	<b>Sub Title: Automata Theory and Introduction to Compilers</b>		
	<b>Sub Code:</b> <b>21CST501</b>	<b>No. of Credits:3=3: 0: 0</b> <b>(L-T-P)</b>	<b>No. of lecture hours/week: 3</b>
	<b>Exam Duration:</b> <b>3 hours</b>	<b>CIE +Assignment + SEE =</b> <b>45 + 5 + 50 =100</b>	<b>Total No. of Contact Hours:</b> <b>42</b>

### Course Objectives

The objective of the course is to

1. Present fundamental concepts and techniques for designing Automata.
2. Provide necessary background for formulating real-world problems to Finite state machines, construct regular expressions and conversion between themselves.
3. Use the pumping lemma to demonstrate the non-regularity of languages.
4. Design Pushdown Automata for various context-free Grammars, also design Turing Machines.
5. Present fundamental concepts and techniques for the design of a compiler

<b>Unit No</b>	<b>Syllabus Content</b>	<b>No. of Hours</b>
1	<b>Introduction to Finite Automata:</b> Introduction to Finite Automata; The central concepts of Automata theory; <b>Deterministic finite automata</b> ; The Language of a DFA, Extending the Transition Function to Strings, <b>Nondeterministic finite automata</b> and its conversion, The Extended Transition Function, Equivalence of Deterministic and Nondeterministic Finite Automata, Finite automata with Epsilon-transitions, Extended Transitions and Languages for NFAs, Eliminating Epsilon-Transitions	9
2	<b>Regular Expressions:</b> The Operators of Regular Expressions, Building Regular Expressions, From DFAs to Regular Expressions, Converting DFAs to Regular Expressions by Eliminating States, Converting Regular Expressions to Automata <b>Regular Languages:</b> Regular languages; Proving languages not to be regular languages; Equivalence and minimization of automata	8
3	<b>Context-Free Grammars and Languages :</b> Context-free grammars, Definition, Examples, Derivation, Parse trees; Ambiguity in grammars and Languages.	8
4	<b>Pushdown Automata:</b> Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG. <b>Introduction To Turing Machine:</b> Problems that Computers cannot solve; Definition and representation, Basic model of Turing Machine, Instantaneous Description, Language acceptance by Turning Machines, Programming techniques for Turning Machines	9

5	<b>Introduction to Compiler Design:</b> The Structure of a Compiler, Language Processors, Phases of Compilers, Applications of Compiler Technology, Programming Language Basics. Lexical Analysis Phase of compiler Design: Role of Lexical Analyzer, Input Buffering, Specification of Token, Recognition of Token.	8
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Course Outcomes	Statements	Bloom's Level
CO1	Design different finite state machines for regular languages, make conversion between them, construct the regular expression and study its applications.	6
CO2	Obtain a minimized DFA, convert the given automata to regular expressions and vice-versa and prove languages not to be regular using pumping lemma.	4
CO3	Know basic definitions in Grammar, Write CFGs, Construct parse trees, find and remove ambiguity in grammars.	3
CO4	Study Pushdown Automata, Design NPDA and DPDA after the CFG conversion and convert PDAs to grammar. Design Turing machines to solve	2
CO5	Illustrate the structure of compiler including its phases and components and Design and Implement Lexical Analyzer for different programming constructs by having a good knowledge of Context Free Grammars.	3

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	2	-	-	-	-	-	-	2	2	-
CO2	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO3	2	-	2	-	2	-	-	-	-	-	-	-	2	1	-
CO4	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO5	2	2	2	-	2	2	-	-	-	-	-	-	2	1	-

#### Text Book:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, Publisher: Pearson Education; Third edition (2011)  
(Chapters: 1.1, 1.5, 2.2 to 2.5, 3.1 to 3.3, 4, 5, 6, 7, 8.1 to 8.4, 8.6)  
ISBN-10: 8131762688 & ISBN-13: 978-8131762684
2. Alfred W Aho, Monica S Lam, Ravi Sethi, and Jeffrey D Ullman, "Compilers-Principles, Techniques and Tools" Publisher: Pearson Education; Second edition (1 January 2011)  
ISBN-10: 8131759024 ISBN-13: 978-8131759028

#### Reference Books:

# Dr. Ambedkar Institute of Technology, Bengaluru-56

## Department of Computer Science & Engineering

### Scheme and Syllabus - CSE – 2022 -2023

Course Title	COMPUTER NETWORKS						
Course Code	21CST502						
Category and Type	Integrated						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	60	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		


#### COURSE OBJECTIVES:

1. Fundamentals of data communication networks.
2. Software and hardware interfaces.
3. Application of various physical components and protocols.
4. Communication challenges and remedies in the networks.

<b>UNIT I</b>	<b>9 hours</b>
Introduction to networks: Introduction Data communications, Networks, Internet, protocols and standards layered tasks, layered tasks, layers in the OSI Model, TCP/IP protocol suite, Introduction to NS2.	
<b>UNIT II</b>	<b>8 hours</b>
The Data link layer: Introduction(Types of Errors, Redundancy, Detection Versus Correction) Block Coding (Error Detection and correction, Hamming Distance ), Cyclic Codes(Cyclic Redundancy Check) Checksum(Internet Checksum) Framing, Stop and wait ARQ, Random access.	
<b>UNIT III</b>	<b>8 hours</b>
The Network Layer: Network Layer Design Issues, Routing Algorithms (Distance vector and Link state) Congestion Control Algorithms (leaky Bucket), IPV4-addressing, header format, subnet addressing, fragmentation and reassembly; IPV6-addressing, header format.	
<b>UNIT IV</b>	<b>9 hours</b>
The Transport Layer: User datagram protocol; Transmission control protocol; TCP congestion control; Internet routing protocols (RIP,OSPF).	
<b>UNIT V</b>	<b>8 hours</b>
Application Layer: Domain Name Space, Electronic Mail, File Transfer, Web Documents and HTTP,Network Management System.	

Programming Assignments		
Practice Programs		
1.		Write and execute to simulate Network Topology - Star, Bus, Ring structures.
2.		Write and execute a C/C++ program for parity detection.
3.		Write and execute a C/C++ program for Hamming Code
4.		Write and execute NS2 code to create scenario and study the performance of token bus protocol through simulation.
5.		Write and execute NS2 code to simulate and to study stop and Wait protocol
6.		Write and Execute a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and FTP between n1-n3. Apply relevant applications over TCP and FTP agents changing the parameter and determine the number of packets sent by TCP / FTP.
<b>Lab Programs</b>		
<b>Instructions to the Students</b>		
<b>Part a: Students will be executing programs in C/C++</b>		
<b>Part b: Shall be conducted using either NS2</b>		
1	A	Write a program for error detecting code using CRC-CCITT (16- bits).
	B	Simulate a three nodes point-to-point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2	A	Write a program for distance vector algorithm to find suitable path for transmission.
	B	Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.
3	A	Write a program for congestion control using leaky bucket algorithm.
	B	Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
4	A	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Link state algorithm.
	B	Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and determine collision across different nodes.
5	A	Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present
	B	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

	<b>Course Title: DATABASE MANAGEMENT SYSTEMS</b>		
	<b>Course Code : 21CST503</b>	<b>No. of Credits: 3: 0: 0 (L-T-P)</b>	<b>No. of lecture hours/week : 3</b>
	<b>Exam Duration : 3 hours</b>	<b>CIE+ Assignment + SEE = 45+5+50=100</b>	<b>Total No. of Contact Hours : 42</b>
<b>Description</b>			
<b>Course Objectives:</b>	<p>1. To understand the different issues involved in the design and implementation of a database system.</p> <p>2. To study the physical and logical database designs, database modeling, relational algebra concepts.</p> <p>3. To understand and use data manipulation language to query, update and manage a database.</p> <p>4. To develop an understanding of essential DBMS concepts such as normalization and transaction concepts.</p>		
<b>Unit No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>	
<b>1</b>	<b>Introduction:</b> Introduction, an example, Characteristics of Database approach; Advantages of using DBMS approach; Data models, schemas and instances; three schema architecture and data independence; Database languages and interfaces; Classification of Database management systems. Entity-Relationship model; using High- Level conceptual Data Models for database Design; An example Database Application; Entity types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and structural Constraints; Weak Entity types; Refining the ER Design, ER to relational schema diagram mapping	9	
<b>2</b>	<b>Relational Model and Relational Algebra:</b> Relational Model Concepts; relational Model constraints and Relational Database Schemas; update operations, Transactions and dealing with constraint violations; Unary Relational Operations; SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.	8	
<b>3</b>	<b>SQL:</b> Specifying basic constraints in SQL; schema change statements in SQL; Basic queries in SQL; More complex SQL queries-Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL.	8	
<b>4</b>	<b>Database Design:</b> Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Cod Normal form, Properties of Relational Decompositions; Algorithms for relational Database Schema Design; Multi-valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form	9	

5	<b>Transaction Management:</b> Transaction and System Concepts, Desirable Properties of Transactions, characterizing schedules based on Recoverability, characterizing schedules based on Serializability. Two-Phase Locking Techniques for Concurrency Control, Concurrency Control based on Timestamp ordering.											8
<b>Course Outcomes</b>		<b>Description</b>										<b>RBT Levels</b>
<b>CO1</b>		Understand the basic concepts and architecture associated with DBMS so as to employ the conceptual and relational models to design large database systems.										<b>L4</b>
<b>CO2</b>		Create, maintain and manipulate a relational database using SQL.										<b>L4</b>
<b>CO3</b>		Analyze the database design & normalize it so that the data conforms to design principles.										<b>L4</b>
<b>CO4</b>		Apply the characteristics of database transactions and assess how they affect database integrity and consistency.										<b>L3</b>
<b>CO-PO Mapping</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	3	3	2								
<b>CO2</b>	3	3	3	3	2							
<b>CO3</b>	3	3	2	2								
<b>CO4</b>	2	2	2									
<b>Strong -3      Medium -2      Weak -1</b>												
<b>TEXT BOOKS:</b>												
1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015, ISBN-10: 0133970779, ISBN-13: 978-0133970777												
<b>REFERENCE BOOKS:</b>												
1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006. 2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education, 2013. 3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.												
<b>SELF STUDY REFERENCES / WEBLINKS:</b>												
1. Database Management System: <a href="https://onlinecourses.nptel.ac.in/noc19_cs46/course">https://onlinecourses.nptel.ac.in/noc19_cs46/course</a> 2. Introduction to Database Management Systems: <a href="https://www.youtube.com/watch?v=OMwgGL3IHII&amp;list=PLBlnK6fEyqRiyrTrbKHX1Sh9luYI0dh">https://www.youtube.com/watch?v=OMwgGL3IHII&amp;list=PLBlnK6fEyqRiyrTrbKHX1Sh9luYI0dh</a> 3. SQL Tutorial - Full Database Course for Beginners: <a href="https://www.youtube.com/watch?v=HXV3zeQKqGY">https://www.youtube.com/watch?v=HXV3zeQKqGY</a>												
<b>COURSE COORDINATORS:</b>				<b>Dr. Asha, Mrs. Veena Potdar</b>								

**Dr. Ambedkar Institute of Technology, Bengaluru-560056**  
**Department of Computer Science & Engineering Scheme and Syllabus-CBCS**  
**2023 -2024**

Course Title	<b>CLOUD INFRASTRUCTURE SERVICES</b>						
Course Code	<b>21CST5083</b>						
Category	Ability enhancement course – V						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Max. Marks=100</b>			<b>Duration of SEE:03 Hours</b>		

**COURSEOBJECTIVES:**

This course will help students to achieve the ability to:

- CO 1:** Analyze the working of data centers using Cloud Analyst simulator.
- CO 2:** Develop web applications in cloud in SALESFORCE and GOOGLE Cloud Platforms.
- CO 3:** Demonstrate resource utilization in the AWS Cloud.
- CO 4:** Demonstrate the usage of Virtualbox/VMware Workstation.
- CO 5:** Learn the design and development process involved in creating a cloud-based application

	<b>Practice Programs</b>
	<ul style="list-style-type: none"> <li>• Learn about Cloud Analyst simulator</li> <li>• Understand how business process work by completing the modules in Sales force platform and earn the Sales force badges</li> <li>• Installation of Google App engine and application development</li> <li>• Demonstration of service utilization in AWS</li> <li>• Installation of VMware</li> </ul>

<b>Exp. No</b>	<b>Experiment List</b>
<b>PART-A</b>	
1	a) Creation of the following web applications on Salesforce cloud Platform. <ul style="list-style-type: none"> <li>a) Create a web application to enter the students' details like name, USN, semester, section and CGPA to a database on Salesforce cloud platform.</li> <li>b) Create a web application to implement an online cart for adding items to a shopping cart and deleting it.</li> <li>c) Create a web application to enter the faculty details like faculty ID, faculty name,</li> </ul>

		<p>and salary to a database and calculate the income tax to be paid by the faculty at the end of financial year.</p> <p>d) Create a web application to book a flight from a source to destination and store the status of flight, and departure timings on database.</p> <p>e) Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively.</p> <p>f) Develop Department events' registration app with an object containing event name , date/time , venue as parent relationship , another object containing student name, branch, event name , date/time , venue as child relationship.</p> <p>g) Develop Blood donation registration app with an object which records donors' name , age and blood group as parent relationship and another object containing haemoglobin level, donated or not details (if age&gt;18) child relationship.</p> <p>h) Develop Attendance maintenance app with an object to record student details and attendance and a provide a link to college websites' results webpage.</p> <p>i) Create a web application with objects to maintain database of an art gallery which contains objects like artists, arts , inventory and provide a link to any of the art gallery website.</p> <p>j) Create a web application with objects to record details about staff, syllabus and activities of a department and provide a link to college website from any of the objects</p>																																					
	b)	<p>Use the following userbase configuration to simulate following scenarios for the given data centre and virtual machine configuration and answer to the following questions.</p> <p><b>Scenario-1:</b> Nearest data center with round robin policies</p> <p><b>Scenario-2:</b> Optimize response time with round robin policies</p> <table><tr><th>User base</th><th>Region</th><th>Data center</th><th>Peak-hour users</th><th>Off-peak hour users</th><th>Virtual machines</th></tr><tr><td>UB1</td><td>North America</td><td>--</td><td>1000</td><td>500</td><td rowspan="6">DC1-50</td></tr><tr><td>UB2</td><td>South America</td><td>--</td><td>800</td><td>1200</td></tr><tr><td>UB3</td><td>Europe</td><td>DC1</td><td>2000</td><td>1000</td></tr><tr><td>UB4</td><td>Africa</td><td>--</td><td>500</td><td>300</td></tr><tr><td>UB5</td><td>Asia</td><td></td><td>3000</td><td>300</td></tr><tr><td>UB6</td><td>Ocenia</td><td></td><td>1500</td><td>150</td></tr></table> <p>i) Tabulate the overall response time of all the scenarios and plot a line graph</p> <p>ii) Plot a bar graph for the data processing time of all the scenarios</p> <p>iii) Compare average response time by regions of all scenarios by plotting line graph</p> <p>iv) Using Pie chart show the total cost spent for each scenario</p>	User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines	UB1	North America	--	1000	500	DC1-50	UB2	South America	--	800	1200	UB3	Europe	DC1	2000	1000	UB4	Africa	--	500	300	UB5	Asia		3000	300	UB6	Ocenia		1500	150
User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines																																		
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UB4	Africa	--	500	300																																			
UB5	Asia		3000	300																																			
UB6	Ocenia		1500	150																																			
2	a)	Install Virtualbox/VMware Workstation with different flavours of linux and execute some C programs																																					



	b)	Simulate the following scenarios for the given userbase, data centre and virtual machine configuration and answer to the given questions																																			
		<table><tr><th>Scenario</th><th>Scenario Description</th><th>Load Balancing algorithm</th><th>Service broker policy</th></tr><tr><td>1</td><td>One data center with 50 Virtual Machines for UB1</td><td rowspan="3">Nearest Data Centre</td><td rowspan="3">Round robin</td></tr><tr><td>2</td><td>Two data centers with 25 and 50 Virtual Machines respectively for UB1</td></tr><tr><td>3</td><td>Three data centers with 100,75 and 25 Virtual Machines respectively for UB1</td></tr></table>						Scenario	Scenario Description	Load Balancing algorithm	Service broker policy	1	One data center with 50 Virtual Machines for UB1	Nearest Data Centre	Round robin	2	Two data centers with 25 and 50 Virtual Machines respectively for UB1	3	Three data centers with 100,75 and 25 Virtual Machines respectively for UB1																		
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i) Tabulate the overall response time and data processing of all the scenarios and plot the bar graph																																					
ii) Plot a line graph of data center request servicing time of all the data centers for all the scenarios																																					
iii) Compare average response time by regions of all scenarios by plotting line graph																																					
		iv) Mention the data centers used by the UB2,UB3, UB4 and UB5																																			
3	a)	Install Google App Engine. Create hello world app and other simple web applications using python/java.																																			
	b)	Simulate the following scenarios for given data centre, data centre and virtual machine configuration and answer the following questions <b>Scenario 1:</b> closest data center and round robin policies <b>Scenario 2:</b> optimize response time and round robin policies Use the following userbase configuration for all the scenarios																																			
		<table><tr><th>User base</th><th>Region</th><th>Data center</th><th>Peak-hour users</th><th>Off-peak hour users</th><th>Virtual machines</th></tr><tr><td>UB1</td><td>North America</td><td>DC1, DC3</td><td>1000</td><td>500</td><td>DC1-50 DC3-100</td></tr><tr><td>UB2</td><td>South America</td><td>---</td><td>800</td><td>1200</td><td></td></tr><tr><td>UB3</td><td>Europe</td><td>DC4</td><td>2000</td><td>1000</td><td>DC4-150</td></tr><tr><td>UB4</td><td>Africa</td><td>--</td><td>500</td><td>300</td><td></td></tr></table>						User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines	UB1	North America	DC1, DC3	1000	500	DC1-50 DC3-100	UB2	South America	---	800	1200		UB3	Europe	DC4	2000	1000	DC4-150	UB4	Africa	--	500	300	
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UB3	Europe	DC4	2000	1000	DC4-150																																
UB4	Africa	--	500	300																																	
		i) Tabulate and compare the Average response time and data processing time of all the scenarios by plotting the line graph																																			
		ii) Tabulate the response time of user bases in all scenarios and compare these by plotting bar graph. Which user base is taking maximum time among three scenarios? Why																																			
		iii) Calculate the data transmission time from DC1 to UB2																																			
		iv) Plot the bar graph for data center cost of all scenarios																																			
4	a)	Demonstrate the following services in AWS																																			
	i) Create a RDS and launch in your custom VPC Network. ii) Creating a custom VPC and launch an EC2 Instance in your VPC.																																				

		<div>iii) Creating IAM users and applying policies.-</div> <div>iv) CUSTOM VPC &amp; Subnet Creation.</div> <div>v) Logging to the EC2 Windows Instance</div> <div>vi) Login to EC2 Instance</div>																																																								
b)	Analyze the various service broker policies for the following configuration and answer the following questions.	<table><tr><th>Parameter</th><th>Value Used</th></tr><tr><td>UB Name</td><td>UB1</td></tr><tr><td>Region</td><td>2</td></tr><tr><td>Request Per User Per Hour</td><td>60</td></tr><tr><td>Data Size Per Request</td><td>100</td></tr><tr><td>Peak hour start(GMT)</td><td>3</td></tr><tr><td>Peak hour end (GMT)</td><td>9</td></tr><tr><td>Avg Peak Users</td><td>40000</td></tr><tr><td>Avg Off Peak Users</td><td>4000</td></tr><tr><td>DC 1 – No Of VM</td><td>75</td></tr><tr><td>DC 2 – No Of VM</td><td>50</td></tr><tr><td>DC 3 – No Of VM</td><td>25</td></tr><tr><td>VM Image Size</td><td>10000 MB</td></tr><tr><td>VM Memory</td><td>512 MB</td></tr><tr><td>VM Bandwidth</td><td>1000 bps</td></tr><tr><td>DC 1 – No Of Physical Machine</td><td>2</td></tr><tr><td>DC 2 – No Of Physical Machine</td><td>2</td></tr><tr><td>DC 3 – No Of Physical Machine</td><td>2</td></tr><tr><td>DC – Memory Per Machine</td><td>204800 Mb</td></tr><tr><td>DC – Storage Per Machine</td><td>100000000 Mb</td></tr><tr><td>DC – Available BW Per Machine</td><td>1000000</td></tr><tr><td>DC – No Of Processors Per Machine</td><td>4</td></tr><tr><td>DC – Processor Speed</td><td>10000 MIPS</td></tr><tr><td>DC – VM Policy</td><td>Time Shared</td></tr><tr><td>User Grouping Factor</td><td>1000</td></tr><tr><td>Request Grouping Factor</td><td>100</td></tr><tr><td>Executable Instruction Length</td><td>500</td></tr><tr><td>Load Balancing Policy</td><td>Throttled</td></tr></table> <div>a) Tabulate and compare the data processing time of service broker policies by plotting the line graph</div> <div>b) Tabulate and compare response time of service broker policies by plotting the bar graph</div> <div>c) Tabulate the cost for service broker policies and represent it using pie chart</div> <div>d) Which service broker policy is best and why?</div>	Parameter	Value Used	UB Name	UB1	Region	2	Request Per User Per Hour	60	Data Size Per Request	100	Peak hour start(GMT)	3	Peak hour end (GMT)	9	Avg Peak Users	40000	Avg Off Peak Users	4000	DC 1 – No Of VM	75	DC 2 – No Of VM	50	DC 3 – No Of VM	25	VM Image Size	10000 MB	VM Memory	512 MB	VM Bandwidth	1000 bps	DC 1 – No Of Physical Machine	2	DC 2 – No Of Physical Machine	2	DC 3 – No Of Physical Machine	2	DC – Memory Per Machine	204800 Mb	DC – Storage Per Machine	100000000 Mb	DC – Available BW Per Machine	1000000	DC – No Of Processors Per Machine	4	DC – Processor Speed	10000 MIPS	DC – VM Policy	Time Shared	User Grouping Factor	1000	Request Grouping Factor	100	Executable Instruction Length	500	Load Balancing Policy	Throttled
Parameter	Value Used																																																									
UB Name	UB1																																																									
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Peak hour start(GMT)	3																																																									
Peak hour end (GMT)	9																																																									
Avg Peak Users	40000																																																									
Avg Off Peak Users	4000																																																									
DC 1 – No Of VM	75																																																									
DC 2 – No Of VM	50																																																									
DC 3 – No Of VM	25																																																									
VM Image Size	10000 MB																																																									
VM Memory	512 MB																																																									
VM Bandwidth	1000 bps																																																									
DC 1 – No Of Physical Machine	2																																																									
DC 2 – No Of Physical Machine	2																																																									
DC 3 – No Of Physical Machine	2																																																									
DC – Memory Per Machine	204800 Mb																																																									
DC – Storage Per Machine	100000000 Mb																																																									
DC – Available BW Per Machine	1000000																																																									
DC – No Of Processors Per Machine	4																																																									
DC – Processor Speed	10000 MIPS																																																									
DC – VM Policy	Time Shared																																																									
User Grouping Factor	1000																																																									
Request Grouping Factor	100																																																									
Executable Instruction Length	500																																																									
Load Balancing Policy	Throttled																																																									
5	a)	<div>Demonstrate Virtualization in VM WARE</div> <div>Case Study of ESXi Bare Metal Hypervisor: Create and deploy a Virtual Machine on ESXi Server with an operating system onto it. Deploy a web application onto the VM to read a text file and display it on the web browser.</div>																																																								
b)	Analyze the various load balancing algorithms for the given userbase, data centre and virtual machine configuration and answer the following questions. Consider the following userbase configuration for all load balancing algorithms	<table><tr><td>Number of User bases</td><td>06</td></tr></table>	Number of User bases	06																																																						
Number of User bases	06																																																									

		Region for the userbases	UB1-South America, UB2-Asia, UB3-North America, UB4-Europe, UB5-Africa, UB6-Ocenia
		Average peak users for all the user bases	10000
		Average off-peak users for all the user bases	100
		Peak hours' time	Depends on the region
		Data centers in each user base	UB1-1, UB2-2, UB3-1, UB4-3, UB5-2, UB6-1
		Virtual machines in each data center	6
		Simulation time	10 mins
		Service broker policy	Nearest data center
		a) Tabulate and compare the data processing time of load balancing algorithms by plotting the line graph b) Tabulate the response time of load balancing algorithms by plotting the bar graph c) Tabulate the response time by region for load balancing algorithms and plot bar graph d) Which load balancing algorithm is best and why?	
		<b>PART-B</b>	
		Design and implementation of mini projects using concepts of cloud computing.	

**Note:**

1. Students can pick one experiment from the questions lot of **PART A** with equal choice to all the students in a batch. For **PART B**, Student should develop a mini project and it should be demonstrated in the laboratory examination (with report).
2. Weightage of marks for **PART A** is **60%** and for **PART B** is **40%**. General rubrics suggested to be followed for part A and part B.
3. Change of experiment is allowed only once (in part A) and marks allotted to the procedure part to be made zero.

**Course Outcomes:** At the end of the course the student will be able to:

**CO 1:** Describe and analyze the cloud setting using Cloud Analyst simulator.

**CO 2:** Develop applications on different cloud platforms such as Salesforce, Google App Engine, AWS.

**CO 3:** Use various services of AWS.

**CO 4:** Demonstrate Virtualization concepts.

**CO 5:** Implement mini project using various cloud platform services

**Dr. Ambedkar Institute of Technology,  
Bengaluru-56**  
**Department of Computer Science & Engineering**  
**Scheme and Syllabus-NEP – 2023-2024**

Course Title	<b>ADVANCED JAVA PROGRAMMING</b>						
Course Code	<b>21CST504</b>						
Category	<b>PROFESSIONAL CORE COURSE</b>						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	01	00	00	03	42	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE:03 Hours		

### COURSE OBJECTIVES

1. To understand String Functions, Collections and Framework in Java programming language.
2. To create and understand the basic Networking concepts and RMI in Java.
3. To design Event Handling, GUI applications Using Swings and JDBC with advanced Java concepts.
4. Design and develop, Distributed and Server based applications in Java.

<b>UNIT-1</b>	<b>9 Hours</b>
<b>String Handling :</b> The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf ( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer.	
<b>Networking:</b> Networking Basics: The Networking Classes and Interfaces;TCP/IP Client Sockets;TCP/IP Server Sockets.	
<b>Java Remote Method Invocation (RMI):</b> Remote Method Invocation concept and technology.	
<b>UNIT-2</b>	<b>8 Hours</b>
<b>The collections and Framework:</b> The collections and Framework: Collections Overview, The Collection Interfaces, The Collection Classes, Accessing a collection, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections? , The legacy Classes and Interfaces, Parting Thoughts on Collections.	
<b>UNIT-3</b>	<b>8 Hours</b>

**Swings:** Swings, The origins of Swing, Swing is built on the AWT, Two key Swing features, The MVC Connection, Components and Containers, The Swing Packages, A simple Swing Application, Event Handling, Create a Swing Applet, JLabel and ImageIcon, JTextField, The Swing Buttons, JScrollPane, JList, JComboBox, JTable.

#### **UNIT-4**

**9 Hours**

**Servlet:** The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; Packages; Handling HTTP Requests and Responses; Handling Cookies; Session Tracking.  
**Java Server page(JSP):** Overview of JSP; JSP tags; Invoking java code with Scripting Elements.

#### **UNIT-5**

**8 Hours**

**JDBC:** The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.

**TEACHING LEARNING PROCESS:** Chalk and Talk, Powerpoint presentation, animations, videos.

**COURSE OUTCOMES:** On completion of the course, student should be able to,

**CO1:** To apply strings, collections and Swings in developing modular and efficient programs.

**CO2:** To analyze Java applications comprising of RMI, Servlet and JSP.

**CO3:** To develop Java applications along with database connection using JDBC Package.

**CO4:** To develop programs that demonstrate the advanced Java and J2EE concepts.

#### **TEXT BOOKS**

1. The Complete Reference - Java , Herbert Schildt 9th Edition, 2016, TMH Publications, ISBN: 978-93-392-1209-4.
2. J2EE - The Complete Reference Jim Keogh, 2017 Tata McGraw Hill.

#### **REFERENCE BOOKS**

1. Cay S. Horstmann : Core Java volume I-Fundamental , 11<sup>th</sup> Edition, Pearson Education, 2019.

#### **ONLINE RESOURCES**

1. Java Program: [https://www.youtube.com/watch?v=mQj34vUhpts&list=PLfn3cNtmZdPOe3RwO\\_h540QNfMkCQ0ho&index=44&t=0s](https://www.youtube.com/watch?v=mQj34vUhpts&list=PLfn3cNtmZdPOe3RwO_h540QNfMkCQ0ho&index=44&t=0s)
2. Java Program: [https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3RwO\\_h540QNfMkCQ0ho&index=44](https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3RwO_h540QNfMkCQ0ho&index=44)

	<b>Course Title: DATABASE MANAGEMENT SYSTEMS LABORATORY WITH MINI PROJECT LAB</b>		
	<b>Course Code : 21CLS505</b>	<b>No. of Credits: 0: 0: 1 (L-T-P)</b>	<b>No. of lecture hours / week: 2</b>
	<b>Exam Duration : 3 hours</b>	<b>CIE + SEE = 50+50=100</b>	
<b>Course Objectives:</b>	<b>Description</b>		
	1. Provide a strong formal foundation in database concepts and technology and techniques relating to query processing by SQL. 2. Design and implement a real time database application for a given problem-domain. 3. Demonstrate the use of relational data model and systematic database design approaches covering conceptual design, logical design through the mini project. 4. Introduce MongoDB, CRUD Operations & its usage in Enterprise Applications.		
<b>COURSE CONTENTS:</b>			
<b>Part A</b>	1. Execution of given 3 exercises. 2. Introduction to MongoDB and CRUD Operations. 3. MongoDB Usage in Enterprise Applications.		
<b>Part B</b>	Implementation of mini project.		
<b>PART – A</b>			
<b>INSTRUCTIONS:</b>			
1. The exercises are to be solved in an RDBMS environment like Oracle or DB2. 2. Suitable tuples have to be entered so that queries are executed correctly. 3. Relevant queries other than the ones listed along with the exercises may also be asked in the examinations. 4. Questions must be asked based on lots.			
1	<b>Consider the schema for Movie Database:</b> ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by ‘Hitchcock’. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by ‘Steven Spielberg’ to 5.		

2	<p><b>Consider the following schema for Order Database:</b>  SALESMAN(Salesman_id, Name, City, Commission)  CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id)  ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)  Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. Count the customers with grades above Bangalore's average.</li> <li>2. Find the name and numbers of all salesmen who had more than one customer.</li> <li>3. List all the salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)</li> <li>4. Create a view that finds the salesman who has the customer with the highest order of a day.</li> <li>5. Demonstrate the DELETE operation by removing salesman with id 12345. All his orders must also be deleted.</li> </ol>
3	<p><b>Consider the schema for College Database:</b>  STUDENT(USN, SName, Address, Phone, Gender)  SEMSEC(SSID, Sem, Sec)  CLASS(USN, SSID)  SUBJECT(Subcode, Title, Sem, Credits)  CIEMARKS(USN, Subcode, SSID, CIE1, CIE2, CIE3, FinalCIE)  Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. List all the student details studying in fourth semester 'C' section.</li> <li>2. Compute the total number of male and female students in each semester and in each section.</li> <li>3. Create a view of Test1 marks of student USN '1DA15CS101' in all subjects.</li> <li>4. Calculate the FinalCIE (average of best two test marks) and update the corresponding table for all students.</li> <li>5. Categorize students based on the following criterion:  If FinalCIE = 17 to 20 then CAT = 'Outstanding'  If FinalCIE = 12 to 16 then CAT = 'Average'  If FinalCIE &lt; 12 then CAT = 'Weak'</li> </ol> <p>Give these details only for 8th semester A, B, and C section students.</p>

## PART – B

A mini project should be implemented by the students in teams. The maximum size of a team can be 3 from the same batch. The students have to finalize a project topic by discussing with the faculty. The mini project must be carried out in the college only.

Design a Database application for a particular case study using Visual Basic/Java Script in visual studio /Eclipse Tool.

The tasks when implementing mini project would be:

1. Understand the complete domain knowledge of the application and derive the complete data requirement specification for the mini project.
2. Design the ER diagram for the application.
3. Design Relational Schema diagram for the application.
4. Normalization of the relational design.
5. Implement minimum 5 queries for the application.
6. Documentation & submission of report.

**General guidelines:**

- Database for the project - Oracle / MySQL/ DB2 / SQL Server / MongoDB etc.

**Sample Mini Projects.**

Inventory Control System.	Placement management system
Material Requirement Processing.	Library management system
Hospital Management System.	Web Based User Identification System.
Railway Reservation System.	Timetable Management System
Hotel Management System	Personal Information System

**Note:** In the examination, the marks will be evaluated based on database execution from Part A and project demonstration, project report and viva-voce from Part B.

Course Outcomes	Description	RBT Levels
<b>CO1</b>	Understand, analyze, and effectively explain the underlying concepts of database technologies.	<b>L4</b>
<b>CO2</b>	Use SQL to create, secure, populate, maintain and query a database.	<b>L4</b>
<b>CO3</b>	Design and implement real time applications according to design principles that balance data retrieval performance with data consistency.	<b>L5</b>
<b>CO4</b>	Identify the Core MongoDB Operations.	<b>L2</b>

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3										
<b>CO2</b>	3	3	3									
<b>CO3</b>	3	3	3	3	3				3			
<b>CO4</b>	3				2							

**Strong - 3      Medium - 2      Weak - 1**

**TEXT BOOKS:**

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015  
**ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

**REFERENCE BOOKS:**

- Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
- An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education, 2013.
- Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

**SELF STUDY REFERENCES/WEBLINKS:**



**Dr Ambedkar Institute of Technology, Bengaluru-56**  
**Department of Electrical and Electronics Engineering**  
**Scheme and Syllabus - CBCS –2022 -2023**

Course Title	<b>RESEARCH METHODOLOGY &amp; INTELLECTUAL PROPERTY RIGHTS</b>						
Course Code	<b>21RMT506</b>						
Category	Ability Enhancement Course(AEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	<b>02</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>02</b>	<b>25</b>	<b>02</b>
<b>CIE Marks: 50</b> <b>40+05(A)+05(GA)</b>	<b>SEE Marks: 50</b>		<b>Total Max. marks=100</b>		<b>Duration of SEE: 02 Hours</b>		

**COURSE OBJECTIVE:**

1. Understand the knowledge on basics of research and its types.
2. Learn the concept of Literature Review and technical Reading.
3. Understanding the importance of giving credit to citations and attributions.
4. Learn ethics in Engineering Research.
5. Discuss the concepts of Intellectual Property Rights in engineering.

**COURSE CONTENT:**

<b>UNIT I</b>	<b>5 hours</b>
<b>Introduction:</b> Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Research Process, Types of Engineering Research, Finding and Solving a Worthwhile Problem.	
Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Registration.	
<b>UNIT II</b>	<b>5 hours</b>
<b>Literature Review and Technical Reading:</b> New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.	
<b>Attributions and Citations:</b> Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.	
<b>UNIT III</b>	<b>5 hours</b>
<b>Introduction to Intellectual Property:</b> Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India.	
<b>Patents:</b> Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-	

Patentable Matters. Patent Infringements. Avoid Public Disclosure of an Invention before Patenting.

**Process of Patenting.** Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained. Do I Need First to File a Patent in India? Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.

#### **UNIT IV**

**5 hours**

**Trademarks:** Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration. Prior Art Search. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.

#### **UNIT V**

**5 hours**

**Industrial Designs:** Eligibility Criteria. Acts and Laws to Govern Industrial Designs. Design Rights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for Registration of Industrial Designs. Prior Art Search. Application for Registration. Duration of the Registration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trend in India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co.

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:** On completion of the course, student should be able to:

**CO1:** Understand the meaning of engineering research.

**CO2:** Recognize the procedure of literature review and technical reading.

**CO3:** Know the fundamentals of patent laws and drafting procedure.

**CO4:** Understand the subject matters of copyright laws and trademarks.

**CO5:** Realize the basic principles of design rights.

#### **TEXT BOOKS**

1. Dipankar Deb, Rajeeb Dey, Valentina E. Balas “Engineering Research Methodology”, ISSN 1868-4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library, ISBN 978-981-13-2946-3 ISBN 978-981-13-2947-0 (eBook), <https://doi.org/10.1007/978-981-13-2947-0>.

2. Intellectual Property A Primer for Academia by Prof. Rupinder Tewari Ms. Mamta Bhardwaj.

#### **REFERENCE BOOKS**

1. David V. Thiel “Research Methods for Engineers” Cambridge University Press, 978-1-107-03488- 4.

2. Intellectual Property Rights by N.K.Acharya Asia Law House 6th Edition. ISBN: 978-93-81849-30-9.

#### **ONLINE RESOURCES**

1. <https://www.slideshare.net/indravi/intellectual-property-rights-ipr-in-engineering>
2. [http://bspublications.net/downloads/050e6a699258c8\\_IPR\\_chapter1.pdf](http://bspublications.net/downloads/050e6a699258c8_IPR_chapter1.pdf)