Course Code	**CMSIT25121104**
Course Level	**100-199**
Course Summary	This course introduces the fundamental concepts of programming methodologies and data structures essential for problem-solving and software development. It begins with the structured programming approach and algorithm complexity analysis, including Big O notation and asymptotic analysis. Students explore recursive and iterative techniques and basic data structures such as arrays, vectors, and various types of linked lists. The course covers stack and queue structures along with their applications, including expression evaluation and different queue variants like circular and priority queues. Sorting algorithms such as bubble, selection, insertion, merge, quick, and heap sort are discussed in detail, along with searching techniques and file organization methods for internal and external sorting.

Semester	**2**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	Programming in C					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		

1	Understand programming methodologies and algorithmic complexity using Big O notation and asymptotic analysis.	U	1,2
2	Apply structured programming techniques and stepwise refinement in problem-solving.	A	2,3
3	Implement and manipulate linear data structures such as arrays, stacks, queues, and linked lists.	A	2,3,5
4	Analyze and apply appropriate stack and queue-based solutions in practical applications like expression evaluation.	An	1,2,5
5	Implement and compare sorting and searching algorithms in terms of efficiency and complexity.	An	1,2,4
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to programming methodologies and Complexity of algorithms**		
	1.1	Introduction to programming methodologies, Structured approach, Stepwise refinement techniques	1,2	**15**
	1.2	Programming style, Documentation, Analysis of algorithms: frequency count	1,2	
	1.3	Definition of Big O notation, Asymptotic Analysis of simple algorithms	1	
	1.4	Recursive and iterative algorithms, Study of basic data structures: Vectors and Arrays	3	
	1.5	Linked lists: Singly linked list, Doubly linked list, Circular linked list, Operations on linked list	3	
2		**Basic data structures**		

	2.1	Stacks: Introduction, Definition, Representation of stack, Operations on Stacks	3	**15**
	2.2	Applications of stack: Evaluation of Arithmetic expressions	3,4	
	2.3	Queues: Introduction, Definition, Representation of queues, Various Queue structures: Circular queue	3	
	2.4	Dequeue, Priority queue, Multiple stacks and queues, Applications	3,4	
3		**Sorting & File Organization**		**15**
	3.1	Internal and external sorting techniques, Selection sort, Bubble sort	5	
	3.2	Insertion sort, Merge sort, Quick sort	5	
	3.3	Heaps and Heap sort, Searching: linear and binary	5	
4		**Practical using C**		**30**
	1	Stack using array	3	
	2	Stack using linked list	3	
	3	Queue using array	3	
	4	Queue using linked list	3	
	5	Program to implement Selection sort	5	
	6	Program to implement Insertion sort	5	
	7	Program to Bubble sort	5	
	8	Program to implement Merge sort	5	
	9	Program to implement Quick sort	5	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

	Classroom Procedure (Mode of transaction)

<table>
<tr><td>Teaching and Learning Approach</td><td colspan="3">Lecture, Tutorial, Presentations, Programming sessions.</td></tr>
<tr><td rowspan="10">Assessment Types</td><td colspan="3">MODE OF ASSESSMENT</td></tr>
<tr><td>A</td><td colspan="2">Continuous Comprehensive Assessment (CCA)</td></tr>
<tr><td rowspan="3">Theory</td><td>Components</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">25</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">Practical</td><td>Lab Involvement</td><td rowspan="2">15</td></tr>
<tr><td>Viva</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>1.5 hrs</td><td>50</td></tr>
<tr><td>Practical</td><td>2 hrs</td><td>35
(Exam-30, Record-5)</td></tr>
</table>

Text Books for Reference:

1. Tremblay and Sorenson, Introduction to data structures with applications, TMH.
2. Wirth N., Algorithms + Data Structures = Programs, Prentice Hall
3. Achuthsankar S. N. and Mahalakshmi T., Data Structures Using C, Prentice Hall India
4. Hugges J. K., & J. I. Michtm, A Structured Approach to Programming, Prentice Hall.
5. Thomas H. Corman, Charles E. Leiserson and Ronald L. Rivest., Introduction to Algorithms, Prentice Hall India
6. Samanta D, Classic Data Structures, Prentice Hall India, 2/e, 2009
7. G S Baluja, Data Structures through C, A Practical Approach

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Database Management Systems**
Type of Course	**SDC**
Course Code	**CMSIT25121105**
Course Level	**100-199**
Course Summary	This course provides a comprehensive foundation in the principles, design, and practical implementation of Database Management Systems. It begins by introducing the database approach, its key characteristics, and advantages over traditional file systems. Students explore various types of database users including DBAs, designers, and end users, and gain an understanding of data models, schemas, and the three-schema architecture. The course delves into the relational model and Entity-Relationship (ER) modeling, equipping students with skills to design robust database schemas using entities, relationships, keys, and constraints. Concepts like domain, attributes, tuples, relational constraints, and integrity rules form the basis for relational schema design. Hands-on learning is emphasized through mastery of SQL, covering data definition (DDL), manipulation (DML), control commands (DCL, TCL), and advanced querying techniques such as joins, nested queries, subqueries, set operations, aggregate functions, and views. Students also gain exposure to transaction processing concepts, including ACID properties and system recovery. Further, the course introduces normalization techniques essential for optimizing database design and performance. Students learn to apply functional dependencies and normal forms (1NF to BCNF), and explore different types of indexing such as primary, clustering, and secondary indexes. Lab sessions reinforce theoretical knowledge with practical exercises aligned with SQL syntax and real-world database scenarios. By the end of

	the course, students will be capable of designing, querying, and maintaining efficient and normalized relational databases.					
Semester	**2**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamental concepts of DBMS including its architecture, data models, schemas, and types of users.	U	1,2,10
2	Create Entity-Relationship (ER) models for database design using entities, relationships, keys, and constraints.	A	1,3,10
3	Apply relational model concepts and constraints to design normalized relational schemas.	A	2,3,10
4	Analyse database schemas through normalization and indexing for performance optimization.	An	1,2,10
5	Apply SQL queries for data definition, manipulation, and retrieval.	A	2,4,10
6	Understand the principles of transaction processing and the importance of ACID properties.	U	1,2,6,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		

	1.1	Characteristics of the database approach, Database users: DBA, Database designers, End users	1	**15**
	1.2	Advantages of using the DBMS approach, Data models, schemas, and instances	1	
	1.3	Three-schema architecture and data independence, DBMS Languages	1	
	1.4	The database system environment, DBMS Component Modules	1	
	1.5	Entity Relationship Modeling: Introduction, Entity Types, Entity Sets, Attributes and Keys	2	
	1.6	Relationship Types, Relationship Sets, Roles, Structural Constraints, Weak Entity Types, Notation for ER diagrams – Sample ER diagrams	2	
2		**Relational Model and Normalization**		**15**
	2.1	Relational Model concepts: Domains, Attributes, Tuples, and Relations, Characteristics of Relations, Relational Model Constraints	3	
	2.2	Relational Database Schemas, Domain Constraints, Key Constraints, Entity Integrity, Referential Integrity, and Foreign Keys	3	
	2.3	Informal Design Guidelines for Relational Schemas, Functional Dependencies	4	
	2.4	Normalization, Normal forms: First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal form	4	
3		**SQL and Transaction processing**		**15**
	3.1	Data Types, Data Definition commands : CREATE, ALTER, DROP, Adding constraints in SQL, Basic SQL Queries: INSERT, SELECT, DELETE, UPDATE	5	
	3.2	Substring comparison using LIKE operator, BETWEEN operator, Ordering of rows, SQL set operations UNION, EXCEPT, INTERSECT	5	

	3.3	Nested queries, EXISTS and UNIQUE functions, Renaming of attributes, Joining of tables, Aggregate functions, Grouping, Managing Views.	5	
	3.4	Transaction Processing: Introduction to Transaction Processing, Transaction and System Concepts, Desirable properties of Transactions	6	
4		**Practical**		**30**
	1	DDL commands	5	
	2	DML commands	5	
	3	DCL and TCL commands	5	
	4	SQL constraints	5	
	5	Aggregate functions	5	
	6	Special operators	5	
	7	Set operators	5	
	8	Queries on multiple tables	5	
	9	Nested queries	5	
	10	Subqueries	5	
	11	Views	5	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
	MODE OF ASSESSMENT		
	A	**Continuous Comprehensive Assessment (CCA)**	
		Components	**Marks**
		Assignment/Seminar	

Assessment Types	**Theory**	Quiz/Viva voce	25
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Ramez Elmasri and Shamkant B. Navathe – Database Systems, Sixth Edition, Pearson Education.
2. C.J. Date – An Introduction to Database Systems, Eighth Edition, Pearson Education, 2003.
3. Raghu Ramakrishnan and Johannes Gehrke – Database Management Systems, Third Edition, McGraw Hill International Edition.
4. Dipin Desai – An Introduction to Database Systems, First Edition, Galgotia Publications.

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Introduction to IT**					
Type of Course	**SDC**					
Course Code	**CMSIT25121106**					
Course Level	**100-199**					
Course Summary	This course provides foundational knowledge about computers and their role in modern society. It begins with the evolution, classification, and characteristics of computers, covering their various generations and structural components. Students learn about hardware elements such as the CPU, memory types (RAM, ROM, magnetic and optical storage), and input/output devices. The course also introduces the concept of software, distinguishing between system and application software, and explains computer languages and the steps involved in programming. In addition, the course explores operating systems and their types, offering a basic understanding of how software and hardware interact. It covers essential networking concepts, including data communication, transmission modes, network topologies, and categories of networks. The final part introduces the internet, its working, features like the World Wide Web, web browsers, and search engines, emphasizing practical uses of the internet in daily life. Overall, the course equips students with a solid understanding of IT concepts necessary for further studies and real-world applications.					
Semester	**2**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand computer fundamentals and organization.	U	1,2
2	Identify and describe hardware, memory, I/O devices.	K	1,2
3	Discuss different types of software, OS functions, and basic programming concepts.	U	1,2,3
4	Describe networking and Internet concepts and applications.	U	1,2,4,9
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Computer characteristics, Evolution of Computers, Generations of computers, Classification of computers.	1	**15**
	1.2	The computer system, Applications of computers, Computer organization: Central processing unit.	1	
2		**Hardware**		**15**
	2.1	Memory-Primary Memory-Random Access Memory: Types, Read Only Memory: Types. Secondary Memory- Magnetic Memory, Optical Memory, SSD	2	
	2.2	Input and Output Devices	2	
3		**Software**		

	3.1	Computer software-Types of computer software, Computer Languages.	3	**15**
	3.2	Introduction to Operating Systems, Definition of an Operating System, Different types of PC Operating Systems.	3	
	3.3	Programming languages: Characteristics, Popular high level languages, Steps in developing a program - (problem analysis, algorithm design, coding, debugging, testing, documentation). Approaches - top down and bottom up approaches.	3	
4		**Computer Networks and Internet**		**15**
	4.1	Data Communication: Characteristics, Basic elements of communication system, Data transmission modes. Categories of networks.	4	
	4.2	Network topologies and devices, Applications of network.	4	
	4.3	Internet: Definition, Working of Internet, Major features of Internet, WWW, Web Browsers, Major elements of Internet Search engines, Popular Search Engines, Uses of the Internet.	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	30
		Quiz/Viva voce	

		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	2 hrs	70

Textbooks for Reference:

1. E. Balaguruswamy, Fundamentals of Computers, McGraw hill, 2014
2. Dennis P. Curtain, Information Technology: The Breaking wave, McGrawHill, 2014
3. Peter Norton, Introduction to Computers, McGrawHill, Seventh edition

CMS College Kottayam (Autonomous)

Programme						
Course Name	**Smart Farming using IoT**					
Type of Course	**MDC**					
Course Code	**CMSIT25124102**					
Course Level	**100-199**					
Course Summary	This course introduces the fundamentals of the Internet of Things (IoT) and its applications in modern agriculture. Students will learn about IoT components such as microcontrollers, sensors, actuators, and communication protocols used in smart farming systems. The course also covers modern farming techniques like vertical farming, hydroponics, and aquaponics, alongside the importance of data collection and analysis in precision agriculture. Practical exposure through case studies or field visits helps students understand the real-world implementation of smart farming solutions such as soil moisture monitoring, agricultural drones, UV bug traps, and smart irrigation systems.					
Semester	**2**	**Credits**			**3**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		2	1	0	0	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		

1	Understand the basic concepts, components, and role of IoT in smart farming applications.	U	1,2
2	Describe modern farming techniques and identify challenges in traditional farming practices.	U	1,2,3
3	Apply IoT devices like sensors, actuators, and controllers in designing or analyzing smart farming solutions.	An	1,2,3
4	Create and present a report or case study based on practical exposure to smart farming techniques or IoT applications.	C	4,9,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Introduction to IoT-Definition, History and Key Concepts, Importance of IoT in Farming.	1	**15**
	1.2	IoT Components in Farming-Microcontrollers (e.g., Arduino, Raspberry Pi), Sensors: Soil Moisture, Temperature, Humidity, Actuators: Irrigation Systems, Robotic Tools (Basics only)	1	
	1.3	IoT Networks-Communication Methods: Zigbee and LoRa	1	
2		**Modern Farming Technique**		**15**
	2.1	Plant Growth Basics- Plant Life Cycle & Growth Stages, Factors affecting plant health & crop yield	2	
	2.2	Problems in Traditional Farming - Water and Irrigation Issues, Overuse of Pesticides, Climate and Weather Challenges.	2	

	2.3	Modern Farming Techniques- Vertical Farming, Hydroponics, Aquaponics	2	
	2.4	Data in Farming- Why Data is Important in Agriculture, Collecting and Storing Farm Data, Introduction to Data Analysis in Farming	3	
3		**IoT for Farming – Practical (Any One Case Study or Field Visit)**		
	1	Modern Farming Methods-Vertical Farming/ Hydroponics / Aquaponics *(Case Study or Field Visit)*	4	**30**
	2	Smart Irrigation System- Using Soil Moisture Sensors and ESP32-controlled Irrigation Pump.*(Case Study or Field Visit)*	4	
	3	Agricultural Drone Technology-Understanding the Use of Drones in Farming*(Case Study or Field Visit)*	4	
	4	Visit to a Smart Farm-Observe Modern IoT Techniques Used in Real Farms and Prepare a Report	4	
	5	IoT-based UV Bug Trap-Study of UV Bug Trap Technology for Pest Control in Farming *(Case Study or Field Visit)*	4	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

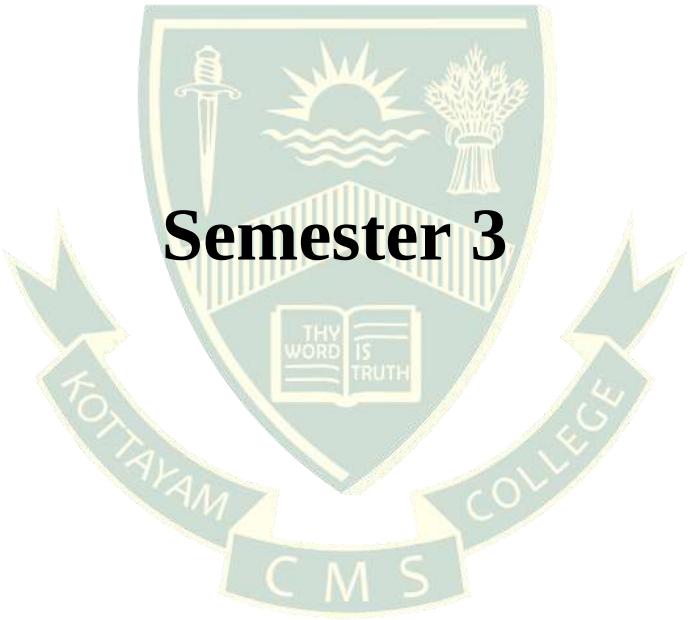
Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	15
		Quiz/Viva voce	
		Written Test	
		Participation/Involvement	15

	Practical	Analysis/Problem Solving/	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1 hr	35
	Practical	2 hrs	35 (Viva, Report)

Textbooks for Reference:

1. R. Bassi, "IoT: Building Arduino-Based Projects," Packt Publishing, 2016.
2. P. Dutta, "Building Arduino Projects for the Internet of Things
3. M. Y. Chowdhury et al., "Internet of Things (IoT) in Agriculture: A Comprehensive Survey," Journal of King Saud University - Computer and Information Sciences, 2021.

Semester 3



ESTD:1817

Semester 3

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25131207	Web Technologies	SDC	4	5	3	2	0
CMSIT25131208	Object Oriented Programming with Java	SDC	4	5	3	2	0
CMSIT25131209	Software Engineering and Testing	SDC	4	4	4	0	0
CMSIT25134203	Principles of Data Science	MDC	3	3	3	0	0
CMSIT25132201	Foundations of Web Design	MPC	4	5	3	2	0
CMSIT25132202	Design and Visualization with 3DS MAX	MPC	4	5	3	2	0
CMSIT25130203	On-the-Job Training	SDC	2	5	0	0	5

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Web Technologies**					
Type of Course	**SDC**					
Course Code	**CMSIT25131207**					
Course Level	**200-299**					
Course Summary	This course introduces the fundamentals of web development using XHTML**,** CSS**,** and JavaScript**.** Students learn to create structured and semantically correct web pages using XHTML elements such as headings, links, images, lists, tables, and forms. The course also covers Cascading Style Sheets (CSS) to control the layout and appearance of web pages. Topics include different types of stylesheets, element positioning, backgrounds, the box model, and media types, helping students design visually appealing and responsive web pages. In the JavaScript modules, students gain basic and advanced scripting skills to build interactive web pages. Key areas include user input handling, control structures, functions, loops, and recursion, along with logical operations and random number generation. Through practical lab sessions, students apply these concepts to develop dynamic and user-friendly websites. The course builds a solid foundation for further learning in front-end web development.						
Semester	**3**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamental concepts of XHTML including document structure, formatting elements, lists, tables, forms, and meta elements.	U	1,2,10
2	Apply CSS for styling and positioning of web elements, and demonstrate proficiency in handling the box model, backgrounds, and layout design.	A	2,3,10
3	Develop interactive and dynamic web pages using JavaScript by implementing control structures, functions, and user input handling.	A	1,2,4,10
4	Design and integrate XHTML, CSS, and JavaScript components to build functional and visually appealing web applications.	C	1,2,4,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to XHTML**		
	1.1	Introduction, Editing XHTML, XHTML example, XHTML validation service	1	**12**
	1.2	Headings, Linking, Images	1	
	1.3	Special characters and horizontal rules, Lists	1	
	1.4	Tables, Forms, Internal Linking, meta elements	1	
2		**Cascading Style Sheets**		
	2.1	Introduction, Inline styles, Embedded style sheets, Conflicting styles	2	

	2.2	Linking External Style Sheets, Positioning elements, Backgrounds	2	**12**
	2.3	Element Dimensions, Box model and Text flow, Media types	2	
	2.4	Building a CSS drop-down menu, User style sheets	2	
3		**JavaScript**		
	3.1	Introduction to scripting, Simple program, Obtaining user input with prompt dialogs, Equality and relational operators	3	
	3.2	Control structures: if selection statement, if..else selection statement, while repetition statement	3	
	3.3	Counter-controlled repetition, Sentinel-controlled repetition, Nested control statements, Assignment operators, Increment and decrement operators	3	**21**
	3.4	for repetition statement, Examples, switch multiple-selection statement, do-while repetition statement	3	
	3.5	break and continue statements, Labelled break and continue statements, Logical operators	3	
	3.6	Functions: Program modules in Java Script, Programmer-defined functions, Function definitions	4	
4		**Practical**		
	1	Create an HTML document giving details of your [Name, Age], [Address, Phone], and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.	1	
	2	Create a page to show different character formatting (B, I, U, SUB, SUP) tags and heading tags.	1	
	3	Create web pages using Anchor tag with its attributes for external links	1	
	4	Create a web page with different sections and internal links using links and sectioning elements; when the user	1	

		clicks on different links it should go to sections on the same page.		
	5	Create a web page, showing ordered list of semesters and an unordered list of Diploma Programmes in your institution.	1	
	6	Design a registration form using HTML form elements and apply styles using embedded CSS. Style the input fields, labels, and buttons using CSS properties like background colour, font, padding, and border.	2	
	7	Create a table to show your class timetable. Specify font and border attributes using CSS.	2	
	8	Write a program in HTML to design a Bio-Data and set style attributes in CSS using IDs and selectors.	2	**30**
	9	Create a web page to show text and image special effects.	2	
	10	Create a web page with four content sections (Picture, Table, List, and Hyperlink) styled and positioned using CSS. Use CSS to arrange the sections side-by-side or in a grid, applying borders, margins, and positioning techniques.	2	
	11	Design an HTML page for adding two numbers using JavaScript prompt.	3	
	12	Create a JavaScript program that prints all even numbers from 1 to 50 using a loop. Skip the numbers that are divisible by 10 using continue.	3	
	13	Create an HTML page with a JavaScript function that changes the text or background colour of a paragraph when the user hovers over it.	3	
	14	Create a JavaScript program that uses a loop to print a table of numbers and their squares on the HTML page.	3	

	15	Write a JavaScript program using a programmer-defined function that accepts two numbers and returns the greater one using logical operators.	3	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

<table>
<tr><td colspan="2">Teaching and Learning Approach</td><td colspan="3">Classroom Procedure (Mode of transaction)</td></tr>
<tr><td colspan="2"></td><td colspan="3">Lecture, Tutorial, Presentations, Programming sessions.</td></tr>
<tr><td rowspan="11">Assessment Types</td><td colspan="4">MODE OF ASSESSMENT</td></tr>
<tr><td>A</td><td colspan="3">Continuous Comprehensive Assessment (CCA)</td></tr>
<tr><td rowspan="4">Theory</td><td>Components</td><td colspan="2">Marks</td></tr>
<tr><td>Assignment/Seminar</td><td colspan="2" rowspan="3">25</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">Practical</td><td>Lab Involvement</td><td colspan="2" rowspan="2">15</td></tr>
<tr><td>Viva</td></tr>
<tr><td rowspan="2">B</td><td colspan="3">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td colspan="2">Marks</td></tr>
<tr><td>Theory</td><td>1.5 hrs</td><td colspan="2">50</td></tr>
<tr><td>Practical</td><td>2 hrs</td><td colspan="2">35
(Exam-30, Record-5)</td></tr>
</table>

Textbooks for Reference:

1. Internet & World Wide Web How to Program, 5/e, Paul Deitel, Harvey Deitel, Abbey Deitel
2. Andy Harris, “HTML5 and CSS3 All-in-one for Dummies”, A Wiley Brand, Third Edition
3. Don Gosselin; Comprehensive Java Script; Web Warrior Series, Course Technologies Inc
4. https://books.goalkicker.com/HTML5Book/
5. Thomas A. Powell; Web Design: The Complete Reference (Second Edition); Tata McGraw Hill, 2002
6. David Flanagan; JavaScript The Definitive Guide; O’Reilly & Associates 1997

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Object Oriented Programming with Java**					
Type of Course	**SDC**					
Course Code	**CMSIT25131208**					
Course Level	**200-299**					
Course Summary	This course introduces the foundational principles of object-oriented programming using Java. It begins with the basics of Java—its history, features, program structure, and the Java Virtual Machine (JVM). Students learn to work with variables, data types, operators, control statements, and methods including method overloading. Core object-oriented concepts such as classes, objects, constructors, inheritance, interfaces, abstract classes, and the use of the super keyword are covered in depth. The course also explores advanced features like packages, multithreading using the Thread class and Runnable interface, exception handling mechanisms, and the development of interactive Java applets. By combining theoretical concepts with practical implementations, this course equips learners with the skills needed to design and develop robust, efficient, and scalable Java applications.					
Semester	**3**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:

	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamentals of Java programming, including its structure, tokens, data types, and the Java Virtual Machine (JVM).	U	1,2,10
2	Apply decision-making constructs, loops, and Java operators to control program flow and solve basic programming problems.	A	1,3,10
3	Create classes, objects, and constructors to implement object-oriented concepts such as inheritance, interfaces, method overloading, and visibility control.	A	2,3,10
4	Apply multithreading techniques and exception handling mechanisms to write robust and concurrent Java programs.	A	2,4,10
5	Develop interactive Java applets and manage I/O operations using file handling and stream classes.	C	1,2,6,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Basic concepts of object oriented programming, Java history, Features, Java environment, Overview of Java language	1	**15**
	1.2	Java Program Structure, Java tokens, Implementing a java program, Java virtual machine	1	
	1.3	Constants, Variables, Data types, Variable declaration, Assignment statement	1	
	1.4	Scope of variables, symbolic constants, type casting, getting values of variables	1	
	1.5	Java Operators, Decision making and branching, Decision making and looping	2	

	1.6	Class, objects, constructors, Method Overloading, static members	3	
2		**Inheritance, Interfaces and Packages**		**15**
	2.1	Inheritance, Overriding methods, Final variables and methods, final classes	3	
	2.2	Abstract methods and classes, Visibility control	3	
	2.3	Interfaces, Packages	3	
	2.4	Multithreaded Programming: Creating threads, Extending thread class, Stopping and blocking thread, Lifecycle of a thread, Implementing Runnable interface	4	
3		**Exception Handling and Applets**		**15**
	3.1	Types of errors, Exceptions, The try-catch Statement	4	
	3.2	Catching more than one Exception, The finally Clause, Generating Exceptions	4	
	3.3	Applet Programming: Introduction, Applets and Applications, Developing applets, Applet life cycle	5	
	3.4	Creating an executable applet, Designing web page, Applet tag, Adding applet to HTML file, Running the applet	5	
4		**Practical**		**30**
	1	Check Whether a Given Number is Odd or Even	2	
	2	Class and Object Implementation using Methods	3	
	3	Constructor in Java	3	
	4	Method Overloading	3	
	5	Runtime Polymorphism	3	
	6	Inheritance	3	
	7	Using the super keyword	3	
	8	Abstract Classes	3	

	9	Interfaces	3	
	10	Multithreading	4	
	11	Runnable Interface	4	
	12	Exception Handling	5	
	13	Applet Programming	5	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1.E. Balagurusamy, Programming with Java, McGraw Hill Education

2.Deitel & Deitel, Java: How To Program, Pearson Education

3.Java2: The Complete Reference Seventh Edition: Herbert Schildt

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Software Engineering and Testing**					
Type of Course	**SDC**					
Course Code	**CMSIT25131209**					
Course Level	**200-299**					
Course Summary	This course introduces the essential concepts of professional software development, including the Software Development Life Cycle and various software process models such as the Waterfall, Spiral, and Agile models. It covers the fundamental principles of requirement engineering, functional and non-functional requirements, and the preparation of requirement specifications. Students will also learn about different system modeling techniques which are crucial for understanding and designing software systems. In addition to software design and implementation using object-oriented principles, UML diagrams, and design patterns, the course provides a detailed study of software testing processes. Various testing techniques such as white-box, black-box, path, control structure, and system testing are explained. Students will gain hands-on experience with test automation tools like Selenium IDE and learn about different categories of test tools including test management and incident management tools. The course also highlights the comparison between manual and automated testing to provide a comprehensive understanding of the software quality assurance process.						
Semester	**3**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Describe the fundamental concepts of software development, software process models, and the Software Development Life Cycle (SDLC).	K	1,2
2	Describe the principles of requirements engineering and illustrate system models including context, interaction, structural, and behavioral models.	U	1,2
3	Apply object-oriented design principles using UML diagrams and design patterns for software design and implementation.	A	1,2,10
4	Analyze various software testing techniques and demonstrate the use of testing tools such as Selenium IDE for automated testing.	An	1,2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Professional Software development, Software Development Life Cycle (SDLC), Software Process models, Agile software development.	1	**15**
	1.2	Functional and non-functional Requirements, Software Requirement Specification (SRS), Requirement Engineering process.	1	
	1.3	System context model, Interaction Model, Structural Model, Behavioral Model.	1	

2		**Software Design & Implementation**		
	2.1	Architectural Design, Architectural Patterns, Application Architecture.	2	**15**
	2.2	Object Oriented Design using UML, Design Patterns, Implementation Issues.	2	
3		**Software Testing**		
	3.1	Software testing fundamentals, Test Case Design, Validation and Verification	3	**15**
	3.2	White box Testing, Basic Path Testing, Control Structure Testing, Black box Testing	3	
	3.3	Unit testing, Integration Testing, Validation Testing, System testing and User Acceptance Testing	3	
4		**Tool support for testing**		
	4.1	Tool support for testing Automated Testing, Types of Test tool- Test management tools, Requirements management tools, Incident management tools, Configuration management tools	4	**15**
	4.2	Dynamic analysis tools, Monitoring tools, Manual testing, Goals of manual testing	4	
	4.3	Comparison of Manual testing and Automated testing , Familiarization of a test tool (Selenium IDE)	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
	MODE OF ASSESSMENT		
	A	**Continuous Comprehensive Assessment (CCA)**	
		Components	**Marks**
		Assignment/Seminar	

Assessment Types	**Theory**	Quiz/Viva voce	30
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	2 hrs	70

Textbooks for Reference:

1. Ian Sommervile, Software Engineering, Ninth Edition.
2. Roger S Pressman, Software Engineering A Practitioners Approach, McGraw-Hill Series, fifth edition.
3. Dorothy Graham, Erik Van Veenendaal, Isabel Evans, Rex Black, Foundations of Software Testing, Gaynor Redvers-Mutton, Third Edition.

CMS College Kottayam (Autonomous)

Programme						
Course Name	**Principles of Data Science**					
Type of Course	**MDC**					
Course Code	**CMSIT25134203**					
Course Level	**200-299**					
Course Summary	This course provides a foundational understanding of data science, its core concepts, and practical methodologies. It begins with an overview of data science terminology, classifications, and processes, including the Data Science Venn diagram, types of data, and the levels of data. Students will explore the structured approach to data science and learn about various algorithms and components that form the backbone of data-driven problem-solving. The course further delves into data processing and exploration, focusing on data preparation, modelling, and application. Emphasis is placed on understanding datasets, applying descriptive statistics, and visualizing data using diverse techniques aligned with the five Cs of effective visualization. Students gain exposure to data modelling and analytics, including key methodologies, the data analytics life cycle, and practical case studies. The course equips students with the skills to discover, prepare, plan, build, and operationalize data models for informed decision-making in real-world scenarios. Through a blend of theoretical understanding and applied techniques, this course lays a strong foundation for further study and professional work in the field of data science and analytics.						
Semester	**3**	**Credits**			**3**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	0	0	0	**45**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Discuss key concepts, types of data, and the fundamental structure of the data science process.	U	1,2,3
2	Apply techniques of data preparation and exploration using descriptive statistics for basic data analysis.	A	1,2,4
3	Demonstrate appropriate visualization techniques to explore and present data insights effectively.	A	1,2,4
4	Analyze the data analytics life cycle and apply suitable data science methodologies for model development.	A	1,2,3,5
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate I, Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to data science**		
	1.1	Definition, Basic terminology, Data science Venn diagram	1	**15**
	1.2	Types of data, Structured versus Unstructured data, Quantitative versus Qualitative data	1	
	1.3	The four levels of data, Five steps of data science, Data science process overview	1	
	1.4	Data science classification, Data science algorithms, Components of data science	1	
2		**Data process and Exploration**		**15**
	2.1	Introduction, Prior knowledge, Data preparation, modelling, Applications	2	
	2.2	Objectives of data exploration, datasets, descriptive statistics	2	

	2.3	Data visualization: Introduction, Types of data visualization, Various visualization techniques, the five Cs of data visualization	3	
3		**Data modelling and Analytics**		**15**
	3.1	Data science methodology, Analytics for data science, Data Analytics Examples	4	
	3.2	Data Analytics life cycle, Data discovery, Data preparation	4	
	3.3	Model planning, Model building, Operationalization	4	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50

Text Books for Reference:

1. Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare, Fundamentals of Data Science, 1st Edition, 2022
2. Daimi, Kevin, Ed. Hamid R. Arabnia, Principles of Data Science, Springer, 2020.
3. Vijay Kotu, Bala Deshpande, Data Science: Concepts and Practices, Morgan Kaufmann

Publishers, Second edition, 2019

4. D J Patil, Hilary Mason, Mike Loukides, Ethics and Data Science, O' Reilly, 1st edition, 2018
5. Sinan Ozdemir, Principles of Data Science, Packt Publishing, December 2016
6. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, Mining of Massive Datasets. V2.1, Cambridge University Press, 2014.
7. Cielen, Davy, Arno DB Meysman, Mohamed Ali, Introducing Data Science: Big Data, Machine Learning, and more, using Python Tools, Manning Publications Co., 2016

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Foundations of Web Design**					
Type of Course	**MPC**					
Course Code	**CMSIT25132201**					
Course Level	**200-299**					
Course Summary	This course introduces the fundamentals of web development using XHTML**,** CSS**,** and JavaScript**.** Students learn to create structured and semantically correct web pages using XHTML elements such as headings, links, images, lists, tables, and forms.The course also covers Cascading Style Sheets (CSS) to control the layout and appearance of web pages. Topics include different types of stylesheets, element positioning, backgrounds, the box model, and media types, helping students design visually appealing and responsive web pages. Through practical lab sessions, students apply these concepts to develop dynamic and user-friendly websites. The course builds a solid foundation for further learning in front-end web development.					
Semester	**3**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		

1	Explain the history, architecture, and key components of the Internet and World Wide Web, including search engines, FTP, and social media platforms.	U	1,2,10
2	Describe and differentiate various Web 2.0 technologies such as blogs, social networking, tagging, mashups, and widgets.	U	1,2,10
3	Design and develop structured web pages using XHTML elements such as text, links, images, tables, and forms, ensuring proper validation.	A	1,2,10
4	Apply CSS to enhance the style, layout, and interactivity of web pages, including the use of external style sheets and drop-down menus.	A	1,2,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	History of the Internet and World Wide Web, World Wide Web Consortium	1	**15**
	1.2	Web browsers, Connecting to the Internet, Searching the Internet, Keeping track of your favourite sites, File Transfer protocol	1	
	1.3	Content Networks, User-generated content, Blogging, Social networking, Social media, Tagging	2	
	1.4	Social bookmarking, Rich Internet Applications, Web Services, Mashups, Widgets and Gadgets, Location-based services	2	
2		**Introduction to XHTML**		
	2.1	Introduction, Editing XHTML, XHTML Example, XHTML validation service	3	

	2.2	Headings, Linking, Images	3	**15**
	2.3	Special characters and horizontal rules, Lists	3	
	2.4	Tables, Forms, Internal Linking, meta elements	3	
3		**Cascading Style Sheets**		
	3.1	Introduction, Inline styles, Embedded style sheets, Conflicting styles	4	
	3.2	Linking External Style Sheets, Positioning elements, Backgrounds	4	**15**
	3.3	Element Dimensions, Box model and Text flow, Media types	4	
	3.4	Building a CSS drop-down menu, User style sheets	4	
4		**Practical**		
	1	Create an HTML document giving details of your [Name, Age], [Address, Phone], and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.	3	
	2	Create a page to show different character formatting (B, I, U, SUB, SUP) tags and heading tags.	3	
	3	Create web pages using Anchor tag with its attributes for external links.	3	
	4	Create a web page with different sections and internal links using links and sectioning elements; when the user clicks on different links it should go to sections on the same page.	3	**30**
	5	Create a web page, showing ordered list of semesters and an unordered list of Diploma Programmes in your institution.	3	
	6	Design a registration form using HTML form elements and apply styles using embedded CSS.Style the input fields, labels, and buttons using CSS properties like background colour, font, padding, and border.	4	

	7	Create a table to show your class timetable. Specify font and border attributes using CSS.	4
	8	Write a program in HTML to design a Bio-Data and set style attributes in CSS using IDs and selectors.	4
	9	Design a web page with colour background and give gradient effects using CSS.	4
	10	Create a web page to show text and image special effects.	4
	11	Create a web page with four content sections (Picture, Table, List, and Hyperlink) styled and positioned using CSS. Use CSS to arrange the sections side-by-side or in a grid, applying borders, margins, and positioning techniques.	4
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35

			(Exam-30, Record-5)

Textbooks for Reference:

1. Internet & World Wide Web How to Program, 5/e, Paul Deitel, Harvey Deitel, Abbey Deitel
2. Andy Harris, "HTML5 and CSS3 All-in-one for Dummies", A Wiley Brand, Third Edition
3. Don Gosselin; Comprehensive Java Script; Web Warrior Series, Course Technologies Inc
4. https://books.goalkicker.com/HTML5Book/
5. Thomas A. Powell; Web Design: The Complete Reference (Second Edition); Tata McGraw Hill, 2002
6. David Flanagan; JavaScript The Definitive Guide; O'Reilly & Associates 1997

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**		
Course Name	**Design and Visualization with 3DS MAX**		
Type of Course	**MPC**		
Course Code	**CMSIT25132202**		
Course Level	**200-299**		
Course Summary	This course offers a comprehensive introduction to 3D modeling and visualization using Autodesk 3ds Max. It begins by familiarizing students with the user interface, coordinate systems, and scene navigation tools essential for effective operation within the software environment. Learners gain hands-on experience in creating and managing standard and extended primitive objects, laying the foundation for building complex 3D models. As the course progresses, students explore object management techniques and develop skills in applying materials, textures, lighting setups, and camera controls to enhance the realism and aesthetics of 3D scenes. They learn to simulate real-world lighting conditions, apply photometric lighting, and render scenes with visual depth using physical camera settings. These components are crucial for producing professional-quality visualizations used in architecture, animation, and game design. In the final module, learners delve into advanced modeling techniques using editable poly objects, modifiers, and splines. They also acquire external files and use utilities to refine their models. Practical sessions reinforce the theoretical concepts through exercises like morphing, extrusion, lofting, and terrain modeling. By the end of the course, students will have developed the practical expertise required to design, model, and render 3D environments with precision and creativity.		
Semester	**3**	**Credits**	**4**

Course Details	Learning Approach	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the 3ds Max interface, coordinate systems, navigation tools, and viewport management.	U	1,2,10
2	Apply skills to create, edit, and manage different 3D objects using standard and extended primitives.	A	1,2,10
3	Apply appropriate materials, lighting, and camera settings to enhance 3D visualizations.	A	1,3,10
4	Construct and modify complex 3D models using advanced tools like splines, modifiers, and poly objects.	A	1,2,4,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Navigating the 3ds Max Scene**		
	1.1	The 3ds Max Scene, Units Setup and Distance from the Origin Factor	1	**15**
	1.2	Scene Navigation, Viewports	1	
	1.3	Object Creation and Types of Objects	2	
	1.4	Object Management, Object Selection, Object Transforms	2	
2		**Materials, Lights and Cameras**		
	2.1	Material Editor, Material/Map Browser, Material Library	3	

	2.2	Types of Materials, Texture Mapping.	3	**15**
	2.3	Considerations on Reflectance and Transmittance, Photometric Lights, Cameras	3	
3		**Modeling**		
	3.1	Concept of Sub-object Level, 2D Splines	4	**15**
	3.2	Editable Poly Objects, Modifiers	4	
	3.3	Modeling Walls Using Splines, Acquiring Objects from External Files, Tools and Utilities.	4	
4		**Practical**		
	1	Creating & Editing Standard Primitive Objects	2	**30**
	2	Creating & Editing Extended Primitive Objects	2	
	3	Create a scene using rendering and twist	2	
	4	Convert 2D to 3D object using extrude	2	
	5	Convert 2D to 3D object using loft	2	
	6	Convert 2D to 3D object using terrain	2	
	7	Working with Architectural objects: Foliage, Railing, Wall	3	
	8	To Create Architectural Object: Doors, Stairs, Windows	3	
	9	Create a scene using lights	3	
	10	Set up physical camera settings	3	
	11	Morph a compound object	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

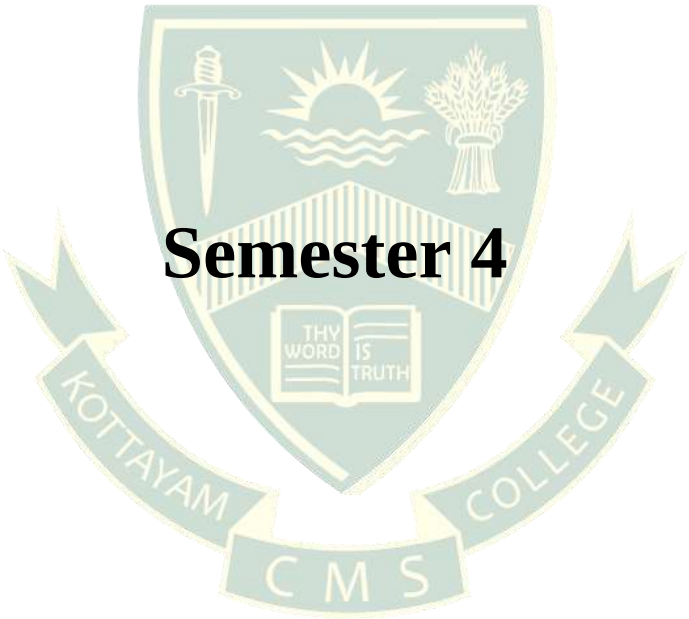
Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**	
	Lecture, Tutorial, Presentations, Programming sessions.	
	MODE OF ASSESSMENT	
	A	**Continuous Comprehensive Assessment (CCA)**

Assessment Types	**Theory**	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Autodesk® 3ds Max Design -The Designer's Handbook Notes from the course Architectural Design using Autodesk® 3ds Max Design
2. Prof. Sham Tickoo, Autodesk 3ds Max 2017: A Comprehensive Guide, BPB Publications
3. Kelly L. Murdock, 3ds Max 2014 Bible, John W
4. 3ds Max Quick Start Guide | Autodesk

Semester 4



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Semester 4

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25141210	Programming with Python	SDC	4	5	3	2	0
CMSIT25141211	Web Application Development with PHP	SDC	4	5	3	2	0
CMSIT25141212	Computer Networks	SDC	4	4	4	0	0
CMSIT25145201	Professional Competence and Life Skills for IT Industry	SEC	3	3	3	0	0
CMSIT25149201	Discrete Structures for Computer Science	VAC	3	3	3	0	0
CMSIT25142203	Creative Computing with Python	MPC	4	5	3	2	0
CMSIT25142204	Smart Web Design with PHP	MPC	4	5	3	2	0
CMSIT25140204	Summer Internship	INT	2	-	-	-	2

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Programming with Python**
Type of Course	**SDC**
Course Code	**CMSIT25141210**
Course Level	**200-299**
Course Summary	This course offers a comprehensive introduction to Python programming, aimed at developing both foundational and advanced programming skills. It begins with the creation and execution of Python programs, emphasizing key concepts such as data types, variables, operators, and string manipulation techniques. Students will gain proficiency in working with Python's built-in collection data types, including lists, tuples, sets, and dictionaries, and will develop the ability to process and analyze textual and numerical data effectively. The course advances to control flow mechanisms such as conditional statements and looping constructs, along with the creation of user-defined functions, including recursive and anonymous (lambda) functions. Robust software development practices are introduced through exception handling, modular programming with packages, and assertions. Object-oriented programming (OOP) concepts are explored through the design of custom classes, inheritance, method overloading, and encapsulation. Functional programming principles, debugging strategies, unit testing, and profiling tools are also covered to ensure efficient and maintainable code development. Students are introduced to applied programming topics such as network communication using TCP/IP, database interaction using SQL and DBM, regular expressions for data validation, and graphical user interface (GUI) development with Tkinter. These advanced topics prepare students to design interactive, data-driven, and real-world applications. Through structured lab exercises and practical

	assignments, the course ensures students acquire the necessary skills to solve complex problems and build scalable Python applications.					
Semester	**4**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Apply Python syntax, data types, string operations, and built-in collection types to perform basic data manipulation and program construction.	A	1,2,10
2	Develop structured Python programs using conditional statements, loops, exception handling, custom functions, and modular programming concepts.	A	1,2,10
3	Design and implement object-oriented programs in Python using custom classes, collection classes, recursion, and multiple inheritance.	A	1,2,3,10
4	Apply functional programming constructs and develop real-world applications using networking and database programming with Python.	A	1,2,4,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		

	1.1	Creating and Running Python Programs, Data types: Identifiers and keywords, Integral Types, Floating point Types	1	**15**
	1.2	Strings: Comparing strings, Slicing and Striding Strings, String operators and methods, String Formatting	1	
	1.3	Collection Data types-sequence types, Set types,	2	
	1.4	Mapping types- Dictionaries, Default Dictionaries, Ordered Dictionaries	2	
	1.5	Iterating collections, Copying collections	2	
2		**Control Structure And Functions**		**15**
	2.1	Conditional branching, Looping	3	
	2.2	Exception Handling: Catching and raising exceptions, Custom exceptions	3	
	2.3	Custom Functions, lambda functions, assertions	3	
	2.4	Modules and packages	3	
3		**Advanced Programming Techniques**		**15**
	3.1	Custom classes, Custom collection classes, Local and recursive functions	4	
	3.2	Multiple inheritance, Functional style programming	4	
	3.3	Networking: Creating TCP client, Creating TCP server	4	
	3.4	Database programming: DBM databases, SQL databases	4	
4		**Practical**		
	1	Perform different arithmetic operations on numbers in Python.	1	
	2	Swap two numbers without any arithmetic operator or temporary variable.	1	
	3	Check whether the given string is a palindrome.	1	

	4	Create a list and perform insert(), remove(), append(), len(), pop(), clear()	1	
	5	Move all duplicate values in a list to the end of the list.	2	
	6	Write a function that takes two lists and returns True if equal.	2	
	7	Input three numbers and display the sum and difference of largest and smallest.	2	
	8	Demonstrate try, except, and finally block.	2	
	9	Factorial of a number using recursion.	3	
	10	Class that accepts and prints a string.	3	**30**
	11	Account class with deposit, withdraw, and Customer subclass.	3	
	12	Student class with methods for display, setAge, setMarks.	3	
	13	Class for basic calculator operations.	3	
	14	Connect to a SQLite database and perform CRUD operations.	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	

	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Mark Summerfield-Programming in Python3 A Complete Introduction to Python Language, 2nd Edition, Addison-Wesle
2. Learning Python, Mark Lutz
3. Introduction to Computation and Programming Using Python, John Guttag (MIT Press)
4. Python for Everybody, Dr. Charles Severance, Available free: https://www.py4e.com/book

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Web Application Development with PHP**					
Type of Course	**SDC**					
Course Code	**CMSIT25141211**					
Course Level	**200-299**					
Course Summary	This PHP course begins by laying a strong foundation in PHP programming and MySQL database integration. Students are introduced to the PHP environment setup using XAMPP and learn the basics of PHP syntax, including variables, data types, operators, and control flow, and arrays. The course progresses into MySQL database operations, where students gain practical skills in creating, accessing, and manipulating databases using phpMyAdmin and PHP. They learn essential operations such as inserting, updating, displaying, and deleting data, as well as embedding HTML in PHP scripts and handling user inputs through GET and POST methods. In addition, students learn about web session and cookie management to maintain state and enhance user experience. The course concludes with an introduction to PHP frameworks, focusing on Laravel. Learners explore the MVC architecture, benefits of using frameworks, and how Laravel compares to other frameworks, preparing them for modern, scalable web application development.					
Semester	**4**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Set up and operate a local development environment through installation, configuration, and practical use.	A	1,2,10
2	Design and interact with MySQL databases	An	1,2,3,10
3	Develop modular and secure PHP applications	A	1,2,9,10
4	Understand the fundamentals of PHP frameworks	U	1,2,3,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to PHP**		
	1.1	Installing XAMPP on windows, Using Program editor and IDE.	1	**20**
	1.2	Introduction to PHP, Echo and Print, Comments, Variables, Data Types, Constants, Operators.	1	
	1.3	Control Flow-Decision making, Looping and Control Statements.	1	
	1.4	Arrays and Strings – Indexed Array, Associative Array, Multidimensional Array, Array Functions. String Functions.	1	
2		**Accessing MySQL using PHP**		**15**
	2.1	MySQL Basics, Data Types, Accessing MySQL using phpMyAdmin.	2	
	2.2	Connecting to MySQL database, Creating a Database, Selecting a Database, Creating Database Tables, and Inserting Data.	2	

	2.3	Displaying Data from MySQL Database, Updating Data, Deleting Data, Deleting a Database, Deleting Tables.	2	
	2.4	Embedding HTML in PHP, GET and POST method.	2	
3		**State Management and Introduction to Laravel Framework**		
	3.1	Using cookies in PHP, setting a cookie, Accessing a cookie, Destroying a cookie.	3	
	3.2	Session Management, Starting a Session, Ending a Session, Setting a Time-out.	3	**10**
	3.3	Introduction to PHP Frameworks (Laravel overview), Benefits of Using Frameworks, Introduction to Laravel. Features and Advantages, MVC Architecture in Laravel.	4	
	3.4	Laravel vs Other PHP Frameworks	4	
4		**Practical**		
	1	Write a PHP script to display "Hello World" message.	1	
	2	Write a PHP program to check if a number is even or odd using if-else.	1	
	3	Write a PHP program to find the largest of three numbers using conditional statements.	1	
	4	Write a PHP program to print numbers from 1 to 10 using for loop.	1	
	5	Write a PHP program to calculate the factorial of a given number using a while loop.	1	
	6	Write a PHP program to generate the Fibonacci series up to N terms.	1	
	7	Write a PHP function to calculate the sum of two numbers.	1	
	8	Write a PHP program to demonstrate indexed and associative arrays.	1	**30**
	9	Write a PHP program to sort an array in ascending order.	1	

	10	Write a PHP function to check if a string is palindrome or not.	1
	11	Write a PHP script to count the number of words in a string.	1
	12	Create a simple HTML form and display the entered data using PHP (GET method).	2
	13	Write a PHP script to connect to a MySQL database with phpmyadmin.	2
	14	Write a PHP script to insert, update, delete, and select records from a MySQL table.	2
	15	Write a PHP program to set, retrieve, and delete cookies.	3
	16	Write a PHP program to start a session and store user data in session variables.	3
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**

	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Robin Nixon, PHP, MySQL & JavaScript with JQUERY,CSS & HTML5, O,Reilly Microsoft Office Bible - John
2. Luke Welling, Laura Thomson, “PHP and MySQL Web Development”, 5th Edition
3. Matt Stauffer, “Lavarel: Up & Running”, 2nd Edition

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Computer Networks**					
Type of Course	**SDC**					
Course Code	**CMSIT25141212**					
Course Level	**200-299**					
Course Summary	This course provides a basic understanding of computer networks based on the OSI reference model. It explains how different types of networks like LAN, WAN, and the internet help computers communicate with each other. Students will learn about common network devices such as hubs, switches, and routers, as well as network topologies. The course covers the Physical and Data Link layers, focusing on how data is transmitted through cables or wireless signals, how errors are detected, and how multiple devices share the communication medium using technologies like Ethernet and Wi-Fi. In the higher layers, students will explore how data is addressed and routed across networks using IP addresses and routing techniques. The role of the Transport layer in ensuring correct and reliable data delivery through protocols like TCP and UDP is also discussed. Additionally, the course explains how data is prepared, formatted, and secured in the Session, Presentation, and Application layers, supporting services like web browsing, file transfer, and email. By the end of the course, students will understand how data travels through a network and how everyday internet services work.						
Semester	**4**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Discuss the fundamental concepts of computer networks and the OSI reference model.	U	1,2
2	Analyze the functionalities of the physical and data link layers in ensuring reliable data transmission.	An	1,2
3	Apply addressing and routing techniques used in network and transport layers for efficient data delivery.	A	2,3
4	Demonstrate the role of session, presentation, and application layers in enabling end-user network services.	U	4,9
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Overview of Computer Networks: Definitions, Goals, Advantages.	1	**12**
	1.2	Types of Networks: LAN, MAN, WAN, PAN, Network Topologies: Star, Bus, Ring, Mesh, Network Devices: Hub, Switch, Router, Bridge, Repeater, Gateway	1	
	1.3	OSI Reference Model: Concept, Importance, Functions of Each Layer, Protocols and Standards: ISO, IEEE, IETF, ITU, TCP/IP Model vs OSI Model	1	
2		**Physical and Data Link Layers**		
	2.1	Physical Layer: Functions and Services, Transmission Media: Guided media (Coaxial, Twisted Pair, Optical Fiber), Unguided Media (Radio, Microwave, Infrared).	2	

		Switching Techniques: Circuit, Packet, Message Switching.		**18**
	2.2	Data Link Layer: Framing, Error Detection & Correction Techniques (VRC, LRC, CRC, Checksum, Hamming Code), Line Discipline - ENQ/ACK, Poll/Select, Flow Control: Stop-and-Wait, Sliding Window, Error Control - STOP and WAIT ARQ, Sliding Window ARQ, Go - back - n ARQ, Select - Reject ARQ.	2	
	2.3	Medium Access Control: CSMA/CD, CSMA/CA, Token Ring, Ethernet, Wireless LAN (802.11)	2	
3		**Network and Transport Layers**		**15**
	3.1	Network Layer: Logical Addressing (IPv4, IPv6), Routing Algorithms: Distance Vector, Link State, Path Vector, Congestion Control, Subnetting and Super netting.	3	
	3.2	Transport Layer: Process-to-Process Delivery, Multiplexing and Demultiplexing, Connection-oriented and Connectionless Services, TCP vs UDP.	3	
4		**Session, Presentation, and Application Layers**		**15**
	4.1	Session Layer: Functions and Protocols, Session Management and Authentication.	4	
	4.2	Presentation Layer: Data Encoding, Encryption, Compression.	4	
	4.3	Application Layer: Functions and Services, Application Protocols: HTTP, FTP, SMTP, DNS, DHCP, TELNET, SNMP, Client-Server Architecture.	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**
	Lecture, Tutorial, Presentations.

<table>
<tr><td rowspan="8">Assessment Types</td><td colspan="3">MODE OF ASSESSMENT</td></tr>
<tr><td>A</td><td colspan="2">Continuous Comprehensive Assessment (CCA)</td></tr>
<tr><td rowspan="4">Theory</td><td>Components</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">30</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>2 hrs</td><td>70</td></tr>
</table>

Textbooks for Reference:

1. B. A. Forouzan, Data communication and Networking (fourth edition)
2. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson Education, 2013.
3. William Stallings, "Data and Computer Communications", 10th Edition, Pearson Education, 2013.

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Professional Competence and Life Skills for IT Industry**
Type of Course	**SEC**
Course Code	**CMSIT25145201**
Course Level	**200-299**
Course Summary	This course aims to equip students with essential life skills and enhance their personal and professional development. It focuses on personality traits, goal setting, emotional intelligence, communication, and leadership. Students will learn to manage their time, attitude, and self-image while building strong interpersonal and teamwork skills. The course also prepares students for employment through resume writing, interview techniques, and workplace etiquette. Through practical activities and reflective learning, students will develop the confidence, awareness, and abilities necessary to thrive in diverse academic and career settings.

Semester	**4**	**Credits**			3	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	0	0	0	**45**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the significance of etiquette, goal setting, attitude, and time management in shaping personality.	U	1,2,10

2	Apply interpersonal, leadership, and teamwork skills in real-life and simulated professional contexts..	A	3,5,10
3	Analyse emotional intelligence, multiple intelligence, and social consciousness to strengthen personal insight.	An	1,6,710
4	Create professional tools like resumes and participate effectively in group discussions and interviews.	C	2,4,5,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Life Skills and Personality Development**		
	1.1	Etiquette in Tech workplace, Goal Settings (SMART Goals)	1	**15**
	1.2	Interpersonal Skills, Team work and Collaboration in Software Development	1	
	1.3	Positive Attitude, Image Management	1	
	1.4	Leadership Skills, Public Speaking	1	
2		**Soft Skills**		
	2.1	Soft Skills in the Digital Workplace	2	
	2.2	Attitude, Time Management in Project Deadlines	2	**15**
	2.3	Emotional Intelligence, Multiple Intelligence	2	
	2.4	Social Consciousness	2	
3		**Employability Skills**		
	3.1	Employability Skills	3	
	3.2	4 p's (Plan- Prepare- Practice- Present)	3	**15**
	3.3	Preparing for IT Employment (Resume-GD, Interview)	4	
	3.4	Workplace Etiquette in IT and Corporate Environments	3	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

<table>
<tr><td rowspan="2">Teaching and Learning Approach</td><td colspan="3">Classroom Procedure (Mode of transaction)</td></tr>
<tr><td colspan="3">Lecture, Tutorial, Presentations.</td></tr>
<tr><td rowspan="8">Assessment Types</td><td colspan="3">MODE OF ASSESSMENT</td></tr>
<tr><td>A</td><td colspan="2">Continuous Comprehensive Assessment (CCA)</td></tr>
<tr><td rowspan="4">Theory</td><td>Components</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">25</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>1.5 hrs</td><td>50</td></tr>
</table>

Textbook for Reference:

1. Business Communications, KK Sinha , Galgotia Publications, New Delhi
2. Business Correspondence & Report Writing , RC Sharma & Krishnan Mohan, Tata McGraw Hill Publications , New Delhi
3. Soft Skills and Employability Skills , Sabina Pillai and Agna Fernadez , Cambridge Press
4. Life Skills and Personality Development , Cambridge University Press

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Discrete Structures for Computer Science**					
Type of Course	**VAC**					
Course Code	**CMSIT25149201**					
Course Level	**200-299**					
Course Summary	This course introduces foundational concepts in discrete mathematics essential for computer science and related disciplines. It begins with the study of basic mathematical structures such as sets, set operations, functions, sequences, and summations. The course then explores Boolean algebra, including Boolean functions and their representations, as well as practical applications using logic gates. A significant portion of the course is dedicated to graph theory—covering graph models, terminology, types of graphs, graph representation, isomorphism, and key concepts like connectivity, Euler paths, and Hamiltonian paths. These topics lay the groundwork for logical reasoning, algorithm design, and network analysis.					
Semester	**4**	**Credits**			**3**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	0	0	0	**45**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		

1	Apply the fundamental concepts of sets, set operations, functions, sequences, and summations in solving mathematical problems.	A	1,2,10
2	Analyze and represent Boolean algebra expressions and Boolean functions; apply logic gates to model and simplify logical operations.	An	1,2,3
3	Construct and interpret truth tables and logic diagrams for various Boolean expressions and logical circuits.	A	2,4
4	Describe graph terminology, identify special types of graphs, and determine graph isomorphism and representations.	U	1,2
5	Analyze graph connectivity and evaluate the existence of Euler and Hamiltonian paths in various types of graphs.	An	1,2, 6
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Basic Structures**		
	1.1	Sets	1	**15**
	1.2	Set operations	1	
	1.3	Functions	1	
	1.4	Sequences and Summations	1	
2		**Boolean Algebra**		**15**
	2.1	Boolean functions	2	
	2.2	Representing boolean functions, Boolean algebra laws	2	
	2.3	Logic gates	3	
3		**Graphs**		**15**
	3.1	Graphs and graph models	4	
	3.2	Graph terminology and special type of graphs	4	
	3.3	Representing graphs, Graph isomorphism	4	

	3.4	Connectivity, Euler and Hamiltonian paths	5	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50

Textbooks for Reference:

1. Kenneth H Rosen; Discrete Mathematics and its applications; 6th Edition; Tata McGraw-Hill Publishing Company Limited
2. Frank Ayres Jr: Matrices, Schaums Outline Series, TMH Edition

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Creative Computing with Python**					
Type of Course	**MPC**					
Course Code	**CMSIT25142203**					
Course Level	**200-299**					
Course Summary	This course provides a foundational introduction to Python programming. It covers essential concepts such as variables, data types, operators, control structures, strings, lists, tuples, and dictionaries. Students learn to write simple programs using conditional and looping statements, perform operations on various collections, and apply built-in functions and methods. The course also introduces user-defined functions, lambda expressions, exception handling, and modular programming using Python modules and packages. Through practical lab exercises, learners develop problem-solving skills and gain hands-on experience in writing clear, functional, and reusable Python code.					
Semester	**4**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		

1	Understand the basic concepts and features of Python programming, including syntax, keywords, variables, data types, and operators, and apply them to write and debug simple programs.	U	1,2,10
2	Apply control structures and collection types such as strings and lists to develop efficient Python programs using appropriate logic and data manipulation techniques.	A	1,2,10
3	Analyze and use advanced Python data structures like tuples and dictionaries, and implement exception handling mechanisms to build robust programs.	An	1,2,4, 10
4	Develop modular and error-resilient Python programs by effectively implementing user-defined functions, handling exceptions, and organizing code using modules and packages.	C	2,4,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Introduction to Python, Features of Python, Working with Python, Execution modes	1	**15**
	1.2	Python keywords, Identifiers , Variables, Comments, Object concept	1	
	1.3	Data types: Number, Sequence, Set, None, Mapping	1	
	1.4	Operators: Arithmetic operators, Relational operators, Assignment operators, Logical operators, Identity operators, Membership operators	1	
	1.5	Expressions: Precedence of operators, Statement, Input and Output, Type conversion: Explicit conversion, Implicit conversion, Debugging	1	
2		**Python Control Structures and Collections**		

	2.1	Flow of execution: Sequential statements, Selection/Conditional statements, Looping constructs	2	**15**
	2.2	Strings: String operations, String slicing, Built-in string methods	2	
	2.3	Lists: List comprehension, List slicing, Built-in list functions and methods, Copying lists	2	
3		**Advanced Data Structures and Exception Handling**		**15**
	3.1	Tuples: Iterating through a tuple, Tuple slicing	3	
	3.2	Dictionary: Iterating through a dictionary, Updating dictionary elements, built-in dictionary functions	3	
	3.3	Exception Handling: Catching and raising exceptions, Custom exceptions	3	
	3.4	Custom functions, Assertions, Modules and packages	4	
4		**Practical**		
	1	Write a program to print your name, age, and course using variables.	1	
	2	Write a Python program to perform all arithmetic operations on two numbers.	1	
	3	Create a list of 5 fruits and print each one using indexing.	1	
	4	Create a set of unique colors and try adding a duplicate item. Observe the result.	1	
	5	Write a Python program to check whether a number is positive, negative, or zero.	2	
	6	Print the first 10 natural numbers using a loop.	2	
	7	Write a program to input a string and count the number of vowels.	2	
	8	Create a list of 5 integers and print the square of each using list comprehension.	2	
	9	Demonstrate list slicing by printing the first 3 and last 3 elements of a list.	2	

	10	Create a list and perform these operations: append an item, remove an item, sort the list, and display the result.	2	**30**
	11	Write a program to print the first 3 and last 3 elements of a tuple.	3	
	12	Create a dictionary with 3 key-value pairs (e.g., student name and marks). Print all keys and values.	3	
	13	Use a defaultdict to store the number of times each word appears in a list.	3	
	14	Create a list of numbers and a tuple of letters. Use a loop to print items from both collections.	3	
	15	Write a program to divide two numbers and handle the case where the denominator is zero using try-except.	3	
	16	Create a program that raises a custom exception when the user enters a negative number.	3	
	17	Create a module with a function that returns the area of a rectangle. Import and use it in another file.	4	
	18	Write a package with two modules: one for arithmetic operations and another for string operations. Import and use them.	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
		Lab Involvement	15

	Practical	Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Mark Summerfield-Programming in Python3 A Complete Introduction to Python Language, 2nd edition, Addison-Wesle
2. Learning Python, Mark Lutz
3. Introduction to Computation and Programming Using Python, John Guttag (MIT Press)
4. Python for Everybody, Dr. Charles Severance, Available free: https://www.py4e.com/book

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Smart Web Design with PHP**
Type of Course	**MPC**
Course Code	**CMSIT25142204**
Course Level	**200-299**
Course Summary	This PHP course begins by laying a strong foundation in PHP programming and MySQL database integration. Students are introduced to the PHP environment setup using XAMPP and learn the basics of PHP syntax, including variables, data types, operators, control flow, and arrays. The course progresses into MySQL database operations, where students gain practical skills in creating, accessing, and manipulating databases using phpMyAdmin and PHP. They learn essential operations such as inserting, updating, displaying, and deleting data, as well as embedding HTML in PHP scripts and handling user inputs through GET and POST methods. Building on the fundamentals, the course then introduces object-oriented programming in PHP. Advanced features like encapsulation, polymorphism, and abstract classes are also explored. In addition, students learn about web session and cookie management to maintain state and enhance user experience. The course concludes with an introduction to PHP frameworks, focusing on Laravel. Learners explore the MVC architecture, benefits of using frameworks, and how Laravel compares to other frameworks, preparing them for modern, scalable web application development.

Semester	**4**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**

Pre-requisites, if any	NIL

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Set up and operate a local development environment through installation, configuration, and practical use.	A	1,2,10
2	Design and interact with MySQL databases	An	1,2,3,10
3	Develop modular and secure PHP applications	A	1,2,9,10
4	Understand the fundamentals of PHP frameworks	U	1,2,3,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to PHP**		
	1.1	Installing XAMPP on windows, Using Program editor and IDE.	1	**15**
	1.2	Introduction to PHP, Echo and Print, Comments, Variables, Data Types, Constants, Operators.	1	
	1.3	Control Flow-Decision making, Looping and Control Statements.	1	
	1.4	Arrays – Indexed Array, Associative Array, Multidimensional Array, Array Functions.	1	
2		**Accessing MySQL using PHP**		
	2.1	MySQL Basics, Data Types, Accessing MySQL using phpMyAdmin.	2	

	2.2	Connecting to MySQL database, Creating a Database, Selecting a Database, Creating Database Tables, Inserting Data.	2	**15**
	2.3	Displaying Data from MySQL Database, Updating Data, Deleting Data, Deleting a Database, Deleting Tables.	2	
	2.4	Embedding HTML in PHP, GET and POST method.	3	
3		**Web Application Project and Advanced Concepts**		**15**
	3.1	Introduction to PHP Frameworks (Laravel overview), Benefits of Using Frameworks.	4	
	3.2	Introduction to Laravel. Features and Advantages.	4	
	3.3	Laravel vs Other PHP Frameworks	4	
4		**Practical**		**30**
	1	Write a PHP script to display "Hello World" message.	1	
	2	Write a PHP program to check if a number is even or odd using if-else.	1	
	3	Write a PHP program to find the largest of three numbers using conditional statements.	1	
	4	Write a PHP program to print numbers from 1 to 10 using for loop.	1	
	5	Write a PHP program to calculate the factorial of a given number using a while loop.	1	
	6	Write a PHP program to generate the Fibonacci series up to N terms.	1	
	7	Write a PHP function to calculate the sum of two numbers.	1	
	8	Write a PHP program to demonstrate indexed and associative arrays.	1	
	9	Write a PHP program to sort an array in ascending order.	1	

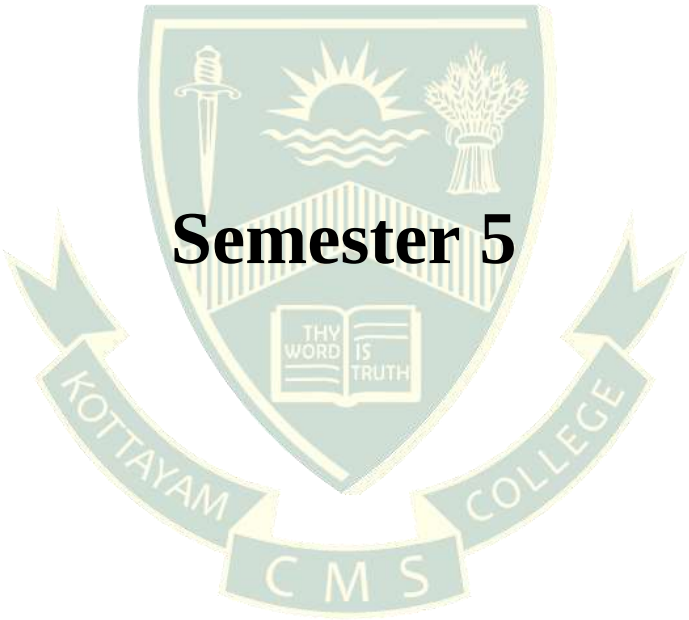
	10	Write a PHP script to connect to a MySQL database using phpmyadmin	2	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Robin Nixon, PHP, MySQL & JavaScript with JQUERY,CSS & HTML5, O,Reilly Microsoft Office Bible - John
2. Luke Welling, Laura Thomson, “PHP and MySQL Web Development”, 5th Edition
3. Matt Stauffer, “Lavarel: Up & Running”, 2nd Edition

Semester 5



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Semester 5

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution/ week		
					L	P	O
CMSIT25151313	Mobile Application Development with Flutter	SDC	4	5	3	2	0
CMSIT25153301	Data Analytics with R	SDE*	4	5	3	2	0
CMSIT25153302	Embedded Systems and IOT		4	5	3	2	0
CMSIT25151314	Operating Systems	SDC	4	4	4	0	0
CMSIT25155302	Artificial Intelligence	SEC	3	4	2	2	0
CMSIT25159302	Virtual and Augmented Reality	VAC	3	3	3	0	0
CMSIT25152305	Digital Marketing	MPC	4	4	4	0	0
CMSIT25152306	Fundamentals of Cloud Computing	MPC	4	4	4	0	0

*** Opt any one from SDE**

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Mobile Application Development with Flutter**
Type of Course	**SDC**
Course Code	**CMSIT25151313**
Course Level	**300-399**
Course Summary	This course introduces the fundamentals of Flutter, covering its features, advantages, disadvantages, and installation on both Windows and Mac OS platforms. It explains the process of creating simple mobile applications using Flutter and the architecture of Flutter applications. The course also covers basic Flutter concepts such as widgets, gestures, state management, and layering. Students will learn Dart programming including variables, data types, decision-making structures, loops, functions, and object-oriented concepts. Layout design using single and multiple child widgets, along with advanced layout applications, is also covered. Topics such as gesture handling, state management methods like ephemeral and scoped models, navigation, routing, and file management including file handling operations are introduced to build fully functional Flutter applications.

Semester	**5**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:

	Upon the successful completion of the course, the student will be able to		
1	Understand the features, advantages, disadvantages, and installation process of Flutter and its architecture.	U	1,2,3
2	Apply basic Dart programming concepts such as variables, data types, control structures, functions, and object-oriented programming in Flutter applications.	A	1,2,3
3	Design user interfaces using Flutter widgets, layout structures, and advanced layout techniques.	A	1,2,3
4	Implement gesture detection and state management techniques in Flutter applications.	A	1,2,3
5	Implement file management operations such as file creation, opening, reading, writing, and closing in Flutter.	A	1,2,3
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to Flutter**		
	1.1	Features of Flutter- Advantages of Flutter- Disadvantages of Flutter.	1	**15**
	1.2	Flutter Installation-Installation in Windows- Installation in Mac OS	1	
	1.3	Creating Simple Application in Flutter - Architecture of Flutter Applications	1	
2		**Flutter Basics**		**15**
	2.1	Widgets- Gestures- Concept of State- Layers	2	
	2.2	Introduction to Dart Programming-Variables and Data types	3	
	2.3	Decision Making and Loops. Functions	3	

	2.4	Object Oriented Programming. Introduction to Widgets- Widget Build Visualization	3	
3		**Introduction to Layouts**		**15**
	3.1	Type of Layout Widgets- Single Child Widgets- Multiple Child Widgets, Advanced Layout Application	5	
	3.2	Introduction to Gestures- Statement Management in Flutter. Ephemeral State Management-Application State	5	
	3.3	Scoped model- Navigation and Routing	5	
	3.4	File Management: Defining, opening and closing a file, Input/output operations on files	5	
4		**Practical**		**30**
	1	Install Flutter SDK on Windows or Mac and configure it with Android Studio.	1	
	2	Create a new Flutter project in Android Studio. Run the default "Hello World" app on an emulator or physical device to verify the setup.	1	
	3	Develop a simple Flutter app that displays "Welcome to Flutter" text in the center of the screen using a Text Widget.	3	
	4	Create a Flutter app with a Column widget containing at least three Text widgets and two Buttons.	3	
	5	Develop a Flutter app that changes the background color of the screen when a button is pressed using setState() for Ephemeral State Management.	4	
	6	Build a Counter Application that increments a number every time a button is clicked using Stateful Widget.	4	
	7	Create an app where a LongPress or DoubleTap, Gesture changes the color of a Container Widget.	4	
	8	Write a Dart program to check whether a given number is even or odd.	2	
	9	Write a Dart program using a loop to print the first 10 natural numbers.	2	

	10	Design a Flutter app using ListView that displays a list of five fruits.	3	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. "Beginning Flutter: A Hands-On Guide to App Development".Marco L. Napoli, Wiley
2. "Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2", Alessandro Biessek, Packt Publishing
3. "Programming Dart: Develop fast, powerful, and modern web apps using Dart", Ivo Balbaert, Packt Publishing

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Data Analytics with R**
Type of Course	**SDE**
Course Code	**CMSIT25153301**
Course Level	**300-399**
Course Summary	This course is designed to equip students with essential knowledge and practical skills in statistical computing and data analysis using the R programming language. Students begin by understanding the fundamental programming constructs in R such as control structures, data types, functions, and data frames. Emphasis is placed on the principles of writing clean, efficient, and reproducible code using data pipelines and manipulation techniques with packages like dplyr. As the course progresses, learners delve into advanced programming features in R, including working with vectors, function operations, and building custom R packages using tools like R oxygen. These concepts are integral for students who wish to automate tasks and develop modular, reusable code in real-world data analysis workflows. In the final stages, students apply their acquired skills to perform real data analysis tasks such as exploratory data analysis, statistical tests and simple linear regression. A significant portion of the course is devoted to hands-on lab sessions where students solve practical problems using R, enhancing their analytical and interpretative capabilities. By the end of the course, students will be well-versed in leveraging R for data-driven decision-making in a wide range of professional contexts.

Semester	**5**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**

Pre-requisites, if any	

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Demonstrate an understanding of fundamental R programming concepts such as variables, functions, control structures, and data frames.	U	1,2,3,8,10
2	Apply R programming skills to manipulate, tidy, and analyze datasets using data pipelines and data manipulation packages such as dplyr.	A	1,2,3,8,10
3	Analyze datasets using statistical methods like correlation, covariance, t-tests, ANOVA, and regression models to interpret data relationships.	An	1,2,3,8,10
4	Design and develop R programs to solve real-life data analysis problems and create user-defined functions and packages for customized applications.	C	1,2,3,5,8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to R Programming**		
	1.1	Basic Interaction with R, Using R as a Calculator, functions, Control Structures, factors, data frames	1	**15**
	1.2	Using R as a Calculator, functions, Control Structures, factors, data frames	1	
	1.3	Data pipelines, coding and naming conventions.	2	

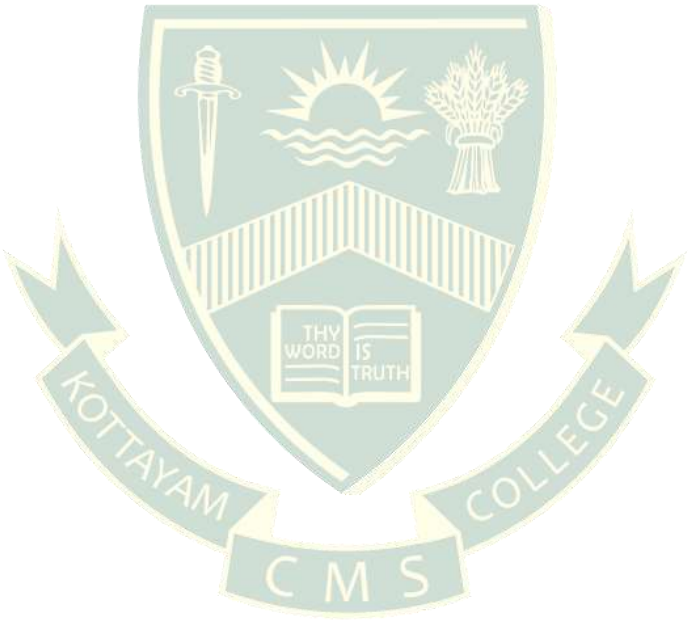
	1.4	Data Manipulation: Reading Data, Manipulating and tidying Data with deplorer	2	
2		**Advanced R Programming**		
	2.1	Working with Vectors and Vectorizing Functions	2	**20**
	2.2	Advanced Functions, Functional Programming.	2	
	2.3	Function Operations: Functions as Input and Output, Building an R Package	2	
	2.4	Creating an R Package, R oxygen	2	
3		**Data analysis using R**		
	3.1	Exploratory data analysis using R functions –sqrt, range, sort, minimum, maximum, median, average, standard deviation, skewness, variance.	3	**10**
	3.2	Correlation and covariance between Power tests- Bivariate Analysis Paired sample t-test, t-test to compare means-one mean and two means	3	
	3.3	One factor ANOVA comparing means across several groups, 2 way ANOVA. Simple linear regression.	4	
4		**Practical**		
	1	Find roots of a quadratic equation using the R program.	1	**30**
	2	Calculate simple interest by creating function in R program	1	
	3	Copy spreadsheet data to clipboard and from clipboard transfer to table. Sort the data in ascending order; find average and standard deviation. [Hint dat <- ead.table("clipboard", header=TRUE)].	1	
	4	A table contains expenditure and profit of a company. Conduct Pearson correlation test using R to find the correlation of expenditure on profit. Display data using line graph using ggplot()	3	
	5	A shopkeeper has data on the sales per day of one month. He introduced a new scheme in the next month. He wants		

		to check whether there are any significant differences in average sales of the current month and the previous month. Display boxplot for both the data and interpret the result [Hint create suitable dataset using rnorm() and conduct 2 Sample t-test].	3	
	6	Crop yield and quantity of fertilizer used in an agricultural field is given. Conduct one-way ANOVA test to check whether the quantity of fertilizer used has any impact on the crop yield. Interpret the result.	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Thomas Mailund, Beginning Data Science in R, Data Analysis, Visualization, and Modelling for the Data Scientist, APress
2. Keen, K. J. Graphics for statistics and data analysis with R. CRC Press, 2010.
3. Tony Fischetti, Data Analysis with R. 4. Joseph Schmuller, Statistical Analysis with R for dummies



CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Embedded Systems and IOT**					
Type of Course	**SDE**					
Course Code	**CMSIT25153302**					
Course Level	**300-399**					
Course Summary	This course offers a comprehensive introduction to Embedded Systems and the Internet of Things (IoT). It begins with an exploration of embedded systems, covering their definitions, characteristics, challenges, and classifications. Students will gain insights into the differences between microprocessors and microcontrollers, the architectural building blocks of embedded systems, and processor types such as CISC and RISC. The key components like Direct Memory Access (DMA), cache memory, System on Chip (SoC), and development tools for embedded systems are also examined to build a solid foundation in system design. The second half of the course delves into the principles and architecture of IoT. It explains the physical and logical design layers of IoT, including protocols, functional blocks, and communication models. Students will explore various levels of IoT deployment, IoT design methodology, and gain hands-on experience with devices like the Raspberry Pi and Python programming. The course concludes with real-world applications of IoT across sectors like smart homes, agriculture, healthcare, logistics, and environment, culminating in the development of a simple IoT project that integrates theoretical knowledge with practical implementation.					
Semester	**5**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**

Pre-requisites, if any	NIL

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamental concepts, characteristics, and components of embedded systems.	U	1,2,10
2	Understand the basic principles, architecture, and communication models of the Internet of Things (IoT).	U	1,2,3
3	Analyze IoT development methodologies and the use of IoT devices like Raspberry Pi.	An	1,2,3,10
4	Identify and explain major application areas of IoT	U	3,6,7

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction To Embedded System**		
	1.1	Embedded Systems: Definitions, Characteristics, Challenges in designing Embedded System, Categorization of Embedded System, Applications of Embedded System.	1	**15**
	1.2	Microprocessor Vs Microcontroller, Functional building blocks of Embedded System, CISC Vs RISC processor, DMA, Cache memory and its types.	1	
	1.3	System on Chip, Tools for Embedded System	1	
2		**Internet of Things**		
	2.1	Definition and characteristics of IOT.	2	

	2.2	Physical Design of IOT- Things in IOT, IOT Protocols.	2	**15**
	2.3	Logical Design of IOT- IOT functional blocks, IOT communication model, IOT communication API	2	
3		**Pillars Of Embedded IOT And Physical Devices**		**15**
	3.1	IOT Levels and Deployment Templates, IOT Design Methodology	3	
	3.2	IOT Devices- Raspberry Pi, Programming Raspberry Pi with Python.	3	
	3.3	IOT Applications - Home Automation, Cities, Environment, Logistics, Agriculture And Health Care	4	
4		**Practical**		**30**
	1	Introduction to Raspberry Pi	3	
	2	Raspberry pi 4	3	
	3	Raspberry pi 4 GPIO Pins	3	
	4	Raspberry pi OS Installation	3	
	5	Connecting Raspberry pi 4 to laptop	3	
	6	LED Blinking Using Python	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
	MODE OF ASSESSMENT		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	

Assessment Types		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. DP Kothari- "Embedded Systems"
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, ISBN: 0: 0996025510, 13: 978-0996025515

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Operating Systems**					
Type of Course	**SDC**					
Course Code	**CMSIT25151314**					
Course Level	**300-399**					
Course Summary	This course introduces the foundational concepts, design principles, and functionalities of modern operating systems. It begins with the structure and operations of operating systems, followed by an in-depth study of process management**,** including process scheduling and interprocess communication. Students explore various CPU scheduling algorithms, their performance criteria, and applications in multiprocessor systems. The course addresses process synchronization using semaphores, mutex locks, and monitors, along with solutions to classic problems like the Dining Philosophers. Deadlock handling techniques—prevention, avoidance, detection, and recovery—are examined within multiprogramming environments. The course also covers memory management strategies such as paging, segmentation, and virtual memory systems. In the final module, students learn about storage management, including disk scheduling, file system structures, directory organization, and file allocation techniques. By the end of the course, learners will be equipped to understand, analyze, and apply key operating system concepts in both academic and practical contexts.					
Semester	**5**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Describe the fundamental concepts, structure, and functionalities of operating systems.	U	1,10
2	Describe the process management activities including process scheduling, operations, and interprocess communication.	U	1,2
3	Apply appropriate CPU scheduling algorithms and evaluate their performance based on scheduling criteria.	A	1,2,10
4	Analyze and implement solutions to classic process synchronization problems using semaphores and monitors.	An	1,2
5	Evaluate deadlock prevention, avoidance, detection, and recovery techniques within a multiprogramming environment.	E	1,2,8
6	Compare and contrast various memory management techniques including paging, segmentation, and virtual memory systems.	An	1,2
7	Illustrate disk scheduling algorithms and demonstrate the structure and implementation of file systems.	U	1,2,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Operating System: Definition, Operating System Structure, Operating System Operations	1	

	1.2	Processes: Process concept, Process scheduling, Operations on processes, Interprocess communication	2	**15**
	1.3	CPU Scheduling: Basic Concepts, Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling	3	
2		**Process Coordination**		**15**
	2.1	Process synchronization: Background, Critical section problem, Mutex locks, Semaphores	4	
	2.2	Classic problems of synchronization, Monitors: Monitor usage.	4	
	2.3	Deadlocks: System Model, Deadlock Characterization, Methods for handling Deadlocks	5	
	2.4	Deadlock Prevention, Deadlock Avoidance: Bankers Algorithm, Deadlock Detection, Recovery from Deadlock	5	
3		**Memory Management**		**15**
	3.1	Main memory: Background, Swapping, Contiguous memory allocation	6	
	3.2	Segmentation, Paging	6	
	3.3	Virtual memory: Demand paging, Page replacement algorithms	6	
4		**Storage Management**		**15**
	4.1	Disk scheduling, File system interface: File concept, Access methods	7	
	4.2	Directory and disk structure: Directory overview, Schemes for defining logical directory structure	7	
	4.3	File-system implementation: File-system structure, Directory implementation, Allocation methods, Free space management	7	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

<table>
<tr><td rowspan="2">Teaching and Learning Approach</td><td colspan="3">Classroom Procedure (Mode of transaction)</td></tr>
<tr><td colspan="3">Lecture, Tutorial, Presentations.</td></tr>
<tr><td rowspan="7">Assessment Types</td><td colspan="3">MODE OF ASSESSMENT</td></tr>
<tr><td>A</td><td colspan="2">Continuous Comprehensive Assessment (CCA)</td></tr>
<tr><td rowspan="3">Theory</td><td>Components</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">30</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>2 hrs</td><td>70</td></tr>
</table>

Textbooks for Reference:

1. Operating System Principles, Seventh Edition, Abraham Silberschatz, Peter Galvin and Greg Gagne, John Wiley
2. Operating Systems- By William Stallings
3. Operating Systems- By Milan Kovic (TMH)

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Artificial Intelligence**					
Type of Course	**SEC**					
Course Code	**CMSIT25155302**					
Course Level	**300-399**					
Course Summary	This course introduce students to the foundational principles, algorithms, and real-world applications of AI and machine learning. It starts by exploring the different types of machine learning systems—including supervised, unsupervised, and reinforcement learning—while addressing key challenges in building effective ML models. Students will gain hands-on understanding of how to evaluate performance, set up ML workspaces, and conduct regression analyses using both linear and polynomial approaches. Building on this, the course delves deeper into regression and classification techniques such as logistic regression, perceptron learning, SVM (with both linear and kernel-based methods), decision trees, and k-nearest neighbors. Students will also be introduced to model selection strategies and learn to implement and interpret results using Python-based tools like Scikit-Learn. In the advanced stages, the focus shifts to deep learning architectures. Learners will explore multilayer perceptrons (MLPs), backpropagation learning, and key neural network models such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs). Complementing the theoretical foundation, the practical component of the course equips students with the skills to implement, train, and test various models using real and synthetic datasets, preparing them for careers in AI-driven technologies.						
Semester	**5**	**Credits**			**3**	
		Lecture	Practical	OJT	Others	Total Hours

Course Details	Learning Approach	2	1	0	0	60
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the basic concepts, types, challenges, and performance evaluation measures of Machine Learning systems.	U	1,2,10
2	Apply data preprocessing techniques and develop regression and classification models such as Linear Regression, Logistic Regression, SVM, Decision Trees, and KNN.	A	1,2,4,10
3	Analyze the performance of various machine learning models using appropriate evaluation metrics, model selection strategies, and learning curves.	An	1,2,4,9,10
4	Demonstrate understanding of Neural Networks and Deep Learning architectures like MLP, CNN, and RNN, along with training processes such as Backpropagation.	U	1,2,3,9,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Machine Learning, Types of machine learning systems, Main challenges of machine learning	1	**15**
	1.2	Performance Measure, Creating the workspace, Study on data,	1	
	1.3	Linear Regression, Gradient Descent	2	

	1.4	Polynomial Regression, Learning Curves	2	
2		**Regression**		**15**
	2.1	Logistic Regression and the Perceptron, Cross – entropy loss, Multi – class classification	2	
	2.2	Linear and Non Linear SVM Classification	2	
	2.3	Kernel Tricks, Decision Trees	2	
	2.4	KNN and model selection, Introduction to Neural Networks, Activation functions	3	
	2.5	Architectures of Deep Learning- Multilayer perceptron, Back propagation Learning, CNN architectures, RNN architectures	4	
3		**Practical**		**30**
	1	Familiarize with Scikit Learn	4	
	2	Familiarize with SVM classification	4	
	3	Familiarize with SVM Kernel tricks	4	
	4	Familiarize with Decision Trees	4	
	5	Familiarize with KNN architecture	4	
	6	Familiarize with Feed forward networks	4	
	7	Familiarize with CNN architecture	4	
	8	Familiarize with RNN architecture	4	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**	
	Lecture, Tutorial, Presentations.	
	MODE OF ASSESSMENT	
	A	**Continuous Comprehensive Assessment (CCA)**

<table>
<tr><td rowspan="8">Assessment Types</td><td rowspan="3">Theory</td><td>Components</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">15</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">Practical</td><td>Lab Involvement</td><td rowspan="2">15</td></tr>
<tr><td>Viva</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>1 hr</td><td>35</td></tr>
<tr><td>Practical</td><td>2 hrs</td><td>35
(Exam-30, Record-5)</td></tr>
</table>

Textbooks for Reference:

1. Géron, Aurélien. Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow" O'Reilly Media, Inc.", 2022.
2. Watt, Jeremy, Reza Borhani, and Aggelos K. Katsaggelos. Machine learning refined: Foundations, algorithms, and applications. Cambridge University Press, 2020.
3. Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020.
4. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2016.
5. Michael Nielsen, Neural Networks and Deep Learning
6. Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, the MIT Press, 2012.

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Virtual and Augmented Reality**					
Type of Course	**VAC**					
Course Code	**CMSIT25159302**					
Course Level	**300-399**					
Course Summary	This course introduces the fundamentals of Virtual Reality (VR) and Augmented Reality (AR), their components, technologies, and applications. It begins with an overview of VR concepts, headsets, major companies, and the 3 I's of VR (Immersion, Interaction, and Imagination), along with the hardware and software components like input/output devices, modeling, and human factors. The AR module covers the basics of AR, its history, key companies, and related fields. Students learn about AR display models, sound integration, tracking technologies, and mobile AR systems, emphasizing how digital content is layered onto the real world. In the final module, students explore tools for AR/VR creation, including SDKs, game engines, and 3D modeling. Practical examples like AR projects, mixed reality applications, and the use of extended reality in marketing, healthcare, education, and other industries are discussed. By the end, learners gain the skills to understand, design, and apply AR and VR technologies across various domains.					
Semester	**5**	**Credits**			**3**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	0	0	0	**45**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamental concepts of Virtual Reality, its components, devices, and applications in real-world scenarios.	U	1
2	Discuss the components and examples of Augmented Reality systems, differentiate them from Virtual Reality, and identify their application areas.	U	1,2
3	Apply knowledge to identify and evaluate different AR/VR hardware and software tools such as SDKs, game engines, and modeling tools.	A	3
4	Analyze the use of AR, VR, and MR in various domains such as entertainment, education, marketing, healthcare, and industry.	An	1,2,3
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Virtual Reality**		
	1.1	Introduction, Virtual Reality, VR Headsets 2, VR companies.	1	**15**
	1.2	3 Is in VR , Commercial VR technology	1	
	1.3	Classic components of VR system, Input Devices, Output Devices, Modeling, Human Factors	1	
2		**Augmented Reality**		**15**
	2.1	Introduction, Augmented Reality, AR Companies	2	
	2.2	Brief history, Examples of AR, Related Fields of AR, Adding sound, Multimodal display, Visual Perception	2	

	2.3	Spatial Display Model, Visual Display, Tracking of AR, Mobile AR	2	
3		**Creation & Applications of AR and VR**		**15**
	3.1	SDK and Games Engine, Selecting, D Modeling	3	
	3.2	AR Project Example, Extended Reality in Marketing	4	
	3.3	Application of AR and VR in different industries	4	
	3.4	Mixed reality	4	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50

Textbooks for Reference:

1. Laura Hakanson ,Virtual And Augmented Reality in Marketing
2. Georgy C Burdea&PhillippeCoiffet, John Weily Virtual Reality Technology 2nd Edition
3. Dieter,Tobias, Principles and practices Augmented Reality

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Digital Marketing**
Type of Course	**MPC**
Course Code	**CMSIT25152305**
Course Level	**300-399**
Course Summary	This course provides a comprehensive introduction to the dynamic world of digital marketing, equipping learners with the essential knowledge and practical skills needed to navigate and leverage online platforms effectively. Beginning with foundational concepts the course lays the groundwork for understanding how digital ecosystems function. Students will learn how to craft effective digital marketing strategies through key concepts in market research and online research methodologies. The course then explores various types of online marketing and introduces analytical tools and techniques, including on-site and off-site web analytics, to assess web traffic and user behaviour using popular metrics and platforms like Google Analytics. A detailed study of Search Engine Marketing follows, covering both paid advertising strategies and Search Engine Optimization elements such as content writing, code optimization, and link-building. Learners will understand how to set up and manage SEM strategies for targeted digital visibility. The module on Email Marketing enable students to plan and execute professional email strategies. The course concludes with an in-depth look at Affiliate Marketing, including its business models, roles of merchants and affiliates, strategic approaches, affiliate networks, and tools used in this performance-based marketing channel. By the end of the course, students will have gained the ability to develop integrated digital marketing strategies using modern tools, interpret web metrics, and apply ethical and effective marketing practices across various digital platforms

Semester	5	Credits			4	
Course Details	Learning Approach	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Define the fundamental concepts of digital marketing, including digital audiences, segmentation, measurability, and the TCEO model.	U	1,10
2	Develop a basic digital marketing strategy using key concepts in market research and online research methodologies.	C	2,3,10
3	Discuss various types of online marketing and analyze web traffic using on-site and off-site web analytics tools and common web metrics.	U	1,2,4
4	Apply Search Engine Marketing techniques and set up an effective SEM plan.	A	2,3,5
5	Design and implement email marketing campaigns by utilizing different email types, segmentation practices, and deliverability strategies.	A	2,4,9
6	Demonstrate an understanding of affiliate marketing by identifying key stakeholders, compensation models, and strategies used by merchants and affiliates.	U	1,6,7
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Digital marketing, Crowd sourcing, Digital audiences, Segmenting and customizing messages, Measurability, The TCEO model	1	**15**
	1.2	Crafting a digital marketing strategy, Key concepts in market research, Online research methodologies	2	
	1.3	Online marketing: Types of online marketing, Web analytics: Off-site web analytics, On-site web analytics, Reasons for using web analytics	3	
	1.4	Methods for measuring web traffic: Eight common metrics of website analysis, ATOS, Internal search, Visitor path, Using logfiles, Page tagging, Determining geographical location, Click analytics, Google Analytics	3	
2		**Search Engine Marketing**		**15**
	2.1	Search Engine Marketing: Definition, Categories, Paid methods: PPC, CPM, Ad formats	4	
	2.2	Search Engine Optimization elements: On-page SEO, SEO content writing, Code optimization, Inbound links	4	
	2.3	Three types of SEO, Setting up SEM strategy	4	
3		**Email Marketing**		**15**
	3.1	Email marketing, Starting with email marketing. Types of emails: one-to-many email, one-to-one email	5	
	3.2	Mailing list: Definition, Best practices, List segmentation, Growing a mailing list.	5	
	3.3	Email deliverability, Spam, Spam filters, Email marketing metrics	5	
4		**Affiliate Marketing**		
	4.1	Affiliate marketing: Definition, Benefits of affiliate marketing	6	

	4.2	Merchant, Affiliate, Affiliate marketing compensation models	6	**15**
	4.3	Affiliate Marketing Strategies for Merchants, Affiliate Marketing Strategies for Affiliates	6	
	4.4	Affiliate network (Definition only), Affiliate software (Definition only) Self-hosted software, Hosted software	6	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	30
		Quiz/Viva voce	
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	2 hrs	70

Text Books for Reference

1. Online Marketing Fundamentals – e-Marketing Institute www.emarketinginstitute.org
2. E-mail Marketing Fundamentals – e-Marketing Institute - www.emarketinginstitute.org
3. Affiliate Marketing Fundamentals – e-Marketing Institute - www.emarketinginstitute.org
4. e-Marketing Essential Guide to marketing in a digital world 5th Edition By Rob Stokes and the Minds of Quirk

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Fundamentals of Cloud Computing**					
Type of Course	**MPC**					
Course Code	**CMSIT25152306**					
Course Level	**300-399**					
Course Summary	This course provides a comprehensive introduction to cloud computing concepts, architecture, and services. It begins with the definition, evolution, characteristics, advantages, and challenges of cloud computing, offering a strong conceptual foundation. The second module covers virtualization, the key technology behind cloud computing. It explores the types, implementation levels, virtualization structures, and tools, along with how virtualization applies to CPU, memory, and I/O devices. The cloud architecture module introduces the layered cloud design, different service models—Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS)—and various deployment models, including public, private, community, and hybrid clouds. The final module focuses on major cloud platforms in the industry, such as Amazon Web Services (AWS), Google App Engine, and Microsoft Azure, and examines their applications in scientific, business, and consumer domains. By the end of this course, learners will understand the core concepts of cloud computing, virtualization technologies, cloud architecture, and how cloud platforms are used in real-world applications.						
Semester	**5**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Describe Cloud Computing fundamentals, including characteristics and on-demand provisioning.	U	1,2,3,10
2	Analyze Virtualization: Types, Implementation Levels, Structures, Tools, and Mechanisms.	An	1,2,3,10
3	Describe Cloud Architecture, NIST reference, and various service models.	U	1,2,3,10
4	Analyze different cloud service providers and cloud applications	An	1,2,3,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to Cloud Computing**		
	1.1	Introduction to Cloud Computing, Definition of Cloud, Evolution of Cloud Computing	1	**15**
	1.2	Cloud Characteristics, Advantages and Challenges	1	
2		**Virtualization**		
	2.1	Basics of Virtualization, Types of Virtualization	2	**15**
	2.2	Implementation Levels of Virtualization, Virtualization Structures	2	
	2.3	Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices	2	
3		**Cloud Architecture**		
	3.1	Layered Cloud Architecture Design, Cloud services	3	

	3.2	Software as a Service (SaaS), Platform as a Service(PaaS), Infrastructure as a Service(IaaS)	3	**15**
	3.3	Cloud deployment models- public private, community, hybrid	3	
4		**Cloud Platforms in Industry**		**15**
	4.1	Amazon Web Services, Google AppEngine	4	
	4.2	Microsoft Azure, Cloud Applications: Scientific Applications	4	
	4.3	Business and Consumer Applications	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

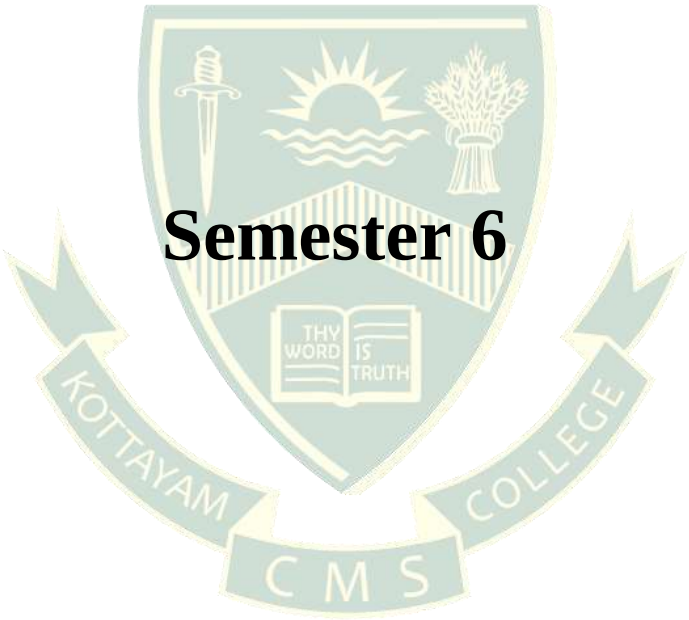
Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	30
		Quiz/Viva voce	
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	2 hrs	70

Text Books for Reference:

1. Toby Velte, Anthony Velte, Robert Elsenpeter(2009). "Cloud Computing -A Practical Approach".Tata Mcgraw Hill.
2. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)", O'Reilly, 2009

3. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
4. Rittinghouse, JohnW., and James F. Ransome, “Cloud Computing: Implementation, Management and Security”, CRC Press, 2017.
5. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, “Mastering Cloud Computing”, Tata Mcgraw Hill, 2013.

Semester 6



ESTD:1817

Semester 6

Course Code	Title of the Course	Type of the Course	Credit	Hours / Week	Hour Distribution/ week		
					L	P	O
CMSIT25161315	Data Science with Python	SDC	4	5	3	2	0
CMSIT25163303	Data Visualization	SDE*	4	5	3	2	0
CMSIT25163304	Building Applications with MongoDB		4	5	3	2	0
CMSIT25165303	Generative AI	SEC	3	3	3	0	0
CMSIT25169303	BigData Analytics	VAC	3	3	3	0	0
CMSIT25162307	Cyber Security	MPC	4	4	4	0	0
CMSIT25162308	Computer Networking	MPC	4	4	4	0	0
CMSIT25160305	Project	PRJ	4	8	0	8	0

*** Opt any one from SDE**

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Data Science with Python**
Type of Course	**SDC**
Course Code	**CMSIT25161315**
Course Level	**300-399**
Course Summary	This course provides a comprehensive introduction to the fundamental principles and practical applications of data science using Python. Students will explore the evolution, roles, and lifecycle of data science, including real-world applications and tools used in the field. The course covers essential data handling skills such as identifying data types, sources, and collection methods, followed by hands-on data preprocessing tasks like cleaning, transformation, and reduction. Learners will gain a deep understanding of Exploratory Data Analysis (EDA), including univariate, bivariate, and multivariate techniques, and the use of Python libraries such as NumPy, pandas, matplotlib, and seaborn. The course also introduces basic statistical concepts and model building, including simple and multiple linear regression. Students will evaluate models using common metrics like MAE, MSE, RMSE, and confusion matrices, along with techniques such as K-fold and stratified cross-validation. Through lectures, hands-on labs, and real-world case studies, students will develop both the theoretical foundation and the practical programming skills required for introductory-level data science projects, preparing them for more advanced analytics and machine learning courses.

Semester	**6**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**

Pre-requisites, if any	NIL

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the need, evolution, and roles in Data Science along with tools and security concerns.	U	1,2,10
2	Apply basic statistical techniques to summarize and interpret data.	A	1,3,10
3	Apply techniques for data preprocessing including cleaning, integration, transformation, reduction, and discretization.	A	2,4,10
4	Analyze data using exploratory techniques including univariate, bivariate, and multivariate analysis with specialized EDA tools.	An	3,4,10
5	Develop and evaluate machine learning models using linear regression and assess them using model evaluation metrics and cross-validation techniques.	A	3,5,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to Data Science**		
	1.1	Need of data Science, Evolution of Data Science, Data Science Roles	1	**14**
	1.2	Data Science Life Cycle, Applications of Data Science in various fields	1	
	1.3	Prerequisites & Tools for Data Science, Data Security Issues	1	

2		**Introduction to Data**		
	2.1	Types of data, Sources of data	2	
	2.2	Data Collection methods, Basic Statistical Descriptions of Data	2	**15**
	2.3	Data Pre-Processing Overview: Data Cleaning	3	
	2.4	Data Integration and Transformation, Data Reduction, Data Discretization.	3	
3		**Exploratory Data Analytics**		
	3.1	Importance of EDA, Types of EDA, Univariate Analysis, Bivariate Analysis, Multivariate Analysis	4	
	3.2	Specialized EDA Techniques, Steps for performing EDA, Tools for Performing EDA, Steps in Data Science Modelling	4	**16**
	3.3	Model Evaluation and Metrics in Data Science - Common Evaluation Metrics: Confusion matrix	4	
	3.4	Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE)	4	
4		**Practical**		
	1	Load and explore datasets (e.g., Iris, Titanic). Identify and classify types of data (categorical, numerical).	3	
	2	Web scraping or API data collection (e.g., weather, Twitter).	3	
	3	Perform data cleaning using pandas: handle missing values, outliers.	3	
	4	Apply data integration, transformation (normalization), and reduction (PCA).	3	
	5	Discretize continuous variables using binning.	3	
	6	Perform Univariate Analysis (histograms, boxplots)	4	**30**
	7	Conduct Bivariate Analysis (scatter plots, correlation matrix).	4	
	8	Multivariate Analysis using pair plots and heatmaps.	4	

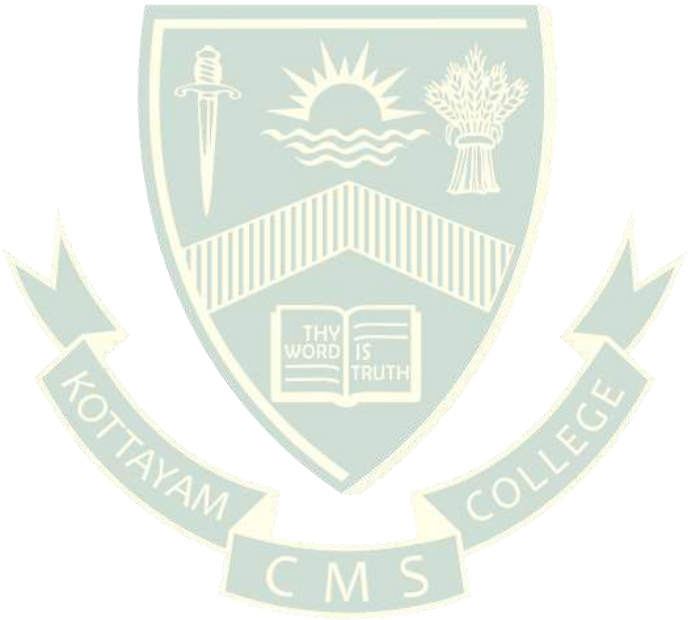
	9	Complete an EDA project on a real-world dataset (e.g., housing, COVID-19, sales data).	4	
	10	Implement Simple Linear Regression on a dataset (e.g., predicting house prices).	5	
	11	Evaluate models using MAE, MSE, RMSE	5	
	12	Build and evaluate confusion matrix for a classification task (e.g., Titanic survival).	5	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	Practical	Lab Involvement	15
		Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”, PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt, “Doing Data Science”, O'Reilly, 2015.

3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global
5. Tilman M. Davies “ The Book of R” 2016, No Starch Press
6. T. M. Mitchell, “Machine Learning”, McGraw Hill, 2017



CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Data Visualization**					
Type of Course	**SDE**					
Course Code	**CMSIT25163303**					
Course Level	**300-399**					
Course Summary	This course introduces students to the core principles and tools used in data visualization**,** with a strong emphasis on creating interactive and meaningful visual representations of data. Students will learn the significance of visual storytelling in the context of different types of data analytics—descriptive, diagnostic, predictive, and prescriptive—and how effective visualization aids decision-making across domains. The course offers hands-on exposure to industry-standard visualization tools including Tableau and Microsoft Power BI**.** Learners will gain practical skills in preparing data, creating various chart types, and building interactive dashboards that provide dynamic insights into data. By the end of the course, students will be able to independently design and implement rich visualizations using Tableau and Power BI, tailor dashboards for specific business needs, and communicate insights clearly and efficiently to stakeholders. The practical component ensures students become proficient in both the tools and the underlying principles of effective visual communication.					
Semester	**6**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	1	0	0	**75**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamentals of data visualization, types of data analytics, and features of visualization tools.	U	1,3,4
2	Demonstrate the ability to use Tableau for creating various charts, heat maps, and interactive dashboards.	A	1,2,3,4,5
3	Apply Power BI to clean data, create visualizations, and build interactive dashboards for business insights.	A	1,2,3,4,5
4	Analyze and compare the features and functions of different data visualization tools to select appropriate tools.	An	1,2,3,4
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to Data Visualization**		
	1.1	Benefits of Data Visualization Tools-Kinds of Data Analytics – Descriptive, Diagnostic, Predictive and Data Mining.	1,4	**15**
	1.2	Data Visualization Tools - Google Data Studio, Qlikview, Tableau, Power BI.	1,4	
	1.3	Features- Common features of Data Visualization Tool, Salient features of popular data visualization tools.	1,4	
2		**Tableau - An Interactive Analytics platform**		

	2.1	Tableau Product Suite. How to connect to a data source using Tableau interface. Tableau interface and basic terminologies.	2	**20**
	2.2	Create – Time series chart, Bullet chart, Area chart, Symbol map, Score cards.	2	
	2.3	Heat Map – Introduction, Uses of Heat Map, Procedure to create heat map in Tableau.	2	
	2.4	Building interactive dashboards using Tableau.	2	
3		**Power BI - Unleash the power of business analytics**		**10**
	3.1	Introduction to Power BI, Preparing data with Power BI.	3	
	3.2	Data visualization using Power BI- Creating simple visualization, Map Visualization, Combination Charts.	3	
	3.3	Dashboard in Power BI - creating, sharing, Tiles in Dashboard.	3	
4		**Practical**		**30**
	1	Create a Time Series Chart in Tableau	2	
	2	Design a Symbol Map in Tableau	2	
	3	Build an Interactive Dashboard in Tableau	2	
	4	Prepare and Clean Data in Power BI	3	
	5	Create a Combination Chart in Power BI	3	
	6	Develop a Power BI Dashboard with Tiles	3	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**	
	Lecture, Tutorial, Presentations, Programming sessions.	
	MODE OF ASSESSMENT	
	A	**Continuous Comprehensive Assessment (CCA)**

<table>
<tr><td rowspan="8">Assessment Types</td><td rowspan="3">Theory</td><td>Componen
ts</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">25</td></tr>
<tr><td>Quiz/Viva voce</td></tr>
<tr><td>Written Test</td></tr>
<tr><td rowspan="2">Practical</td><td>Lab Involvement</td><td rowspan="2">15</td></tr>
<tr><td>Viva</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>1.5 hrs</td><td>50</td></tr>
<tr><td>Practical</td><td>2 hrs</td><td>35
(Exam-30, Record-5)</td></tr>
</table>

Textbook for Reference:

1. Dr. S. Karpagavalli, “Introduction to Data Visualization Tools”, Blue Hill Publishers, 2020.
2. https://www.tutorialspoint.com/tableau/index.htm
3. https://www.tutorialspoint.com/power_bi/power_bi_visualization_options.ht m
4. Alexander Loth, “Visual Analytics with Tableau”, Wiley, 2019.
5. Alberto Ferrari and Marco Russo, “Introducing Microsoft Power BI”, Microsoft Press, 2016.

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Building Applications with MongoDB**
Type of Course	**SDE**
Course Code	**CMSIT25163304**
Course Level	**300-399**
Course Summary	This course offers a comprehensive introduction to the world of NoSQL databases, with a strong focus on MongoDB**,** the most prominent document-oriented NoSQL database in use today. The course begins by establishing a foundational understanding of the limitations of traditional Relational Database Management Systems in the era of big data, real-time analytics, and high scalability requirements. It introduces learners to the key concepts, features, and types of NoSQL databases—such as Key-Value stores, Column-Family stores, Document databases, and Graph databases—while emphasizing their real-world applications and trade-offs. A significant portion of the course is dedicated to hands-on experience with MongoDB**,** enabling students to acquire practical skills in data modeling**,** querying**,** indexing**,** aggregation**,** and system configuration**.** Students will work with Mongo Shell to perform CRUD operations and build efficient data models using collections, embedded documents, and references. Advanced topics like indexing techniques and the Aggregation Framework using $match, $group, $sort, and $unwind pipelines are thoroughly covered to help learners build high-performance analytical queries. Learners will also gain skills in deploying MongoDB instances and managing system configurations using configuration files.

Semester	**6**	**Credits**			**4**	
		Lecture	Practical	OJT	Others	Total Hours

Course Details	Learning Approach	3	1	0	0	75
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the need for NoSQL databases and differentiate them from RDBMS in terms of scalability, flexibility, and performance. Describe MongoDB architecture and setup, including components like replica sets and sharding.	U	1,2,10
2	Design document-based data models using collections, embedded documents, and references in MongoDB.	A	1,2,3,5
3	Construct and refine queries using operators and modifiers to retrieve and manipulate data in MongoDB.	A	2,4,10
4	Apply indexing techniques in MongoDB to enhance performance. Use MongoDB's Aggregation Framework with pipeline stages like $match, $group, and $sort to perform analytical queries.	A	2,4,5
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to NoSQL Databases**		
	1.1	Introduction to NoSQL Databases, NoSQL features, Different types of NoSQL databases	1	**15**
	1.2	Introduction to MongoDB, Data modelling in MongoDB, Advantages of MongoDB over RDBMS	1	
	1.3	Mongo Shell, Configuration file in MongoDB	1	

2		**Documents and collections**		
	2.1	JSON File format for storing documents, Introduction to Documents, Collections	2	**20**
	2.2	Database Commands in Mongodb, Inserting and Saving Documents	2	
	2.3	Inserting multiple documents, Updating Documents, Removing Documents, Document Replacement	2	
3		**Indexing**		
	3.1	Indexing in MongoDB, Single index	4	**10**
	3.2	Finding index, Multikey index	4	
	3.3	Aggregation Framework	4	
4		**Practical**		
	1	Creating database employee, Create collections emp_personal_details with emp_id,emp_name, emp_address, emp_DOB, emp_age, emp_mobile_number, Create another collection emp_professional_details with emp_id, emp_name, designation, salary, incentive, working hours	2	
	2	Insert 10 records in collection emp_personal_details and emp_professional_details, Show all the employees having designation manager, Show all the employees having salary 6000	2	
	3	Create index on emp_id in collection emp_professional_details, Create multiple index on emp_id,emp_name in collection emp_professonal details Find the sum of digits of an integer	2	
	4	Update the collection emp_personal_details , add field status and set it to retired where age is greater than 60 , Update collection emp_professional_details, give incentive 5000 to employees whose working hours is greater than 45 per week, Add 1000 to salary employee whose designation is accountant.	3	**30**

	5	Increase the bonus by 2000 in emp_professional_details for employees in the Sales department who worked more than 50 hours	3	
	6	Replace the entire document in emp_personal_details where emp_id = 1001 with a new document having updated address and contact info	3	
	7	Remove the field temporary_address from all documents in emp_personal_details. Delete documents from emp_professional_details where resigned = true	3	
	8	Set work_mode = "Hybrid" in emp_professional_details for all employees in the IT and HR departments	3	
	9	Find sum of salaries of employee having designation clerk, Filter the employees having designation software engineer and find the minimum salary.	4	
	10	Use unwind command and show the employees whose mobile number is stored in array, Use skip command to skip first 3 records and display rest of records, Use limit command to show only first four records of collection	4	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations, Programming sessions.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
		Lab Involvement	15

	Practical	Viva	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	1.5 hrs	50
	Practical	2 hrs	35 (Exam-30, Record-5)

Textbooks for Reference:

1. "MongoDB: The Definitive Guide" by Kristina Chodorow.
2. "The Little MongoDB Book" by Karl Seguin.
3. MongoDB Manual on website MongoDB.com

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Generative AI**
Type of Course	**SEC**
Course Code	**CMSIT25165303**
Course Level	**300-399**
Course Summary	The Generative AI course offers a comprehensive introduction to the foundational concepts, architectures, and applications of generative models in artificial intelligence. It begins by distinguishing between generative and discriminative models and explores key probabilistic models such as Gaussian Mixture Models (GMM) and Hidden Markov Models (HMM), before diving into more advanced neural approaches like Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs). The course emphasizes both theoretical understanding and practical implementation. Learners will explore the architecture, training techniques, and variants of GANs including DCGAN, WGAN, and conditional GANs, along with methods to address challenges like mode collapse. For VAEs, the course delves into encoder-decoder design, variational inference, reparameterization, and applications in image generation and semi-supervised learning. Additionally, the course stresses the ethical implications of generative AI, including bias, fairness, and responsible use. By the end of the course, students will have a strong grasp of how generative models are built, trained, evaluated, and responsibly applied in real-world AI systems.

Semester	**6**	**Credits**			**3**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		3	0	0	0	**45**

Pre-requisites, if any	NIL

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamental concepts of generative models, their types, and their role in Artificial Intelligence including ethical considerations and responsible use.	U	1,2,3,10
2	Apply knowledge of Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs) to design and develop generative models for real-world applications.	A	1,2,3,10
3	Analyze different architectures and variants of GANs and VAEs, and evaluate their performance, stability issues, and training techniques.	An	1,2,3,10
4	Explore the practical applications of generative models such as image generation, style transfer, super-resolution, and latent space manipulation.	A	1,2,3,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Overview of Generative Models, Introduction to generative models and their role in artificial intelligence. Understanding the difference between generative and discriminative models	1	

	1.2	Types of Generative Models, Probabilistic models: Gaussian Mixture Models (GMM), Hidden Markov Models (HMM).Variational Autoencoders (VAEs) and their applications.	2	**15**
	1.3	Applications, Ethical Considerations and Privacy concerns related to generative models. Understanding bias and fairness in generative AI. Responsible use of generative models in various domains.	2	
2		**GAN Architecture**		**15**
	2.1	Core concepts of GANs: generator, discriminator, adversarial training. Historical development and key milestones in GAN research.	2	
	2.2	Architectures and Variants of GANs, DCGAN, WGAN, and other variants. Conditional GANs and their applications.	3	
	2.3	Training and Stability Issues: Techniques for stable GAN training. Dealing with mode collapse and other common issues.	3	
	2.4	Applications of GANs: Image-to-image translation using GANs. Super-resolution and style transfer.	3	
3		**Introduction to VAEs**		**15**
	3.1	Understanding the encoder-decoder architecture. The role of variational inference in VAEs.	4	
	3.2	Training VAEs: The reparameterization trick and backpropagation. Comparing VAEs to traditional autoencoders.	4	
	3.3	Applications of VAEs: Image generation and reconstruction. Latent space exploration and manipulation. VAEs in semi-supervised learning.	4	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

<table>
<tr><td rowspan="2">Teaching and Learning Approach</td><td colspan="3">Classroom Procedure (Mode of transaction)</td></tr>
<tr><td colspan="3">Lecture, Tutorial, Presentations.</td></tr>
<tr><td rowspan="8">Assessment Types</td><td colspan="3">MODE OF ASSESSMENT</td></tr>
<tr><td>A</td><td colspan="2">Continuous Comprehensive Assessment (CCA)</td></tr>
<tr><td rowspan="3">Theory</td><td>Components</td><td>Marks</td></tr>
<tr><td>Assignment/Seminar</td><td rowspan="3">25</td></tr>
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<tr><td>Written Test</td></tr>
<tr><td rowspan="2">B</td><td colspan="2">End Semester Examination (ESE)</td></tr>
<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>1.5 hrs</td><td>50</td></tr>
</table>

Textbooks for Reference:

1. Ian Goodfellow, Yoshua Bengio, and Aaron Courville (2016) . Deep Learning". MIT Press
2. David Foster (2019)."Generative Deep Learning". O'Reilly Media
3. Rajalingappaa Shanmugamani, "Hands-On Generative Adversarial Networks with Keras"
4. Jakub Langr and Vladimir Bok, Generative Adversarial Networks(GANs):"GANs in Action".
5. Kailash Ahirwar, Generative Adversarial Networks: Building Intelligent Applications

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**BigData Analytics**
Type of Course	**VAC**
Course Code	**CMSIT25169303**
Course Level	**300-399**
Course Summary	This course introduces learners to the dynamic and rapidly evolving field of big data and its critical role in modern data-driven decision-making. It provides a comprehensive understanding of the Big Data ecosystem, emphasizing the need, challenges, and opportunities associated with analyzing vast and complex datasets. Learners will explore the foundational concepts, including the stages of the data analytics lifecycle—from data discovery and preparation to model building, evaluation, and operationalization. The course equips students with practical knowledge of key analytics techniques. Topics such as clustering (e.g., K-means) and association rule mining (e.g., Apriori algorithm) are covered to help uncover hidden patterns within data. In addition, students gain exposure to classification methods like Decision Trees and Naïve Bayes and regression techniques including Linear and Logistic Regression, enabling them to build, evaluate, and interpret predictive models. Through lectures and interactive sessions, this course fosters analytical thinking and hands-on application of modern data science methodologies. It prepares students for roles in data analysis, business intelligence, and machine learning, while also cultivating their skills to address real-world problems using advanced analytical tools and techniques.

Semester	**6**	**Credits**			**3**	
		Lecture	Practical	OJT	Others	Total Hours

Course Details	**Learning Approach**	3	0	0	0	**45**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamentals of Big Data, its ecosystem, and the stages of the Data Analytics Lifecycle.	U	1,2
2	Apply clustering techniques and association rule mining to uncover hidden patterns in large datasets.	A	3,4
3	Implement classification models such as Decision Trees and Naïve Bayes in data-driven applications.	A	4,5
4	Demonstrate the ability to build and interpret regression models (Linear and Logistic) for predictive analytics.	A	5,6

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction**		
	1.1	Big Data Overview, State of the Practice in Analytics, Key Roles for the New Big Data Ecosystem	1	**15**
	1.2	Data Analytics Lifecycle Overview	1	
	1.3	Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, operationalize.	1	
2		**Clustering and Association Rules**		
	2.1	Overview of Clustering	2	
	2.2	K-means	2	

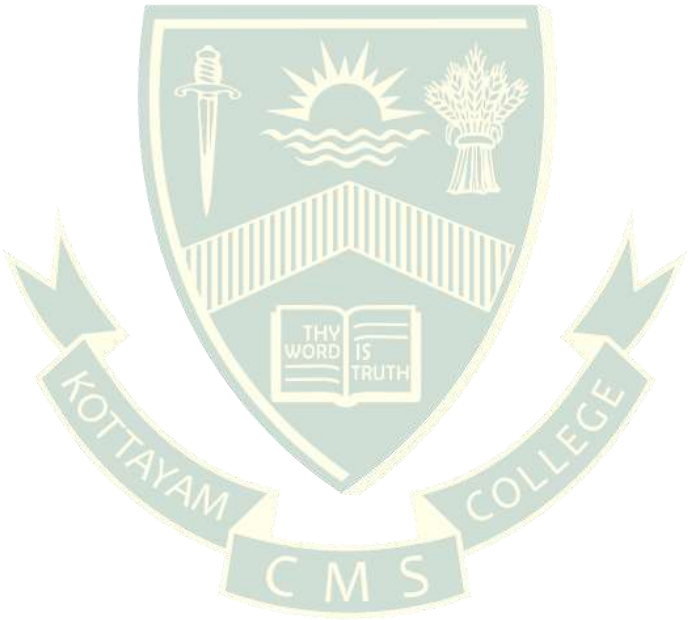
	2.3	Overview of association rule	2	
	2.4	Apriori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules	2	**15**
3		**Classification And Regression**		
	3.1	Decision Trees, Overview of a Decision Tree, The General Algorithm, Decision Tree Algorithms,	3	
	3.2	Naïve Bayes, Bayes' Theorem, Naïve Bayes Classifier, Smoothing	3	**15**
	3.3	Linear Regression, Use Cases, Model Description	4	
	3.4	Logistic Regression, Use Cases, Model Description	4	
4	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**		
	Lecture, Tutorial, Presentations.		
Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
	Theory	**Components**	**Marks**
		Assignment/Seminar	25
		Quiz/Viva voce	
		Written Test	
	B	**End Semester Examination (ESE)**	
		Duration	**Marks**
	Theory	2 hrs	50

Textbooks for Reference:

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Simon Walkowiak, "Big Data Analytics with R", PackT Publishers, 2016

3. Bart Baesens, “Analytics in a Big Data World: The Essential Guide to Data Science and its Applications”, Wiley Publishers, 2015.
4. Kim H. Pries, Robert Dunnigan, “Big Data Analytics: A Practical Guide for Managers”, CRC Press, 2015.



CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**		
Course Name	**Cyber Security**		
Type of Course	**MPC**		
Course Code	**CMSIT25162307**		
Course Level	**300-399**		
Course Summary	This course provides a comprehensive understanding of informatics and its far-reaching impact on modern society. Students explore the fundamentals of computer networks, the Internet, and advancements in wireless and mobile phone technologies. A major focus is placed on Social Informatics, examining how information technology affects societal structures and addressing key issues such as the digital divide, IT for development, and national integration. The course also highlights the diverse applications of IT in fields like medicine, healthcare, business, industry, defense, law, education, communication, media, and weather forecasting. Learners are introduced to responsible digital practices, with discussions on health and environmental concerns related to IT use—such as ergonomic guidelines, e-waste management, green computing, and the cultural impacts of IT, including language localization. The course delves into the cyber world, addressing topics like cyber space, information overload, cyber ethics, and addictions. It categorizes cybercrimes, covering threats to individuals, property, and governments, with a particular focus on issues affecting women and children. Finally, students gain awareness of cyber regulations, including the scope and provisions of cyber laws under the IT Act 2000, and the roles of organizations involved in combating cybercrime. This holistic overview equips students with critical knowledge to navigate and contribute ethically to today's digital world.		
Semester	**6**	**Credits**	**4**

Course Details	Learning Approach	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the concept, features, and significance of informatics, computer networks, internet, wireless technologies, and mobile communication systems.	U	1,2,4,5
2	Analyze the impact of IT on society, including the digital divide, IT for national integration, and IT applications in diverse sectors.	An	1,2,4,5,6
3	Discuss the role of IT in sectors like healthcare, business, industry, defense, education, and understand health, environmental, and cultural impacts.	U	1,2,6,7
4	Understand ethical issues, cybercrime categories, cyber addictions, privacy, and security concerns in the digital world.	U	1,3,6,7
5	Demonstrate knowledge of cyber laws, provisions of the IT Act 2000, cybercrime prevention mechanisms, and the role of regulatory organizations.	U	2,5,6,7
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Overview of Informatics**		

	1.1	Overview of Informatics: meaning, feature and importance	1	**15**
	1.2	Computer networks and Internet	1	
	1.3	Wireless technology, Cellular wireless networks	1	
	1.4	Introduction to mobile phone technology	1	
2		**Social Informatics**		**15**
	2.1	IT and Society, issues and concerns, Digital divide	2	
	2.2	IT and development, IT for national integration	2	
	2.3	Overview of IT application in medicine, healthcare, business, commerce, industry, defense, law, crime detection, publishing, communication, resource management, weather forecasting, education, film and media.	3	
	2.4	Health issues: Guide lines for proper usage of computers, internet and mobile phones, E-wastes and green computing, Impact of IT on language and culture-localization issues.	3	
3		**Cyber World**		**15**
	3.1	Cyber world: Cyber space, Information overload, Cyber ethics	4	
	3.2	Cyber addictions, Classification of cybercrimes, categories, person, property	4	
	3.3	Government, types, stalking, harassment, threats, security and privacy issues	4	
4		**Cyber Regulations**		**15**
	4.1	Cyber Regulations: Scope of cyber laws, Provisions under IT	5	
	4.2	Cybercrime against women and children	5	
	4.3	IT Act 2000 and Cybercrime and offences	5	
	4.4	Organizations dealing with cyber crime	5	
	Teacher Specific Content			

5	*(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)* **This content will be evaluated internally**

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<tr><td>Duration</td><td>Marks</td></tr>
<tr><td>Theory</td><td>2 hrs</td><td>70</td></tr>
</table>

Text Books for Reference:

1. Ramesh Bangia. Learning Computer Fundamentals, Khanna Publishers, New Delhi.
2. Rajaraman, Introduction to information Technology, PHI, New Delhi.
3. Alexis Leon & Mathews Leon. Fundamentals of Information Technology, Vikas Publishing House, New Delhi.
4. Barbara Wilson. Information Technology: The Basics, Thomson Learning.
5. George Beekman, Eugene Rathswohl. Computer Confluence, Pearson Education, New Delhi.
6. IT Act 2000, RohasNagpal, IPR & Cyberspace – Indian Perspective

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**					
Course Name	**Computer Networking**					
Type of Course	**MPC**					
Course Code	**CMSIT25162308**					
Course Level	**300-399**					
Course Summary	This course provides a foundational understanding of computer networking concepts, technologies, and models that enable modern digital communication. Learners are introduced to the types of network topologies and transmission modes, along with both wired and wireless transmission media that form the backbone of networks. The course explains how communication happens between devices using various networking devices. A significant portion of the course is dedicated to understanding the OSI Reference Model, which help standardize network communication. The course also explores different types of networks, analyzing their applications, benefits, and limitations in various settings. Additionally, learners gain insights into the TCP/IP Reference Model, the practical framework used in modern networking. By the end of the course, students will have a comprehensive understanding of how networks operate, the devices involved, key networking protocols, and the layered approaches that ensure reliable and efficient data communication.					
Semester	**6**	**Credits**			**4**	
Course Details	**Learning Approach**	Lecture	Practical	OJT	Others	Total Hours
		4	0	0	0	**60**
Pre-requisites, if any	NIL					

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Understand the fundamental concepts of computer networking, communication models, and the need for networking.	U	1,2
2	Identify and explain various types of network topologies, transmission modes, and transmission mediums including wireless media.	U	1,2
3	Describe the purpose, functions, and working principles of various networking devices.	A	1,2,3
4	Illustrate the architecture and features of the OSI Reference Model and explain the functionalities of each of its seven layers.	U	1,2,3
5	Compare LAN, MAN, and WAN based on their applications, advantages, and disadvantages.	U	1,2
6	Describe the architecture and layers of the TCP/IP Reference Model and explain the differences between TCP/IP and OSI models	U	1,2,3
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT
Content for Classroom transaction (Units)

Module	Units	Course Description	CO No:	Hours
1		**Introduction to Computer Networking**		
	1.1	Basic communication model, Need for computer networking	1	**15**
	1.2	Uses of computer networks, Types of network topologies	2	
	1.3	Transmission modes in computer networks, Transmission mediums in computer networks	2	

	1.4	Wireless communication media	2	
2		**Networking Devices**		**15**
	2.1	Definition and Purpose of Networking Devices, Types of Networking Devices- Hub: Working Principle, Advantages and Limitations.	3	
	2.2	Switch: Functionality, Differences between Hub and Switch, Router: Basic Operation, Role in Internetworking,	3	
	2.3	Repeater: Purpose and Use Cases, Bridge: Function and Application, Gateway: Introduction and Importance.	3	
	2.4	Modem – Purpose, Working Principle Types.	3	
3		**OSI Reference Model**		**15**
	3.1	OSI model: Architecture, Features of the OSI model	4	
	3.2	Seven layers of the OSI model	4	
	3.3	Local Area Network(LAN), Applications of the LAN, Advantages of LAN, Disadvantages of LAN	5	
	3.4	Metropolitan Area Network(MAN), Applications of the MAN, Advantages of MAN, Disadvantages of MAN	5	
	3.5	Wide Area Network(WAN), Applications of the WAN, Advantages of WAN, Disadvantages of WAN	5	
4		**TCP/IP Reference Model**		**15**
	4.1	Introduction to TCP/IP Model, Importance and Purpose of TCP/IP in Networking.	6	
	4.2	Layers of TCP/IP Model- Application Layer: Purpose, Examples (HTTP, FTP, Email). Transport Layer: Basic Concept (TCP, UDP). Internet Layer: Function (IP Addressing, Routing). Network Access Layer: Role (Physical Data Transmission)	6	
	4.3	Comparison with OSI Model	6	
5	**Teacher Specific Content** *(This can be either classroom teaching, practical session, field visit etc. as specified by the teacher concerned)*			

	This content will be evaluated internally

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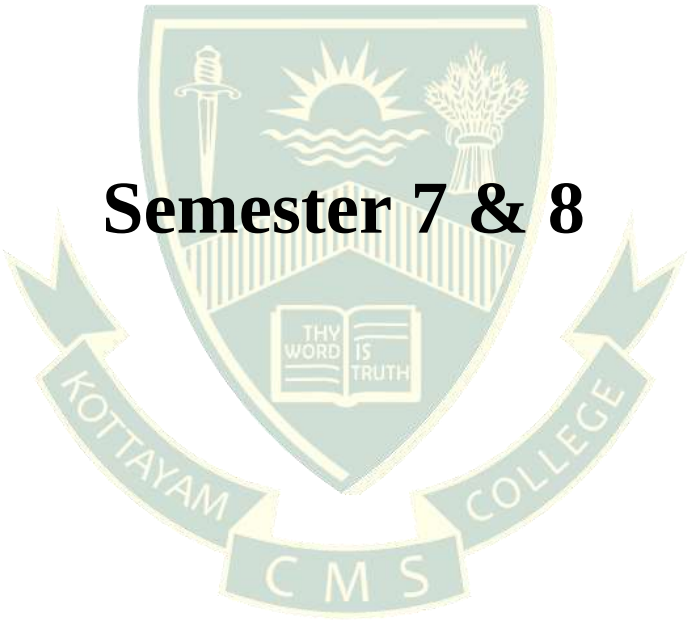
</table>

Text Books for Reference:

1. Data communication and Networking (fourth edition)-B. A. Forouzan
2. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, 5th Edition, Pearson Education, 2013.
3. "Data and Computer Communications", William Stallings, 10th Edition, Pearson Education, 2013.

Semester 7 & 8



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Semester 7 & 8

B.Voc. Honours

Course Code	Type of the Course	Methodology	Number of days	Credits	Hour Distribution		
					L	P	O
CMSIT25170406	APP	Apprenticeship	280	28	0	0	28
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-

Semester 7 & 8

B.Voc. Honours with Research

Course Code	Type of the Course	Methodology	Number of days	Credits	Hour Distribution		
					L	P	O
CMSIT25170407	RIN	Research Internship	200	20	0	0	20
Not Applicable	SDC	Online	NA	4	-	-	-
Not Applicable	SDC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-
Not Applicable	MPC	Online	NA	4	-	-	-

L - Lecture, P - Practical/Practicum, O - On-the-Job Training

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**On-the-Job Training**
Type of Course	**SDC**
Course Code	**CMSIT25110101, CMSIT25120102, CMSIT25130203**
Course Summary	On-the-Job Training (OJT) is designed to equip students with practical skills, workplace discipline, and industry exposure by actively engaging them in real-world professional environments. Conducted in collaboration with firms, industries, research institutions, or higher education establishments, OJT enables students to understand industry standards, apply academic knowledge, and perform job-specific tasks using contemporary tools and practices. The training must be undertaken in the student's own skill domain, aligned with the major area of study in their undergraduate program, to ensure relevance and coherence with their academic and career goals. The program also fosters essential workplace competencies such as communication, responsibility, adaptability, and teamwork. Furthermore, it offers students a platform for career exploration and networking, helping them evaluate potential career paths and align their aspirations with industry demands.

Semester	**1,2,3**	**Duration**	**5 hours/week**	**Credits**	**2**

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Demonstrate understanding of industry operations, standards, and professional expectations through direct exposure to workplace environments.	Ap	1,3,6,10

2	Apply job-specific skills effectively in real-world tasks and responsibilities within the assigned industry setting.	S	2,4,5,10
3	Integrate academic knowledge with practical applications to solve work-related challenges and contribute to organizational goals.	An	1,2,3,6
4	Exhibit essential workplace competencies such as punctuality, accountability, communication, teamwork, and adaptability.	S	4,5,8,9
5	Identify and evaluate potential career opportunities by reflecting on their internship experiences and professional interactions.	E	1,9,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
		Components	**Marks**
		Feedback from the hosting organization	5
		Internal Supervisor feedback	10
		Total	**15**
	B	**End Semester Examination (ESE)**	
		Components	**Marks**
		Presentation	10
		Report	10
		Viva Voce	15
		Total	**35**

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**				
Course Name	**Summer Internship**				
Type of Course	**INT**				
Course Code	**CMSIT25140204**				
Course Summary	The internship is designed to provide students with real-world exposure and hands-on experience in professional environments aligned with their skill domain and major area of study. It acts as a vital link between academic learning and industry application, allowing students to apply theoretical concepts to practical situations. Through active engagement in industry, research institutions, or academic labs, students gain insights into organizational operations, workplace practices, and professional expectations. The internship also supports the development of key professional competencies such as communication, teamwork, time management, and ethical responsibility. Additionally, it encourages critical thinking, reflection, and self-assessment, helping students identify personal strengths and explore potential career pathways. Students shall undergo the internship in a Firm, Industry, or Organization, or engage in Training in Labs with faculty and researchers, or other Higher Education or Research Institutions, ensuring alignment with their area of academic specialization.				
Semester	**4**	**Duration**	**60 hours**	**Credits**	**2**

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Demonstrate practical understanding of operational aspects in	Ap	1,3,6,10

	their domain by engaging in real-world industry settings.		
2	Apply academic knowledge and skills to identify and solve industry-relevant problems.	A	1,2,3,10
3	Exhibit professional competencies including effective communication, teamwork, time management, and ethical responsibility.	S	4,5,8,9
4	Describe workplace practices, expectations, and challenges to demonstrate an understanding of professional environments.	U	1,6,10
5	Evaluate internship experiences to identify personal strengths, areas for improvement, and future career aspirations.	E	1,6,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
		Components	**Marks**
		Feedback from the hosting organization	5
		Internal Supervisor feedback	10
		Total	**15**
	B	**End Semester Examination (ESE)**	
		Components	**Marks**
		Presentation	10
		Report	10
		Viva Voce	15
		Total	**35**

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Project**
Type of Course	**PRJ**
Course Code	**CMSIT25160305**
Course Summary	The project work provides students with an opportunity to identify, analyze, and solve real-world problems relevant to their field of study by integrating and applying the theoretical knowledge and skills acquired throughout their academic program. It fosters independent research, critical thinking, innovation, and the practical use of methodologies, tools, and techniques to design effective solutions. Students are encouraged to work individually or in teams, enhancing their collaboration, time management, ethical responsibility, and self-directed learning. The project also develops competencies in academic writing, documentation, and technical communication. Each project is expected to culminate in a comprehensive report, a working model or prototype (where applicable), and a formal presentation followed by a viva voce examination, demonstrating the student's ability to apply knowledge creatively and professionally in a real-world context.

Semester	**6**	**Duration**	**8 hours/week**	**Credits**	**4**

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Identify, analyze, and define problems relevant to the field of study.	An	1,2,3
2	Apply appropriate methodologies, tools, and techniques to	A	2,3,10

	design and implement effective solutions.		
3	Demonstrate skills in research, critical thinking, project planning, and systematic execution.	S	1,2,5,10
4	Produce well-structured academic reports and communicate project outcomes effectively.	S	4,8,10
5	Exhibit teamwork, time management, ethical responsibility, and initiative in a self-directed project environment.	S	5,8,9,10
6	Address real-world challenges with innovative and context-aware solutions.	Ap	1,2,6,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
		Components	**Marks**
		Commitment and Involvement	5
		Periodic progress review	10
		Quality of work/Implementation effort	10
		Report	5
		Total	**30**
	B	**End Semester Examination (ESE)**	
		Components	**Marks**
		Problem Identification and Objectives	10
		Methodology / Design / Technical Content	15
		Implementation / Analysis / Results	15
		Final Report	10
		Presentation	10
		Viva Voce	10
		Total	**70**

	CMS College Kottayam (Autonomous)
Programme	**B.Voc. (Hons) Information Technology**
Course Name	**Apprenticeship**
Type of Course	**APP**
Course Code	**CMSIT25170406**
Course Summary	As an integral component of the B.Voc. Honours degree programme, students are required to complete a structured apprenticeship or work-integrated learning programme in collaboration with relevant industries, organizations, or institutions. This component, spanning a duration of 280 days, carries 28 academic credits and is compulsory in the student's designated skill domain. It is designed to enhance industry preparedness by reinforcing academic knowledge through sustained, domain-relevant practical experience. The apprenticeship offers students the opportunity to engage directly with real-world professional environments, enabling them to apply domain-specific competencies, gain exposure to industry-standard tools and practices, and participate meaningfully in ongoing operations and projects. This extended, immersive experience serves to bridge the gap between theoretical learning and professional expectations, thereby fostering critical skills for career development and employability. To ensure the effectiveness, academic relevance, and accountability of the apprenticeship: • Each student will be assigned an academic mentor from the parent institution and an industry supervisor from the host organization. • Students are required to maintain a weekly activity logbook, which must be regularly reviewed and signed by the industry supervisor. • Monthly progress reports will be submitted to and reviewed by the academic mentor in consultation with the industry supervisor. • Mid-term and final evaluations will be conducted based on a combination of employer feedback, student outputs/deliverables, and

	academic performance metrics. • The institution will conduct site visits, virtual check-ins, or regular follow-ups to ensure student engagement, address issues promptly, and uphold the quality of the apprenticeship experience. This structured apprenticeship is a critical step in preparing students for the dynamic demands of the professional world, ensuring that their academic journey culminates in a well-rounded and industry-aligned skill set.				
Semester	**7&8**	**Duration**	**280 days**	**Credits**	**28**

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Gain hands-on professional experience by engaging in long-term, domain-specific apprenticeship in real-world industry environments.	S	1,3,6,10
2	Apply domain-specific theoretical knowledge to solve real-time problems, enhancing technical and problem-solving competencies.	A	1,2,3,10
3	Demonstrate professional competencies such as workplace etiquette, communication skills, and teamwork in a collaborative work culture.	S	4,5,8,9
4	Build a professional portfolio by achieving practical outcomes and establishing credible industry references and credentials.	C	5,9,10
5	Cultivate reflective thinking, adaptability, and a lifelong learning mindset through structured and mentored work experience.	Ap	1,6,8,10
6	Transition smoothly from academic study to professional practice by developing job-specific skills and industry-aligned competencies.	S	2,3,5,10
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

Assessment Types	**MODE OF ASSESSMENT**		
	A	**Continuous Comprehensive Assessment (CCA)**	
		Components	**Marks**
		Commitment, Punctuality & Professional Conduct	20
		Monthly Progress Reviews & Logbook Maintenance	25
		Skill Development & Application	25
		Interim Report	20
		Total	**90**
	B	**End Semester Examination (ESE)**	
		Components	**Marks**
		Feedback & Evaluation Report from Host Organization	50
		Skill Demonstration / Summary of Work Exposure	40
		Final Report / Learning Portfolio	40
		Domain Knowledge and Experience Communication (Presentation)	40
		Viva Voce	40
		Total	**210**

Note:

This assessment framework is intended as a guiding structure for evaluating apprenticeship performance. However, in order to remain responsive to the evolving needs of industry and society, the evaluation criteria may be revised from time to time. Such changes aim to enhance the relevance, effectiveness, and fairness of the assessment process.

CMS College Kottayam (Autonomous)

Programme	**B.Voc. (Hons) Information Technology**				
Course Name	**Research Internship**				
Type of Course	**RIN**				
Course Code	**CMSIT25170407**				
Course Summary	As an integral requirement of the B.Voc. Honours with Research degree programme, the Research Internship is designed to provide students with hands-on exposure to real-world research practices in their designated skill domain. This component carries 20 academic credits and extends over a duration of 200 days. The internship must be undertaken in collaboration with a research organization, industry, or university department, under the mentorship of a qualified research guide. The primary aim of this internship is to engage students in industry-linked research projects that allow them to apply theoretical knowledge to practical, domain-specific problems. Students are expected to work on meaningful research inquiries, contribute to data collection and analysis, develop critical thinking and problem-solving skills, and enhance their communication and documentation abilities. In addition to the research internship, students must earn 8 credits through Skill Development Courses (SDCs), specifically chosen for their research orientation, thereby reinforcing their academic and practical foundation. This component not only contributes significantly to the academic rigor of the Honours with Research degree but also ensures a seamless transition from classroom learning to workplace research, preparing students for advanced studies or professional roles in their respective domains.				
Semester	**7&8**	**Duration**	**200 days**	**Credits**	**20**

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains	PO No:
	Upon the successful completion of the course, the student will be able to		
1	Demonstrate research aptitude and inquiry-based learning by actively engaging in real-time research projects.	S	1,2,10
2	Apply academic knowledge in a professional research environment to bridge the gap between theory and real-world research practices.	A	2,3,6,10
3	Strengthen domain-specific knowledge and technical competencies through systematic investigation and practical application.	S	1,2,3
4	Address real-world research problems using problem-solving, analytical, and critical thinking skills.	S	1,2,6
5	Communicate scientific ideas and findings effectively through research reports, documentation, and presentations.	S	4,8,10
6	Collaborate with researchers and peer groups to gain exposure to interdisciplinary perspectives and collaborative learning practices.	S	2,3,5,10
7	Demonstrate professional growth and readiness for higher education, entrepreneurship, or research-oriented careers.	I	5,9,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

	MODE OF ASSESSMENT		
	A	**Continuous Comprehensive Assessment (CCA)**	
		Components	**Marks**
		Commitment, Punctuality & Professional Conduct	10
		Monthly Progress Reviews & Logbook Maintenance	15
		Skill Development & Application	15

Assessment Types		Interim Report	20
		Total	**60**
	B	**End Semester Examination (ESE)**	
		Components	**Marks**
		Feedback & Evaluation Report from Host Organization	40
		Skill Demonstration / Summary of Work Exposure	20
		Final Report / Learning Portfolio	25
		Domain Knowledge and Experience Communication (Presentation)	25
		Viva Voce	30
		Total	**140**

Note:

This assessment framework serves as a guiding structure for evaluating research internship performance. However, to remain responsive to the evolving needs of industry, academia, and society, the evaluation criteria may be revised periodically. Such revisions aim to enhance the relevance, effectiveness, and fairness of the overall assessment process.