

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.
 (An Autonomous Institution – Affiliated to Madurai Kamaraj University)
 (Re –accredited (3rd cycle) with Grade A⁺ and CGPA 3.51 by NAAC)

DEPARTMENT OF COMPUTER APPLICATIONS – UG
TANSCHÉ - CBCS with OBE
COURSE STRUCTURE
 (w.e.f. 2023 – 2024 Batch onwards)

Semester	Part	Course Code	Course Title	Teaching hrs	Duration of Exam (hrs.)	Marks allotted			Credits
						CIA	S.E	Total	
I	I	23OU1TA1/ 23OU1HIN1/ 23OU1FR1	Part-I Tamil/Hindi/French	6	3	25	75	100	3
	II	23OU2EN1	General English -I	6	3	25	75	100	3
	III	23OUCA11	Core Course 1:Python Programming	5	3	25	75	100	5
		23OUCA1P	Core Course 2:Python Programming Lab	5	3	40	60	100	5
		23OUCADSE1	DSEC 1:Digital Logic Fundamentals	4	3	25	75	100	3
	IV	23OUCASECN1	SEC 1 (NME): Office Automation	2	3	25	75	100	2
		23OUCAFC1	FC 1:Structured Programming in C	2	3	25	75	100	2
II	I	23OU1TA2/23OU 1HIN2/23OU1FR2	Part-I Tamil/Hindi/French	6	3	25	75	100	3
	II	23OU2EN2	General English – II	6	3	25	75	100	3
	III	23OUCA21	Core Course 3: Object Oriented Programming Concepts using C++	5	3	25	75	100	5
		23OUCA2P	Core Course – 4: C++Programming Lab	5	3	40	60	100	5
		23OUCAGECOM2	GEC 1:Financial Accounting	4	3	25	75	100	3
	IV	23OUCASECN2	SEC 2 (NME): Introduction to HTML	2	3	25	75	100	2
		23OUCASEC3	SEC 3: Multimedia Systems	2	3	25	75	100	2
III	I	23OU1TA3/ 23OU1HIN3/ 23OU1FR3	Part-I Tamil/Hindi/French	6	3	25	75	100	3
	II	23OU2EN3	General English – III	6	3	25	75	100	3
	III	23OUCA31	Core Course 5:Data Structures and Algorithms	5	3	25	75	100	5
		23OUCA3P	Core Course 6: Data Structures and Algorithms Lab	5	3	40	60	100	5
		23OUCAGEMA3	GEC 2: Numerical Methods	4	3	25	75	100	3
	IV	23OUCASEC31	SEC 4 : Understanding Internet	1	3	25	75	100	1
		23OUCASEC32	SEC 5: Biometrics	2	3	25	75	100	2
	V		Environmental Studies	1	-	-	-	-	-

IV	I	23OU1TA4/ 23OU1HIN4/ 23OU1FR4	Part-I Tamil/Hindi/French	6	3	25	75	100	3
	II	23OU2EN4	General English – IV	6	3	25	75	100	3
	III	23OUCA41	Core Course 7: Programming in Java	5	3	25	75	100	5
		23OUCA4P	Core Course 8: Programming in Java Lab	4	3	40	60	100	5
		23OUCAGEMA4	GEC 3: Resource Management Techniques	4	3	25	75	100	3
	IV	23OUCASEC41	SEC 6 : PHP Programming	2	3	25	75	100	2
		23OUCASEC42	SEC 7: Advanced Excel	2	3	25	75	100	2
V	23OU4EV4	Environmental Studies	1	3	25	75	100	2	
V	III	23OUCA51	Core Course 9: Operating System	5	3	25	75	100	4
		23OUCA52	Core Course 10: ASP.Net Programming	5	3	25	75	100	4
		23OUCA5P	Core Course 11: ASP.Net Programming Lab	5	3	40	60	100	4
			DSEC 2	4	3	25	75	100	3
			DSEC 3	4	3	25	75	100	3
		23OUCAPR5	Core Course 12: Project with Viva Voce	5	3	20	80	100	4
	IV	23OU4VE5	AECC: Value Education	2	3	25	75	100	2
		23OUCAIN5	Internship / Industrial Training	-					2
VI	III	23OUCA61	Core Course 13: Computer Networks	6	3	25	75	100	4
		23OUCA62	Core Course 14: Data Analytics using R Programming	6	3	25	75	100	4
		23OUCA6P	Core Course 15: R Programming Lab	6	3	40	60	100	4
			DSEC 4	5	3	25	75	100	3
			DSEC 5	5	3	25	75	100	3
	IV	23OUCASEC6P	SEC 8: Networking Lab	2	3	40	60	100	2
	V	23OU5PE6/ 23OU5NS6	Extension Activities / Physical Education/ NSS	-	3	25	75	100	1
		TOTAL	180					140	

CC - Core Course

GEC – Generic Elective Courses

SEC – Skill Enhancement Course

DSEC – Discipline Specific Elective Course

FC - Foundation Course

Semester - V (DSEC – 2 & 3 Choose any Two)

1. Software Engineering -23OUCADSE5A
2. Data Mining -23OUCADSE5B
3. Database Management System -23OUCADSE5C
4. Enterprise Resource Planning -23OUCADSE5D

Semester - VI (DSEC – 4 & 5 Choose any Two)

1. Cloud Computing -23OUCADSE6A
2. Artificial Intelligence -23OUCADSE6B
3. IOT and its Applications -23OUCADSE6C
4. Blockchain Technologies -23OUCADSE6D

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
V	Core	23OUCA51	Operating System	4	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	--

Course Objectives:

1. Understanding the design of the Operating System
2. Imparting knowledge on CPU scheduling, Process and Memory Management.
3. To code specialized programs for managing overall resources and operations of the Computer.
4. To study about the concept of Job and processor scheduling
5. To learn about the concept of memory organization and multiprogramming

Course Content:

Unit-I Introduction: operating system, history (1990s to 2000 and beyond). Process concepts: definition of process, process States-Life cycle of a process-process management: process state transitions, process control block (PCB), process operations, suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, inter process communication: signals, message passing.

Unit-II Asynchronous concurrent processes: mutual exclusion- critical section, mutual exclusion primitives-implementing mutual exclusion primitives, software solutions to the mutual Exclusion Problem-Peterson's algorithm, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. Concurrent programming: monitors.

Unit-III Deadlock and indefinite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention- deadlock avoidance with Dijkstra's Banker's algorithm - deadlock detection-deadlock recovery

Unit-IV Job and processor scheduling: scheduling levels -preemptive vs non-preemptive scheduling - priorities, scheduling objectives, scheduling criteria, scheduling algorithms: FIFO scheduling, -RR Scheduling- SPF scheduling- HRRN scheduling - SRT scheduling - multilevel feedback queues, Fair share scheduling.

Unit- V Real Memory organization and Management: Memory organization- Memory management- Memory hierarchy - Memory management strategies - contiguous vs non-contiguous memory allocation - single user contiguous memory allocation - fixed partition multiprogramming –variable partition multiprogramming- Memory swapping. Virtual Memory organization: virtual memory basic concepts- -block mapping - paging basic concepts, segmentation -segmentation paging systems. Virtual Memory Management: Demand Paging -Page replacement strategies.

Book for Study:

H.M. Deitel, (2011) -Operating Systems, Pearson Education Asia, 3rd Edition,

Chapters:

- Unit-I** : 1.1, 1.2, 1.8, 1.9 ,3.1-3.5
- Unit-II** : 5.2.2, 5.2.3, 5.3, 5.4.2, 5.6, 6.2
- Unit-III** : 7.4, 7.5 ,7.7 -7.10
- Unit- IV** : 8.2 -8.7
- Unit -V** : 9.2 – 9.10, 10.2- 10.6, 11.3,11.6

Books for Reference:

1. William Stallings (2012), Operating System: Internals and Design Principles, Prentice-Hall of India, 7th Edition,
2. A. Silberschatz, and P.B. Galvin (2012), Operating Systems Concepts, John Wiley & Sons(ASIA)Pte Ltd, 9th Edition.
3. Pramod Chandra Bhatt, (2014), An Introduction to Operating Systems, Concepts and Practice, PHI Learning Pvt. Ltd., Delhi, 4th Edition.

Web Resources/ E. Books:

- 1.<https://gnindia.dronacharya.info/IT/4thSem/Downloads/OperatingSystem/Books/Operating-systems-text-book-3.pdf>
- 2.https://repository.dinus.ac.id/docs/ajar/Operating_System.pdf
- 3.[https://drive.uqu.edu.sa/_/mshayat/files/MySubjects/2017SS%20Operating%20Systems/Abraham%20Silberschatz-Operating%20System%20Concepts%20\(9th,2012_12\).pdf](https://drive.uqu.edu.sa/_/mshayat/files/MySubjects/2017SS%20Operating%20Systems/Abraham%20Silberschatz-Operating%20System%20Concepts%20(9th,2012_12).pdf)

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:**Knowledge and Skill:**

To make students allows Knowledge and skills related to OS cover understanding its core functions, various types, and practical applications like troubleshooting and optimization.

Activities to be given:

Students shall be hands-on exercises, simulations, and problem-solving tasks that help them understand operating system concepts

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management	K1 to K3
CLO2	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	K1 to K3
CLO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measure store retrieve from deadlock. .	K1 to K3
CLO4	Have complete knowledge of Scheduling Algorithms and its types.	K1 to K4
CLO5	Understand memory organization and management	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	1	1
CLO2	2	3	1	2	1	1
CLO3	3	2	1	3	1	1
CLO4	1	3	1	1	3	2
CLO5	3	1	1	3	2	1

1-Basic Level**2- Intermediate Level****3- Advanced Level**

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Introduction: operating system, history (1990s to 2000 and beyond), Process concepts: definition of process, process states-Life cycle of a process-process management : process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication: signals, message passing.	18	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	Asynchronous concurrent processes: mutual exclusion-critical section, mutual exclusion primitives-implementing mutual exclusion primitives, software solutions to the mutual Exclusion Problem-Peterson 's algorithm, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. Concurrent programming: monitors, message passing.	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Deadlock and indefinite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention- deadlock avoidance with Dijkstra's Banker's algorithm - deadlock detection-deadlock recovery	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test

IV	Job and processor scheduling: scheduling levels -preemptive vs non-preemptive scheduling - priorities, scheduling objectives, scheduling criteria, scheduling algorithms: FIFO scheduling,-RR scheduling- Quantum size - SPF scheduling- HRRN scheduling - SRT scheduling - multilevel feedback queues, Fair share scheduling.	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	Real Memory organization and Management: Memory organization- Memory management- Memory hierarchy - Memory management strategies - contiguous vs non-contiguous memory allocation - single user contiguous memory allocation - fixed partition multiprogramming – variable partition multiprogramming- Memory swapping. Virtual Memory organization: virtual memory basic concepts –multilevel storage organization - block mapping - paging basic concepts, segmentation - segmentation Paging systems. Virtual Memory Management: Demand Paging -Page replacement strategies.	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer

Mrs.R. KEERTHANA

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
V	Core	23OUCA52	ASP .Net Programming	4	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

Course Objectives:

1. To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language. Imparting knowledge on CPU scheduling, Process and Memory Management.
2. To develop ASP.NET Web application using standard controls.
3. To implement file handling operations.
4. To handles SQL Server Database using ADO.NET.
5. Understand the Grid view control and XML classes.

Course Content:

Unit-I C# Fundamentals: Primitive types and Variables: What Is a Variable? - Data Types – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – Strings - What Is a String? - The System. String Class- Creating and Initializing a String- Reading and Printing to the Console.

Unit-II Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- Introduction to ASP.NET - Working with Web Forms – Web form standard controls: Properties and its events – HTML Server controls -List Controls: Properties and its events.

Unit-III Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.

Unit-IV ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controls and its Properties – Data Binding

Unit- V Grid View control: Deleting, editing, Sorting and Paging.XML classes – Web form to manipulate XML files –Website Security - Authentication - Authorization – Creating a Web application.

Books for Study:

1. SvetlinNakov, VeselinKolev& Co, (2019) Fundamentals of Computer Programming with C#, Faber publication.

Chapters:

Unit I : 1,3,5,6,7,11

2. Mathew, MacDonald, (2015), The Complete Reference ASP.NET, Tata McGraw-Hill.

Books for Reference:

1. Herbert Schildt, (2017) The Complete Reference C#.NET, Tata McGraw-Hill, 2017.

2. Kogent Learning Solutions, (2013), C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres.

3. Anne Boehm, Joel Murach, Murach 's, (2016), C# 2015, Mike Murach& Associates Inc.

Web Resources/ E.Books:

1.<https://www.geeksforgeeks.org/introduction-to-net-framework>

2. <https://www.javatpoint.com/net-framework>

3.<https://www.pepcoding.com/resources/>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:

Knowledge and Skill: To make students allows knowledge and skills encompass a broad range of abilities, from core framework concepts to specialized areas like MVC and Core.

Activities to be given: ASP.NET activities for students can range from building simple web pages to developing more complex web applications

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Develop working knowledge of C# programming constructs and the .NET Framework	K1 to K3
CLO2	To develop a software to solve real-world problems using ASP.NET	K1 to K4
CLO3	To Work on Various Controls Files	K1 to K4
CLO4	To create a web application using MicrosoftADO.NET.	K1 to K4
CLO5	To develop web applications using XML	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	2	2	1	3
CLO2	3	2	2	2	2	3
CLO3	3	3	2	2	3	3
CLO4	3	1	2	2	1	3
CLO5	3	1	2	2	1	2

1-Basic Level**2- Intermediate Level****3- Advanced Level****LESSON PLAN: TOTAL HOURS (75 HRS)**

UNIT	DESCRIPTION	HRS	MODE
I	C# Fundamentals: Primitive types and Variables: What Is a Variable? - Data Types – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – Strings - What Is a String? - The System. String Class- Creating and Initializing a String- Reading and Printing to the Console.	15	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- Introduction to ASP.NET - Working with Web Forms – Web form standard controls: Properties and its events – HTML Server controls -List Controls: Properties and its events.	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving,	14	Chalk and Talk, PPT, group discussion, quiz, on the spot test

	Copying and Deleting files – File uploading.		
IV	ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controls and its Properties – Data Binding.	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	Grid View control: Deleting, editing, Sorting and Paging.XML classes – Web form to manipulate XML files – Website Security - Authentication - Authorization – Creating a Web application.	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer

Mrs.G. ALAMELU

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
V	Core	23OUCA5P	ASP .Net Programming Lab	4	5	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

Course Objectives:

1. To develop ASP.NET Web application using standard controls.
2. To create rich database applications using ADO.NET.
3. To implement file handling operations.
4. To implement XML classes.
5. To utilize ASP.NET security features for authenticating the website

Course Content:

1. Create an exposure of Web applications and tools
2. Implement the Html Controls
3. Implement the Server Controls
4. Web application using Web controls.
5. Web application using List controls.
6. Web Page design using Rich control. Validate user input using Validation Controls
Working with File concepts.
7. Web application using Data Controls.
8. Data binding with Web controls
9. Data binding with Data Controls.
10. Database application to perform insert, update and delete operations.
11. Database application using Data Controls to perform insert, delete, edit, paging and Sorting operation.
12. Implement the Xml classes.
13. Implement Authentication – Authorization.
14. Ticket reservation using ASP.NET controls.
15. Online examination using ASP.NET controls

Books for Reference:

1. Herbert Schildt, (2017), The Complete Reference C#.NET, Tata McGraw-Hill.
2. Kogent Learning Solutions, (2013), C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres.
3. Anne Boehm, Joel Murach, (2016) Murach’s C# 2015, Mike Murach& Associates Inc.

Web Resources/ E. Books:

1. <https://www.geeksforgeeks.org/introduction-to-net-framework>
2. <https://www.javatpoint.com/net-framework>
3. <https://www.pepcoding.com/resources/>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	1.Create an exposure of Web applications and tools 2. Implement the Html Controls 3. Implement the Server Controls 4. Web application using Web controls.	15	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	5. Web application using List controls. 6. Web Page design using Rich control. Validate user input using Validation controls. Working with File concepts. 7. Web application using Data Controls.	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	8.Data binding with Web controls 9. Data binding with Data Controls. 10.Database application to perform insert, update and delete operations	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test

IV	11.Database application using Data Controls to perform insert, delete, edit, paging and Sorting operation. 12. Implement the Xml classes.	14	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	13. Implement Authentication – Authorization. 14. Ticket reservation using ASP.NET controls. 15.Online examination using ASP.NET controls	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer

Mrs.G. ALAMELU

EVALUATION (PRACTICAL)**Core Lab / Skill Enhancement Course Lab****Internal** (Formative) : 40 marks**External** (Summative) : 60 marks

Total : 100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	40

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	60

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	Core	23OUCADSE5A	Software Engineering	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

Course Objectives:

1. Study the basics of concepts of Software engineering
2. Understand the requirements modeling
3. To Provide Design concepts, Architecture design.
4. Apply the Review Techniques and Software quality assurance
5. Analyze the concept of Project Scheduling, Risk Management.

Course Content:

Unit -I Introduction to Software Engineering: Software - The Changing Nature of Software – The Software Process: A Generic Process Model Process - Process Patterns - Process Assessment. Personal and Team Process Models. Process Models: Prescriptive Process Models – The Waterfall Model – Incremental Process Models – Evolutionary Process Models - Specialized Process Models–The Unified Process. An Agile View of Process: Development: What is Agility? – What is an Agility process? - Agile Process Models.

Unit-II Requirements Engineering: Requirements Engineering Tasks - Eliciting Requirements - Developing Use Cases. Building the Analysis Model: Requirements Analysis – Data Modeling Concepts – Class-Based Modeling.

Unit -III Design Concepts: Design Concepts -The Design Model. Creating an Architectural Design: Architectural Design. Modeling Component-Level Design: What is a Component? – Designing Class-Based Components. Performing User Interface Design: User Interface Analysis and Design.

Unit- IV Testing Strategies: A Strategic Approach to Software Testing –Test Strategies for conventional Software- Validation Testing-System Testing – The Art of Debugging. Quality Management: Software Quality Assurance - Software Reviews - Formal Technical Reviews. Change Management: Software Configuration Management – The SCM Repository – The SCM Process.

Unit –V Estimation: Software Project Estimation - Empirical Estimation Models. Project Scheduling: Project Scheduling – Defining a Task Set for the Software Project – Defining a Task Network – Scheduling. Risk Management: Software Risk – Risk Identification – Risk Projection – Risk Refinement–Risk Mitigation, Monitoring and management-The RMMM Plan.

Book for Study:

Roger Pressman S, (2010), Software Engineering: A Practitioner’s Approach Mc Graw Hill Education, New Delhi, 6th Edition.

Chapters:

Unit I	: 1.2, 1.3, 2.4 to 2.6, 3.1 to 3.6
Unit II	: 7.2, 7.4, 7.5, 8.1, 8.3, 8.7
Unit III	: 9.3, 9.4, 10.4, 11.1, 11.2, 12.2
Unit IV	: 13.1, 13.3, to 13.7, 26.2 to 26.4, 27.1 to 27.3
Unit V	: 23.5, 23.7, 24.2 to 24.5, 25.2 to 25.7

Books for Reference:

1. Aggarwal K & Yogesh Singh, (2007), Software Engineering, New Age International, New Delhi, 2ndEdition.
2. Ian Sommerville, (2009) Software Engineering, Pearson education Asia, Hong Kong, 6thEdition.
3. James Peters F & Witold Pedryez , (2007), Software Engineering – An Engineering Approach, John Wiley and Sons, New Delhi, 2ndEdition.

Web Resources/ E. Books:

1. https://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf
2. <https://www.geeksforgeeks.org/software-engineering/>
3. <https://www.javatpoint.com/software-engineering>

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make students aware of the Software engineers apply engineering principles and knowledge of programming languages to build software solutions for end users.

Activities to be given: Students shall be allowing to design and implementation validation.

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the Basic concept of Software Engineering	K1 to K3
CLO2	Study the Various Requirements Modeling	K1 to K3
CLO3	Apply Design Concepts, Component – Level Design and User Interface Design	K1 to K4
CLO4	Identify the Review Techniques and Software Testing Strategies	K1 to K4
CLO5	Analyze the Software Projects for estimation and Project Scheduling	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	1	2	2	2
CLO2	3	2	2	3	2	1
CLO3	3	2	2	3	2	2
CLO4	2	3	2	3	2	1
CLO5	2	2	3	3	2	1

1-Basic Level

2- Intermediate Level

3- Advanced Level

LESSON PLAN: TOTAL HOURS (60 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Introduction to software Engineering: Software - The Changing Nature of Software –The Software Process: A Generic Process Model Process - Process Patterns - Process Assessment. Personal and Team Process Models. Process Models: Prescriptive Process Models – The Waterfall Model – Incremental Process Models – Evolutionary Process Models - Specialized Process Models–The Unified Process. An Agile View of Process: Development: What is Agility? – What is an Agility process? - Agile Process Models.	14	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	Requirements Engineering: Requirements Engineering Tasks - Eliciting Requirements - Developing Use Cases. Building The Analysis Model: Requirements Analysis – Data Modeling Concepts – Class-Based Modeling.	10	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Design Concepts: Design Concepts -The Design Model. Creating an Architectural Design: Architectural Design. Modeling Component-Level Design: What is a Component? –Designing Class-Based Components. Performing User Interface Design: User Interface Analysis and Design.	11	Chalk and Talk, PPT, group discussion, quiz, on the spot test

IV	<p>Testing Strategies: A Strategic Approach to Software Testing –Test Strategies for conventional Software- Validation Testing-System Testing – The Art of Debugging. Quality Management: Software Quality Assurance - Software Reviews - Formal Technical Reviews. Change Management: Software Configuration Management – The SCM Repository – The SCM Process.</p>	12	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	<p>Estimation: Software Project Estimation - Empirical Estimation Models. Project Scheduling: Project Scheduling – Defining a Task Set for the Software Project – Defining a Task Network – Scheduling. Risk Management: Software Risk – Risk Identification – Risk Projection – Risk Refinement–Risk Mitigation, Monitoring and management-The RMMM Plan.</p>	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer
Mrs. K. KRISHNAVENI

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	DSEC	23OUCADSE5B	Data Mining	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

Course Objectives

1. To understand the basic Concepts of Data Mining.
2. To study the Mining Techniques and Classification concepts.
3. To Access the concept of Clustering Algorithms.
4. To Understand the Concept of Web mining.
5. To Identify the Spatial and Temporal Mining

Course Content:

Unit-I Introduction: Basic Data Mining Task –Data Mining Versus Knowledge Discovery in Databases – Data Mining Issues – Social Implications of Data Mining – Data Mining from a Database Perspective. Related Concepts: Database / OLTP Systems – Fuzzy Sets and Fuzzy Logic – Information Retrieval – Decision Support Systems – Dimensional Modeling – Data Warehousing – OLAP – Web Search Engines.

Unit-II Data Mining Techniques: Introduction – A Statistical Perspective on Data Mining – Similarity Measures – Decision Tress – Neural Networks – Genetic Algorithms. Classification: Introduction – Statistical-Based Algorithms –Distance-Based Algorithms – Neural Network Based Algorithms.

Unit-III Clustering: Introduction – Similarity and Decision Measures – Outliers – Hierarchical Algorithms – Partitional Algorithms – Clustering Large Databases – Clustering with Categorical Attributes.

Unit-IV Association Rules: Introduction – Large Item sets –Basic Algorithms – Parallel and Distributed Algorithms. Web Mining: Introduction – Web Content Mining - Web Usage Mining.

Unit-V Spatial Mining: Introduction – Spatial Data Overview – Spatial Data Mining Primitives – Generalization and Specialization – Spatial Classification Algorithms – Spatial Clustering Algorithm. **Temporal Mining:** Introduction – Modeling Temporal Events – Time Series – Pattern Detection.

Book for study:

Margaret H. Dunham, (2004) S. Sridhar, *Data mining: Introductory and Advanced Topics*, Published by Pearson Education, 1th Edition

Chapters:

- Unit I** : 1.1 to 1.3, 1.5, 1.6, 2.1. To 2.8.
- Unit II** : 3.1 to 3.6, 4.1 to 4.3, 4.5.
- Unit III** : 5.1 to 5.7.
- Unit IV** : 6.1 to 6.4, 7.1, 7.2, 7.4.
- Unit V** : 8.1 to 8.4, 8.6, 8.7, 9.1 to 9.4.

Books for Reference:

1. Arun K. Pujari, (2013), *Data Mining Techniques*, Universities press, 3rd Edition.
2. S.K. Mourya, Shalu Gupta, (2013), *Data Mining and Data warehousing*, Narosa Publishing House Private Ltd, 1st Edition ,
3. Jiawei Han & Micheline Kamber, (2010.), *Datamining Concepts & Techniques*, Morgan Kaufmann Publishers, San Francisco, USA, 2nd Edition.

Web Resources / E. Books:

1. <https://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf>
2. https://www.ramauniversity.ac.in/online-study-material/fet/cs/bca/vsemester/dataminingwarehouseing/lecture_4.pdf
3. https://www.researchgate.net/post/How_to_write_an_Introductory_Text_Book_on_Data_Mining

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz

Rationale for nature of Course:**Knowledge and Skill:**

Data mining is multi-disciplinary and encompasses methods dealing with scaling up for high-dimensional data and high-speed data streams, distributed data mining, mining in a network setting, and many other facets.

Activities to be given: Students shall be allowed to write the many concepts in Data Mining
Course learning Outcomes (CLO's):

CLO	Course learning Outcomes (CLO's)	Knowledge (According to Bloom's Taxonomy)
CLO1	Understand the basic Concepts of Data Mining.	K1 to K3
CLO2	Analyze the Mining Techniques and Classification concepts.	K1 to K3
CLO3	Access the concept of Clustering Algorithms.	K1 to K3
CLO4	Apply the Concept of Web mining.	K1 to K3
CLO5	Identify the Spatial and Temporal Mining	K1 to K3

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	1
CLO2	2	3	3	2	2	2
CLO3	1	2	3	3	3	2
CLO4	3	3	2	3	3	2
CLO5	2	3	3	2	3	2

1-Basic Level**2- Intermediate Level****3- Advanced Level**

LESSON PLAN: TOTAL HOURS (60 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Introduction: Basic Data Mining Tasks– Data Mining Versus Knowledge Discovery in Databases – Data Mining Issues – Social Implications of Data Mining – Data Mining from a Database Perspective. Related Concepts: Database / OLTP Systems – Fuzzy Sets and Fuzzy Logic – Information Retrieval – Decision Support Systems – Dimensional Modeling – Data Warehousing – OLAP – Web Search Engines.	14	Chalk and Talk, PPT, group discussion ,on the spot test
II	Data Mining Techniques: Introduction – A Statistical Perspective on Data Mining – Similarity Measures – Decision Tress – Neural Networks – Genetic Algorithms. Classification: Introduction – Statistical-Based Algorithms –Distance-Based Algorithms – Neural Network Based Algorithms.	11	Chalk and Talk, PPT, quiz, on the spot test
III	Clustering: Introduction – Similarity and Decision Measures – Outliers – Hierarchical Algorithms – Partitional Algorithms – Clustering Large Databases – Clustering with Categorical Attributes.	10	Chalk and Talk, PPT, OHP presentations, quiz, on the spot test
IV	Association Rules: Introduction – Large Item sets –Basic Algorithms – Parallel and Distributed Algorithms. Web Mining: Introduction – Web Content Mining - Web Usage Mining.	12	Chalk and Talk, PPT

V	Spatial Mining: Introduction – Spatial Data Overview – Spatial Data Mining Primitives – Generalization and Specialization – Spatial Classification Algorithms – Spatial Clustering Algorithm. Temporal Mining: Introduction – Modeling Temporal Events – Time Series – Pattern Detection.	13	Seminar
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Course Designer

Mrs .R. KEERTHANA

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	DSEC	23OUCADSE5C	Database Management System	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	---

Course Objectives:

1. To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
2. To the study the concepts of database management system, design simple Database models
3. To learn and understand to write queries using SQL, PL/SQL.
4. To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
5. To study the concepts of data base management system, design simple Database models

Course Content:

Unit-I Database Concepts: Database Systems: Data vs Information - Introducing the database – Evolution of File System Data Processing- Problems with file system – Database systems. Data models: Importance - Basic Building Blocks - Evolution of Data models - Degrees of Data Abstraction

Unit-II Design Concepts: Relational database model: logical view of data-keys–Integrity Rules- Relational Set Operators - Relationships within the Relational Database-indexes - codd's Relational Database Rules- Entity Relationship(ER) Modeling: The Entity Relationship Model (ERM).

Unit-III Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Forms. Introduction to SQL: Data Definition Commands – Data Manipulation Commands –

SELECT Queries – Additional Data Definition Commands- Additional SELECT Query Keywords – Joining Database Tables.

Unit-IV Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT – MINUS. SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function.

Unit- V PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation – Arithmetic operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation– Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

Books for Study:

1. Coronel, Morris, Rob, (2013), "*Database Systems, Design, Implementation and Management*", 9th Edition.

Chapters:

Unit-I : 1.2, 1.3, 1.5-1.7, 2.2, 2.3, 2.5, and 2.6

Unit-II : 3.1-3.4, 3.6, 3.8, 3.9 4.1

Unit-III : 6.1-6.3, 6.6, 7.1-7.6, 7.8

Unit- IV : 8.1.1-8.1.4, 8.2, 8.3.1-8.3.5, 8.4

2. NileshShah, (2016), "*Database Systems Using Oracle*", Pearson Education India, 2nd edition

Chapters:

Unit -V : 10, 11, 12

Books for Reference:

1. Abraham Silberschatz (2010), Henry F.Korth and S. Sudarshan, —Database System Concepts|, McGraw Hill International Publication, 6th Edition

2. Shio Kumar Singh, —Database Systems —, Pearson publications, 2nd Edition

3. R. Pannerselvam, (2015) Database Management Systems, PHI Learning, 2nd Edition.

Web Resources/ E. Books:

- 1.<https://unidel.edu.ng/focelibrary/books.pdf>
- 2.https://www.academia.edu/44088198/Database_System_Concepts_6e_By_Abraham_Silberschatz_Henry_Korth_and_S_Sudarshan
- 3.<https://www.oreilly.com/library/view/database-systems-concepts/9788131760925/>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:**Knowledge and Skill:**

To make students allows DBMS minimizes data redundancy, prevents inconsistencies, and simplifies data management with features like concurrent access and backup mechanisms.

Activities to be given:

Students shall be allowed to write program in many concepts.

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	K1 to K3
CLO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity- Relationship Model.	K1 to K3
CLO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	K1 to K4
CLO4	Classify the different functions and various join operations and enhance the knowledge of handling Multiple tables.	K1 to K4
CLO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	1	1
CLO2	2	3	1	2	1	1
CLO3	3	2	1	3	1	1
CLO4	1	3	1	1	3	2
CLO5	3	1	1	3	2	1

1-Basic Level

2- Intermediate Level

3- Advanced Level

LESSON PLAN: TOTAL HOURS (60 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Database Concepts: Database Systems: Data vs Information - Introducing the database –Evolution of File System Data Processing- Problems with file system – Database systems. Data models : Importance - Basic Building Blocks - Evolution of Data models - Degrees of Data Abstraction	14	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	Design Concepts: Relational database model: logical view of data-keys–Integrity Rules- Relational Set Operators - Relationships within the Relational Database-indexes - codd's Relational Database Rules- Entity Relationship(ER) Modeling: The Entity Relationship Model (ERM).	10	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Forms. Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands-	11	Chalk and Talk, PPT, group discussion, quiz, on the spot test

	Additional SELECT Query Keywords – Joining Database Tables.		
IV	Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT – MINUS. SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function.	12	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation – Arithmetic operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer
Mrs. R. KEERTHANA

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	DSEC	23OUCADSE5D	Enterprise Resource Planning	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	--

Course Objectives:

1. The core of ERP is to planning for justifying ERP investments and to explain the benefits of ERP
2. To learn the fundamental ERP and its related technologies to building excellent software Domain
3. To practice the implementation life cycle to build transaction and package selection.
4. To execute the team members, consultants and to predicts success and failure implementation of ERP
5. To apply the ERP domain in present and future enhancement

Course Content:

Unit-I Introduction: Introduction: Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments - Benefits of ERP

Unit-II ERP and Related Technologies: ERP and Related Technologies - Advanced technology and ERP Security. ERP Marketplace and Functional Modules: ERP Marketplace and Marketplace Dynamics – Business Modules of an ERP Package

Unit-III ERP Implementation: ERP Implementation Lifecycle - ERP Package Selection – ERP Transition Strategies

Unit-IV ERP Implementation: ERP Implementation Process –ERP Project Teams – Consultants, Vendors and Employees – Success and Failure factors of the ERP Implementation

Unit- V ERP – Present and Future: ERP and EBusiness – ERP, The Internet, and WWW-ERP II – Future Directions and Trends in ERP

Book for Study:

Alexis Leon, (2014), ERP Demystified, Tata Mc-Graw Hill , 3th Edition,

Chapters:

Unit - I : 3, 4, 5, 7

Unit – II : 8, 9, 10, 11

Unit - III : 13, 14, 15

Unit - IV : 17, 18, 19, 20

Unit - V : 23, 24, 25

Books for Reference:

1. Joseph Brady A., Ellen Monk F., Bret Wagner, (2001), Concepts in Enterprise Resource Planning, Thompson Course Technology, 1st Edition.
2. Vinod Kumar Garg and Venkitakrishnan N K, (2003), Enterprise Resource Planning – Concepts and Practice, PHI, 2nd Edition.
3. Mary Sumner, (2012), Enterprise Resource Planning, Pearson Education, 9th Edition.

Web Resources/ E.Books:

- 1.<https://unidel.edu.ng/focelibrary/books.pdf>
- 2.https://www.academia.edu/44088198/Database_System_Concepts_6e_By_Abraham_Silbersch_atz_Henry_Korth_and_S_Sudarshan
- 3.<https://www.oreilly.com/library/view/database-systems-concepts/9788131760925/>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:**Knowledge and Skill:**

Business Knowledge/ Domain Knowledge and Technical Knowledge (Database, Integration & Extension etc.)

Activities to be given:

Students shall be allowed to new skills for students are also in-demand skills that will help one thrive in a competitive environment and gain a place in the crowd. Master the art of communication, problem-solving, or other educational skills.

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand to Examine the Basic Concept of contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology	K1 to K3
CLO2	Identify how ERP is secure the data and to expand the market places	K1 to K3
CLO3	Apply the ERP package software for various transition strategies	K1 to K4
CLO4	Apply Knowledge to Construct implementation life cycle of ERP and	K1 to K4
CLO5	select best ERP vendors and Consultants	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	1	1
CLO2	2	3	1	2	1	1
CLO3	3	2	1	3	1	1
CLO4	1	3	1	1	3	2
CLO5	3	1	1	3	2	1

1-Basic Level**2- Intermediate Level****3- Advanced Level****LESSON PLAN: TOTAL HOURS (60 HRS)**

UNIT	DESCRIPTION	HRS	MODE
I	Introduction: Introduction: Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments - Benefits of ERP	14	Chalk and Talk, PPT, group discussion , quiz, on the spot test

II	ERP and Related Technologies: ERP and Related Technologies - Advanced technology and ERP Security. ERP Marketplace and Functional Modules: ERP Marketplace and Marketplace Dynamics – Business Modules of an ERP Package	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	ERP Implementation: ERP Implementation Lifecycle - ERP Package Selection – ERP Transition Strategies.	10	Chalk and Talk, PPT, group discussion, quiz, on the spot test
IV	ERP Implementation: ERP Implementation Process –ERP Project Teams – Consultants, Vendors and Employees – Success and Failure factors of the ERP Implementation	11	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	ERP – Present and Future: ERP and EBusiness – ERP, The Internet, and WWW-ERP II – Future Directions and Trends in ERP	12	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer

Mrs. R. KEERTHANA

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
V	Core	23OUCAPR5	Project with Viva Voce	4	5	20	80	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

The students are allowed to develop the in project within our campus with the help of the internal staff members.

In the first review the students submit their title of the project and synopsis, and also submit the determination of the modules.

In the second review 50% of the project is completed and demonstrate the project.

In the final review the students prepare the PowerPoint Presentation. The oral is must for the completion of the project.

This report will be evaluated 80 marks for external examiner and 20 marks for internal examiner.

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
VI	Core	23OUCA61	Computer Networks	4	6	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	---

Course Objectives:

1. To understand the concept of Data communication and Computer network
2. To get a knowledge on routing algorithms.
3. To impart knowledge about networking and inter networking devices
4. To study about Network communication
5. To learn the concept of Transport layer

Course Content:

Unit-I Introduction – Network Hardware – Network Software – Reference Models: The OSI Reference Model – The TCP/IP Reference Model – Physical Layer: The Theoretical Basis for Data Communication - Guided Transmission Media

Unit-II Wireless Transmission - Communication Satellites – The Public Switched Telephone Network: Structure of the Telephone System – The Local Loop: Modems, ADSL, and Fiber - Trunks and Multiplexing and Switching. The Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction.

Unit-III Elementary Data Link Protocols - Sliding Window Protocols. The Medium Access Control Sublayer – The Channel Allocation Problem – Multiple Access Protocols.

Unit-IV The Network Layer: Network Layer Design Issues - Routing Algorithms - Congestion Control Algorithms – Internetworking.

Unit- V The Transport Layer: The Transport Service –Elements of Transport Protocols: Addressing – Connection Establishment -Connection Release –Network Security: Cryptography.

Book for Study:

1. A. S. Tanenbaum, (2010), *Computer Networks*, Prentice-Hall of India, 5th Edition.

Chapters:

Unit-I : 1.1, 1.2, 1.3, 1.4, (1.4.1, 1.4.2) ,2.1,2.2

Unit-II : 2.3, 2.6, 3.1, 3.2

Unit-III : 3.3, 3.4, 4.1, 4.2

Unit- IV : 5.1, 5.2, 5.3, 5.5

Unit -V : 6.1, 6.2, 8.1

Books for Reference:

1. B. A. Forouzan, (2017), *Data Communications and Networking*, Tata McGraw Hill, 4th Edition.
2. F. Halsall (2008), *Data Communications, Computer Networks and Open Systems*, Pearson Education,
3. D. Bertsekas and R. Gallager (2008), *Data Networks*, 2nd Edition, PHI.

Web Resources/ E.Books:

1. <https://www.geeksforgeeks.org/computer-network-tutorials/>
2. https://en.wikipedia.org/wiki/Computer_network
3. https://www.tutorialspoint.com/data_communication_computer_network/index.htm

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:**Knowledge and Skill:**

To make students understanding how computers and other devices connect, communicate, and share resources. This includes knowledge of network protocols, devices, and security measures.

Activities to be given:

Students can range from simple labeling exercises to complex project-based learning, focusing on understanding network concepts, protocols, and their applications.

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	To Understand the basics of Computer Network Architecture ,OSI and TCP/IP reference model	K1 to K3
CLO2	To gain knowledge on Telephone systems using Wireless network	K1 to K3
CLO3	To understand the concept of MAC	K1 to K4
CLO4	To analyze the characteristics of Routing and Congestion control algorithms	K1 to K4
CLO5	To understand network security and define various Protocols such as FTP, HTTP, Telnet, DNS	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	1	1
CLO2	2	3	1	2	2	1
CLO3	3	1	1	2	1	2
CLO4	3	3	1	1	3	2
CLO5	3	3	1	3	2	1

1-Basic Level**2- Intermediate Level****3- Advanced Level****LESSON PLAN: TOTAL HOURS (90 HRS)**

UNIT	DESCRIPTION	HRS	MODE
I	Introduction – Network Hardware – Network Software – Reference Models: The OSI Reference Model – The TCP/IP Reference Model – Physical Layer: The Theoretical Basis for Data Communication - Guided Transmission Media	18	Chalk and Talk, PPT, group discussion , quiz, on the spot test

II	Wireless Transmission - Communication Satellites – The Public Switched Telephone Network: Structure of the Telephone System – The Local Loop: Modems, ADSL, and Fiber - Trunks and Multiplexing and Switching. The Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction.	17	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Elementary Data Link Protocols - Sliding Window Protocols. The Medium Access Control Sublayer – The Channel Allocation Problem – Multiple Access Protocols.	18	Chalk and Talk, PPT, group discussion, quiz, on the spot test
IV	The Network Layer: Network Layer Design Issues - Routing Algorithms - Congestion Control Algorithms – Internetworking.	18	PPT, group discussion, quiz, on the spot test
V	The Transport Layer: The Transport Service –Elements of Transport Protocols: Addressing – Connection Establishment - Connection Release – Network Security: Cryptography.	19	PPT, group discussion, quiz, on the spot test

Course Designer

Mrs. K. KRISHNAVENI

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
VI	Core	230UCA62	Data Analytics Using R Programming	4	6	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

Course Objectives:

1. To understand the problem solving approaches
2. To learn the basic programming constructs in R Programming
3. To learn the basic programming constructs in R Programming
4. To use R Programming data structures - lists, tuples, and dictionaries.
5. To do input/output with files in R Programming.

Course Content:

Unit I Introduction to Big Data: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with of Big Data – Hadoop Overview – HDFs (Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN (Yet Another Resource Negotiator). Introduction to MapReduce Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – searching – Sorting – Compression.

Unit-II Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors - Common Vector Operations' Vector Arithmetic and Logical Operations, Vector Indexing, Generating Useful Vectors with the: Operators.

Unit-III LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values, Applying Functions to Lists. Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations.

Unit-IV Factors and Tables - Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Doing Math and Simulations In R: Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R programming.

Unit-V Object-oriented programming: classes, S3 Generic functions, Implementations of Generic Methods – Writing S3 Classes – Using Inheritance. S4 Classes: Writing S4 Classes – Implementing a Generic Function on a S4 Class. Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

Books for Study:

1. Seema Acharya, Subhashini Chellappan, (2018), Bid Data and Analytics, Wiley Publisher, 1st Edition.

Chapters:

Unit-I : 2.1 to 2.4, 5.7, 5.10 to 5.13, 8.1 to 8.8

2. Norman Matloff, (2011), The Art of R Programming-A Tour of Statistical Software Design, William Pollock

Unit-II : 1.3, 1.4, 2.1, 2.4

Unit-III : 4.1-4.4, 5.1, 5.2

Unit- IV : 6.1, 6.2, 6.3, 8.1, 8.2

Unit -V : 9.1, 9.2

Books for Reference:

1. Garrett Grolemond, Hadley Wickham, (2014), Hands-On Programming with R: Write Your Own Functions and Simulations, 1st Edition.
2. Venables, W.N., and Ripley, (2000), Sprogramming-, Springer.
3. RogerD.Peng, (2012), Rprogramming for Data Science.

Web Resources/ E.Books:

1. <https://diytranscriptomics.com/Reading/files/The%20Art%20of%20R%20Programming.pdf>
2. <http://www.gvpcew.ac.in/Material/IT/2%20IT%20-%20UNIT-1%20Start%20Learning%20R.pdf>
3. https://bmsce.ac.in/Content/MCA/R-UNIT_1.pdf

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:**Knowledge and Skill:**

To make students strong encompass a range of abilities crucial for data analysis, statistical computing, and visualization

Activities to be given:

Students activities focus on R programming is a valuable skill for students in various fields, and engaging activities can make learning more enjoyable and effective. Students can benefit from coding challenges, interactive projects, and hands-on exercises.

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Work with big data tools and its analysis techniques.	K1 to K3
CLO2	Analyze data by utilizing clustering and classification algorithms.	K1 to K3
CLO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	K1 to K3
CLO4	Perform analytics on data streams.	K1 to K4
CLO5	Learn NoSQL databases and management.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	3	1	1
CLO2	3	3	2	3	2	2
CLO3	1	2	3	1	2	1
CLO4	2	2	1	1	2	1
CLO5	2	2	2	1	3	1

1-Basic Level

2- Intermediate Level

3- Advanced Level

LESSON PLAN: TOTAL HOURS (90 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High- Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model	18	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	CONTROL STRUCTURES AND VECTORS –Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations	19	Chalk and Talk, PPT, group discussion, quiz, on the spot test
	LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of	19	

III	a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations-.		Chalk and Talk, PPT, group discussion, quiz, on the spot test
IV	FACTORS AND TABLES - Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R PROGRAMMING .	18	quiz, on the spot test
V	OBJECT-ORIENTED PROGRAMMING S Classes, S Generic Functions, Writings Classes, Using Inheritance, S Classes, Writing S Classes , Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation	16	quiz, on the spot test

Course Designer
Mrs. K. KRISHNAVENI

Department of Computer Applications				Class : III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
VI	Core	23OUCA6P	R Programming Lab	4	6	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

PROGRAM LIST

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Write a program to find list of even numbers from 1 to n using R- Loops.
4. Create a function to print squares of numbers in sequence.
5. Write a program to join columns and rows in a data frame using cbind () and rbind () in R.
6. Implement different String Manipulation functions in R.
7. Implement different data structures in R (Vectors, Lists, Data Frames)
8. Write a program to read a csv file and analyze the data in the file in R.
9. Create pie chart and bar chart using R.
10. Create a data set and do statistical analysis on the data using R.
11. Program to find factorial of the given number using recursive function
12. Write a R program to count the number of even and odd numbers from array of N numbers.

Books for Reference:

1. Garrett Grolemond, Hadley Wickham, (2014), Hands-On Programming with R: Write Your Own Functions and Simulations, 1st Edition.
2. Venables, W.N., and Ripley, (2000), Sprogramming-, Springer.
3. Roger D. Peng, (2012), R Programming for Data Science.

Web Resources/ E.Books:

1. <https://cdlsiet.ac.in/wp-content/uploads/2023/03/R-Language-Lab-Manual-lab-1.pdf>
2. <https://ggnindia.dronacharya.info/CSE/Downloads/Labmanuals/R-Programming-Lab-14102024.pdf>
3. https://lbrce.ac.in/it/it_materials/Lab%20Manuals/R%20Lab%20Manual.pdf

Pedagogy

Practical Test with viva voce, Group Discussion, Interaction, Quiz.

LESSON PLAN FOR PRATICAL: TOTAL HOURS (90 HRS)

CYCLE	DESCRIPTION	HRS	MODE
1	<p>1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user 's choice.</p> <p>2. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.</p> <p>3. Write a program to find list of even numbers from 1 to n using R- Loops.</p>	16	Writing and executing the program in a system
2	<p>4. Create a function to print squares of numbers in sequence.</p> <p>5. Write a program to join columns and rows in a data frame using cbind () and rbind () in R.</p> <p>6. Implement different String Manipulation functions in R.</p>	18	Writing and executing the program in a system
3	<p>7. Implement different data structures in R (Vectors, Lists, Data Frames)</p> <p>8. Write a program to read a csv file and analyze the data in the file in R.</p>	17	Writing and executing the program in a system
4	<p>9. Create pie chart and bar chart using R.</p> <p>10. Create a data set and do statistical analysis on the data using R.</p>	19	Writing and executing the program in a system
5	<p>11. Program to find factorial of the given number using recursive function</p> <p>12. Write a R program to count the number of even and odd numbers from array of N numbers.</p>	20	Writing and executing the program in a system

Course Designer

Mrs. K. KRISHNAVENI

EVALUATION (PRACTICAL)**Core Lab / Skill Enhancement Course Lab****Internal** (Formative) : 40 marks**External** (Summative) : 60 marks

Total : 100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	40

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	60

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	DSEC	23OUCADSE6A	Cloud Computing	3	5	25	75	100
Nature of the Course								
Knowledge and Skill Oriented			Employability Oriented			Entrepreneurship oriented		
✓			✓			✓		

Course Objectives:

1. Learning fundamental concepts and Technologies of Cloud Computing.
2. Learning various cloud service types and their uses and pitfalls.
3. To learn about Cloud Architecture and Application design.
4. To study various aspects of application design, benchmarking and security on the Cloud.
5. To learn the various Case Studies in Cloud Computing.

Course Content:

Unit-I Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking.

Unit-II Cloud Services & Platforms: Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines. Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage. Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data store - Windows Azure SQL Database - Windows Azure Table Service. Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services. Identity and Access Management Services: Amazon Identify and Access Management - Windows Azure Active Directory. Open Source Private Cloud Software: Cloud Stack – Eucalyptus – OpenStack.

Unit-III Cloud Application Design: Introduction – Design Consideration for Cloud Applications: Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications- Cloud

Application Design Methodologies: RESTful Web Services – Data Storage Approaches: Relational (SQL) Approach, Non-Relational (NoSQL) Approach.

Unit-IV Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.

Unit- V Cloud for Industry, Healthcare & Education: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.

Book for Study:

Arshdeep Bahga, Vijay Madiseti, (2018) Cloud Computing – A Hands On Approach, Universities Press (India) Pvt. Ltd.,

Chapters:

Unit-I : 1.1 -1.4, 2.1-2.7

Unit-II : 3.1-3.3, 3.4(3, 4.1-3.4.3), 3.5, 3.8,3.9

Unit-III : 5.1-5.3, 5.4(5.4.5), 5.5

Unit- IV : 11.1-11.6, 12.1-12.6

Unit -V : 13.1-13.5

Books for Reference:

1. Anthony T Velte, Toby J Velte, Robert Elsenpeter, (2013), Cloud Computing: A Practical Approach, Tata McGraw-Hill.
2. Barrie Sosinsky, (2013), Cloud Computing Bible, Wiley India Pvt. Ltd.,
3. David Crookes, (2015), Cloud Computing in Easy Steps, Tata McGraw Hill.

Web Resources/ E. Books:

- 1.https://en.wikipedia.org/wiki/Cloud_computing
- 2.https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7
- 3.<https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-CDW-Cloud-Computing-Reference-Guide.pdf>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:**Knowledge and Skill:**

To make students allows encompass a broad range of technical and soft skills. Key areas include proficiency in major cloud platforms (AWS, Azure, GCP), understanding DevOps practices, data security, and application programming.

Activities to be given:

Students shall be allowed activities and projects for students to learn and apply their knowledge. These activities range from building simple applications and websites to exploring complex data analysis and cloud security.

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the fundamental concepts and Technologies in Cloud Computing.	K1 to K3
CLO2	Able to understand various cloud service types and their uses and pitfalls.	K1 to K4
CLO3	Able to understand Cloud Architecture and Application design.	K1 to K4
CLO4	Understand the various aspects of application design, Benchmarking and security in the Cloud.	K1 to K4
CLO5	Understand various Case Studies in Cloud Computing.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	2	3	3	1
CLO2	3	1	2	3	3	1
CLO3	3	2	1	2	1	3
CLO4	3	3	2	3	2	1
CLO5	2	2	1	3	3	3

1-Basic Level**2- Intermediate Level****3- Advanced Level**

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – MapReduce – Identity and Access Management – Service Level Agreements – Billing.	15	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service. Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services. Identity and Access Management Services: Amazon Identify and Access Management - Windows Azure Active Directory. Open Source Private Cloud Software: Cloud Stack – Eucalyptus –OpenStack.	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test

III	<p>Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).</p>	14	Chalk and Talk, PPT, group discussion, quiz, on the spot test
IV	<p>Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.</p>	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test

V	Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test
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Course Designer

Mrs. G. ALAMELU

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
VI	DSEC	23OUCADSE6B	Artificial Intelligence	3	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

Course Objectives:

1. To enable computers to perform such intellectual tasks as decision making, problem Solving, perception, understanding human communication.
2. Artificial intelligence shapes the future of every company.
3. Artificial intelligence creates synergy between humans and AI
4. Artificial intelligence helps with planning
5. Artificial intelligence performs more complex tasks

Course Content:

Unit- I Artificial Intelligence: What is Artificial Intelligence - The AI Problems - The Underlying Assumption - What is an AI Technique - Criteria for Success Problems - Problem Spaces And Search: Defining the Problem as a State Space Search -Production Systems –Problem Characteristics - Production System Characteristics -Issues in the Design of Search Programs.

Unit-II Heuristic Search Techniques: Generate and Test - Hill Climbing - Best First Search – Problem Reduction - Constraint Satisfaction - Means Ends Analysis. Knowledge Representation Issues: Representations and Mapping - Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem

Unit-III Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates – Resolution - Natural Deduction. Representing Knowledge Using Rules: Procedural versus Declarative Knowledge - Logic Programming - Forward Versus Backward Reasoning – Matching - Control Knowledge

Unit- IV Statistical Reasoning: Probability and Bayes' Theorem - Bayesian Networks - Fuzzy Logic. Game Playing: Overview - The Minimax Search Procedure - Adding Alpha-beta CutOffs - Iterative Deepening

Unit- V Natural Language Processing: Introduction - Syntactic Processing - Semantic Analysis. Expert Systems: Representing and Using Domain Knowledge - Expert System Shells – Explanation - Knowledge Acquisition.

Book for Study:

Elaine Rich, Kevin Knight and Shivashanker B Nair, (2010), Artificial Intelligence, McGraw Hill, 3rd Edition.

Chapters:

Unit - I : 1.1 – 1.3, 1.5, 2.1-2.5

Unit – II : 3.1-3.6, 4.1-4.4

Unit – III : 5.1 – 5.5, 6.1-6.5

Unit - IV : 8.1, 8.3, 8.5, 12.1-12.3, 12.5

Unit – V : 15.1 – 15.3, 20.1 -20.4

Books for Reference:

1. Kaushik, (2011), Artificial Intelligence, Cengage Publisher, 1st Edition.
2. Dr. Dheeraj Mehrotra, (2019), Basics of Artificial Intelligence & Machine Learning, Notion Press, 1st Edition.
3. Stuart Russell, (2013), Artificial Intelligence: A Modern Approach, Pearson Education, 3rd Edition.

Web Resources/ E.Books:

1. <https://www.javatpoint.com/artificial-intelligence-tutorial>
2. http://zsi.tech.us.edu.pl/~nowak/bien/BIEN_introduction
3. <https://www.guru99.com/artificial-intelligence-tutorial.html>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:

Knowledge and Skill:

Studying artificial intelligence opens a world of opportunities. At a basic level, it's better to understand the systems and tools that we interact with on a daily basis. In the field of artificial intelligence, the possibilities are truly endless

Activities to be given: Students shall be allowed to activities from understanding its core concepts to engaging in hands-on activities

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the importance, the basic concepts and the Applications of AI	K1 to K3
CLO2	Apply various search techniques used for Intelligent systems	K1 to K4
CLO3	Efficiently represent the various knowledge representation schemes used for intelligent systems.	K1 to K4
CLO4	Apply some statistical like Bayes Theorem and Soft computing techniques (like ANN and GA) to solve the AI problem	K1 to K4
CLO5	Understand the phases and the architecture of various advanced system like NLP based system and Expert System	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Artificial Intelligence: What is Artificial Intelligence - The AI Problems - The Underlying Assumption - What is an AI Technique - Criteria for Success Problems - Problem Spaces and Search : Defining the Problem as a State Space Search -Production Systems –Problem Characteristics - Production System Characteristics -Issues in the Design of Search Programs.	18	Chalk and Talk, PPT, group discussion , quiz, on the spot test

II	Heuristic Search Techniques: Generate and Test - Hill Climbing - Best First Search – Problem Reduction - Constraint Satisfaction - Means Ends Analysis. Knowledge Representation Issues : Representations and Mapping - Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates – Resolution - Natural Deduction. Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge - Logic Programming - Forward Versus Backward Reasoning – Matching - Control Knowledge	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test
IV	Statistical Reasoning: Probability and Bayes’ Theorem - Bayesian Networks - Fuzzy Logic. Game Playing: Overview - The Minimax Search Procedure - Adding Alpha-beta CutOffs - Iterative Deepening	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	Natural Language Processing: Introduction - Syntactic Processing - Semantic Analysis. Expert Systems: Representing and Using Domain Knowledge - Expert System Shells – Explanation - Knowledge Acquisition.	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer
Mrs.R. KEERTHANA

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	DSEC	23OUCADSEC6C	IOT and its Applications	3	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

Course Objectives:

1. Use of Devices, Gateways and Data Management in IoT.
2. Design IoT applications in different domain and be able to analyze their performance
3. Implement basic IoT applications on embedded platform
4. To gain knowledge on Industry Internet of Things
5. To Learn about the privacy and Security issues in IoT

Course Content:

Unit-I Driving European Internet of Things Research: The Internet of Things to Day-Time for Convergence - Towards the IoT Universe. Internet of Things Strategic Research and Innovation Agenda: Internet of Things Vision - IoT Strategic Research and Innovation Directions - Internet of Things and Related Future Internet Technologies.

Unit-II M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, an emerging industrial structure for IoT, the international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit-III IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

Unit- IV IoT Applications - Value Creation for Industry: Introduction- IoT Applications for Industry - Value Creation and challenges- Future Factory Concepts- Brownfield IoT: Technologies for Retrofitting- Smart Objects, Smart Applications- Four Aspects in your Business to Master IoT- Auto ID — Value Creation from Big Data and Serialization in the Pharmaceutical - IoT for Retailing Industry, IoT for Oil and Gas Industry- Opinions on IoT Application and Value for Industry.

Unit- V Internet of Things Privacy, Security and Governance: Introduction- Overview of Activity Chain- Governance, Privacy and Security Issues- Contribution from FP7 Projects- Security and Privacy Challenge in Data Aggregation for the IoT in Smart Cities: Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities- First Steps Towards a Secure Platform- Smartie Approach.

Book for Study:

Ovidiu Vermesan and Peter Friess, (2013.), “Internet of Things-Converging Technologies for Smart Environments and Integrated Ecosystems”, River Publisher.

Chapters:

Unit I : 1.1-1.3, 2.1, 2.2, 2.4

Unit IV : 3.1-3.10

Unit V : 4.1-4.3,5.1-5.3

Books for Reference:

1. Michael Miller, —The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, kindle version.
2. Francis daCosta, (2013), Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Press Publications, 1st Edition,
3. Walteneus Dargie, Christian Poellabauer, (2011), "Fundamentals of Wireless Sensor Networks: Theory and Practice

Web Resources/ E. Books:

1. <https://www.simplilearn.com>
2. <https://jcer.in/jcer-docs/E-Learning/Digital%20Library%20/E-Books/Internet-of-things-a-hands-on-approach-%20Arshadeep.pdf>
3. <https://dokumen.pub/internet-of-things-a-hands-on-approach-2015nbsped-9788173719547.html>

Pedagogy:

Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for Nature of Course:**Knowledge and Skill:**

To make students can include hardware, software, networking, data analysis, and cybersecurity. They need to understand embedded systems programming, networking protocols, and data analytics for effective IoT system development

Activities to be given:

Students shall be allowed to can include building projects like smart home systems, environmental monitoring, and traffic management

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Work with big data tools and its analysis techniques	K1 to K3
CLO2	Analyze data by utilizing clustering and classification algorithms.	K1 to K3
CLO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	K1 to K4
CLO4	Perform analytics on data streams.	K1 to K4
CLO5	Learn NoSQL databases and management.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	1	1
CLO2	2	3	1	2	1	1
CLO3	3	2	1	3	1	1
CLO4	1	3	1	1	3	2
CLO5	3	1	1	3	2	1

1-Basic Level

2- Intermediate Level

3- Advanced Level

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Driving European Internet of Things Research: The Internet of Things To Day-Time for Convergence - Towards the IoT Universe. Internet of Things Strategic Research and Innovation Agenda: Internet of Things Vision - IoT Strategic Research and Innovation Directions - Internet of Things and Related Future Internet Technologies.	18	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, an emerging industrial structure for IoT, the international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture Introduction, Functional View, Information View,	13	Chalk and Talk, PPT, group discussion, quiz, on the spot test

	Deployment and Operational View, Other Relevant architectural views.		
IV	IoT Applications - Value Creation for Industry: Introduction- IoT Applications for Industry - Value Creation and challenges- Future Factory Concepts- Brownfield IoT: Technologies for Retrofitting- Smart Objects, Smart Applications- Four Aspects in your Business to Master IoT- Auto ID — Value Creation from Big Data and Serialization in the Pharmaceutical - IoT for Retailing Industry, IoT for Oil and Gas Industry- Opinions on IoT Application and Value for Industry.	15	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	Internet of Things Privacy, Security and Governance: Introduction- Overview of Activity Chain- Governance, Privacy and Security Issues- Contribution from FP7 Projects- Security and Privacy Challenge in Data Aggregation for the IoT in Smart Cities: Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities- First Steps Towards a Secure Platform- Smartie Approach.	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test

Course Designer
Mrs.R. KEERTHANA

Department of Computer Applications				Class: III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	DSEC	23OUCADSE6D	Blockchain Technologies	3	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

Course Objectives:

1. Blockchain increases trust, security, transparency, and the traceability of data shared across a business network
2. Blockchain can be used to track information over time, enabling a secure, reliable audit of information
3. Blockchain-verified data is highly secure and trustworthy, meaning transactions can be processed much faster than in today's world without compromising security.
4. Blockchain is a database system that maintains and records data in a way that allows multiple organizations and individuals to confidently share access to the same data in real-time,
5. The encryption is done through cryptography to eliminate vulnerabilities such as unauthorized data tampering.

Course Content:

Unit-I Introducing Blockchain: Beginning at the Beginning: What Blockchain Are -The Structure of blockchains-Blockchain Applications- The Blockchain Life Cycle – Consensus: The Driving Force of Blockchains -Blockchains in Use.Picking a Blockchain-Where Blockchains Add Substance- Choosing a Solution.

Unit-II Getting Your Hands on Blockchain-Diving into the Bitcoin Blockchain- Using Smart Contracts with Bitcoin-Building a Private Blockchain with Docker and Ethereum Beholding the Bitcoin Blockchain: Getting a Brief History of the Bitcoin Blockchain—Debunking some common Bitcoin misconceptions - Bitcoin: The New Wild West-Mining for Bitcoins.

Unit-III Encountering the Ethereum Blockchain-Exploring the Brief History of Ethereum - Ethereum: The Open-Source World Wide Computer -Hacking a Blockchain-Getting Up and Running on Ethereum. Regarding the Ripple Blockchain-Getting a Brief History of the Ripple Blockchain- Ripple: It’s All About Trust-Seeing How Ripple Differs from Other Blockchains - Unleashing the Full Power of Ripple.

Unit-IV Finding the Factom Blockchain-A Matter of Trust -Building on Factom. Digging into DigiByte-Getting Familiar with DigiByte: The Fast Blockchain- Mining on DigiByte-Signing Documents on Digi Byte’s DiguSign -Earning DigiBytes While Gaming.

Unit- V Powerful Blockchain Platforms: Getting Your Hands on Hyperledger Getting to Know Hyperledger: Dreams of a Hyper Future- Focusing on Fabric-Investigating the Iroha Project- - Diving into Sawtooth Lake. Applying Microsoft Azure: Bletchley: The Modular Blockchain Fabric -Building in the Azure Ecosystem-Getting Started with Chain on Azure- Deploying Blockchain Tools on Azure.

Books for Study:

Blockchain for Dummies, (2017), Tiana Laurance, John Wiley & Sons Publisher

Chapters

Unit I : 1, 2

Unit II : 3, 4

Unit III : 5, 6

Unit IV : 7, 8

Unit V : 9, 10

Books for Reference:

1. Arshdeep Bahga and Vijay Madisetti, (2017), Blockchain Applications –A Hands on Approach, 1st Edition.
2. Raymond kazuya, (2018), Blockchain Technology and Blueprint Ultimate Guide -, Kindle Edition.
3. Ray Toffler, (2017), Blockchain Blueprint: The Complete Guide to Blockchain Technology and How it is Creating a Revolution, Kindle Edition.

Web Resources/ E.Books:

1. <https://www.packtpub.com/free-ebook/blockchain-by-example>
2. <https://www.blockchain-council.org/wp-content/uploads/2020/02/Blockchain- For-Beginners-Study-Guide-1>
3. <https://link.springer.com/book/10.1007/>

Pedagogy: Chalk and Talk, PPT, Group discussion, Quiz.

Rationale for nature of Course:**Knowledge and Skill:**

Students to learn about powerful Block chain platforms, so that Students will gain Knowledge about technologies used in Block chain.

Activities to be given:

Students learn Cryptocurrency Wallet. Blockchain-Based Voting System., Digital Identity Management.

Course Learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the fundamental concepts and Technologies in Cloud Computing.	K1 to K3
CLO2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	K1 to K3
CLO3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and Methods.	K1 to K3
CLO4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems	K1 to K4
CLO5	Have an ability to use software testing methods and modern software testing tools for their testing projects.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	2	2	2	1
CLO2	3	2	2	3	3	2
CLO3	2	3	3	2	2	3
CLO4	2	1	2	2	2	1
CLO5	2	2	3	2	2	2

1-Basic Level**2- Intermediate Level****3- Advanced Level**

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Introducing Blockchain: Beginning at the Beginning: What Blockchains Are -The Structure of Blockchains-Blockchain Applications- The Blockchain Life Cycle – Consensus: The Driving Force of Blockchains -Blockchains in Use.Picking a Blockchain-Where Blockchains Add Substance- Choosing a Solution.	16	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	Getting Your Hands on Blockchain-Diving into the Bitcoin Blockchain- Using Smart Contracts with Bitcoin-Building a Private Blockchain with Docker and Ethereum Beholding the Bitcoin Blockchain: Getting a Brief History of the Bitcoin Blockchain— Debunking some common Bitcoin misconceptions - Bitcoin: The New Wild West-Mining for Bitcoins.	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test
III	Encountering the Ethereum Blockchain-Exploring the Brief History of Ethereum - Ethereum: The Open-Source World Wide Computer -Hacking a Blockchain-Getting Up and Running on Ethereum. Regarding the Ripple Blockchain-Getting a Brief History of the Ripple Blockchain- Ripple: It's All About Trust-Seeing How Ripple Differs from Other Blockchains - Unleashing the Full Power of Ripple.	10	Chalk and Talk, PPT, group discussion, quiz, on the spot test
IV	Finding the Factom Blockchain-A Matter of Trust -Building on Factom. Digging into DigiByte-Getting Familiar with DigiByte: The Fast Blockchain- Mining on DigiByte-Signing Documents on DigiByte's DiguSign -Earning DigiBytes While Gaming.	16	Chalk and Talk, PPT, group discussion, quiz, on the spot test
V	Powerful Blockchain Platforms: Getting Your Hands on Hyperledger Getting to Know Hyperledger: Dreams of a Hyper Future- Focusing on Fabric-Investigating the Iroha Project- -Diving into Sawtooth	17	Chalk and Talk, PPT, group discussion, quiz, on the spot test

	Lake. Applying Microsoft Azure: Bletchley: The Modular Blockchain Fabric -Building in the Azure Ecosystem-Getting Started with Chain on Azure- Deploying Blockchain Tools on Azure.		
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Course Designer
Mrs. G. ALAMELU

Department of Computer Applications				Class : III B.C.A				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
VI	SEC	23OUCASEC6P	Networking Lab	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓	✓	✓

PROGRAM LIST

1. Study of different types of Network cables
2. Study of Network Devices in Detail.
3. Study of network IP.
4. Connect the computers in Local Area Network.
5. Study of basic network command and Network configuration commands.
6. Performing an Initial Switch Configuration
7. Performing an Initial Router Configuration
8. Configuring and Troubleshooting a Switched Network
9. Connecting a Switch
10. Configuring WEP on a Wireless Router
11. Using the Cisco IOS Show Commands
12. Examining WAN Connections
13. Interpreting Ping and Trace Route Output
14. Demonstrating Distribution Layer Functions
15. Print a Client Address at Server End
16. Exploring Different LAN Switch Options
17. Implement three nodes point – to – point network with duplex links.
18. Implement an Ethernet LAN using n nodes
19. Study of Simple Network using Hubs.
20. Study of Networks using Hubs.
21. Simulation of DNS using UDP sockets.

22. Write a code simulating ARP protocols.
23. Write a code simulating RARP protocols.
24. Study of TCP/UDP performance using Simulation tool.
25. Simulation of Distance Vector Routing algorithm.
26. Simulation of error correction code (like CRC).
27. Performance evaluation of Routing protocols using Simulation tool.

Books for Reference:

1. Comer, (2004), Computer Networks & Internet with Internet Applications, 4th edition Pearson Education, Pearson Prentice Hall, New Delhi,
2. Achyut s Godbole, Atul Kahate, (2013), Data Communications and Networks 2nd Editon, Tata McGraw Hill.
3. Simin Haykins S, (2006), Communication System,4th Edition Tata McGraw- Hill, New Delhi,

Web Resources/ E.Books:

1. <https://www.scribd.com/document/531794678/DCN-Lab-Manual-JNUH-Hyderabad>
2. http://iotmumbai.bharativedyapeeth.edu/media/pdf/lab_manuals/Manual_CM4I_DCC_22414_120421.pdf
3. <https://www.studocu.com/row/document/unknown/data-communication/dcn-lab-manual-data-communication/10436159>

Pedagogy

Practical Test with viva voce, Group Discussion, Interaction, Quiz.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (30 HRS)

CYCLE	DESCRIPTION	HRS	MODE
1	1. Study of different types of Network cables 2. Study of Network Devices in Detail. 3. Study of network IP. 4. Connect the computers in Local Area Network. 5. Study of basic network command and Network configuration commands.	6	Writing and executing the program in a system
2	6. Performing an Initial Switch Configuration 7. Performing an Initial Router Configuration 8. Configuring and Troubleshooting a Switched Network 9. Connecting a Switch 10. Configuring WEP on a Wireless Router 11. Using the Cisco IOS Show Commands 12. Examining WAN Connections	5	Writing and executing the program in a system
3	13. Interpreting Ping and Trace route Output 14. Demonstrating Distribution Layer Functions 15. Print a Client Address at Server End 16. Exploring Different LAN Switch Options 17. Implement three nodes point – to – point network with duplex links. 18. Implement an Ethernet LAN using n nodes	6	Writing and executing the program in a system
4	19. Study of Simple Network using Hubs. 20. Study of Networks using Hubs. 21. Simulation of DNS using UDP sockets. 22. Write a code simulating ARP protocols.	5	Writing and executing the program in a system

	23. Write a code simulating RARP protocols.		
5	24. Study of TCP/UDP performance using Simulation tool. 25. Simulation of Distance Vector Routing algorithm. 26. Simulation of error correction code (like CRC). 27. Performance evaluation of Routing protocols using Simulation tool.	8	Writing and executing the program in a system

Course Designer
Mrs. K. KRISHNAVENI

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total : 100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	40

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	60