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Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110.

(An Autonomous Institution, Affiliated to Anna University, Chennai)

B.E. / B.Tech. End Semester Theory Examinations, November / December 2022.

Seventh Semester

Computer Science and Engineering

**UCS1701 DISTRIBUTED SYSTEMS**

(Regulations 2018)

Time: Three Hours

Answer ALL Questions

Maximum: 100 Marks

K1: Remembering

K2: Understanding

K3: Applying

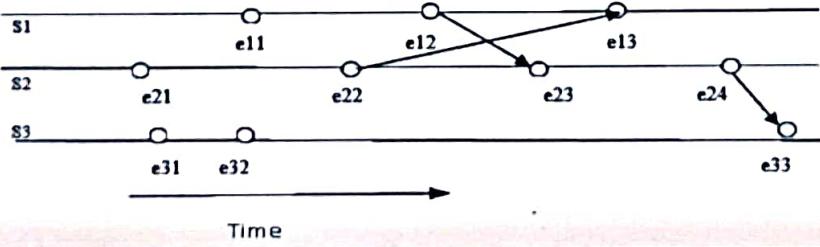
K4: Analyzing

K5: Evaluating

**PART – A (10 × 2 = 20 Marks)**

01.	K1	Define causally ordered events in distributed systems.	CO1
02.	K2	Outline the difference between consistent and inconsistent global states	CO1
03.	K2	Interpret the reason for allowing the transit messages while recording global states.	CO2
04.	K2	Interpret the reason for the usage of an additional vector in the causal ordering of message algorithm for multi-cast environment	CO2
05.	K2	Interpret the reason for occurrence of phantom deadlocks.	CO3
06.	K1	What is an idle token?	CO3
07.	K1	Define Orphaned messages and lost messages.	CO4
08.	K1	What is log-based check pointing?	CO4
09.	K2	Outline the difference between the P2P and client server model.	CO5
10.	K1	What is Distributed Shared Memory?	CO5

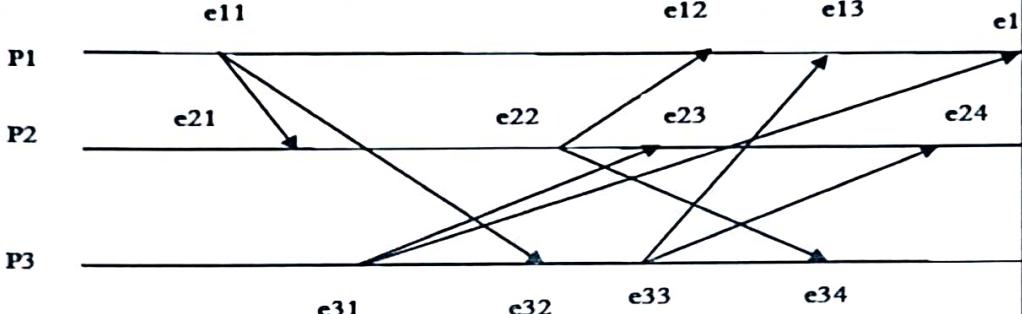
**PART – B (5 × 6 = 30 Marks)**

11.	K2	Explain clock skew and clock drift with suitable examples and graphs	CO1
12.	K3	Apply Lamport's logical clock and vector clock algorithms for the given time-space diagram below. Identify any set of events which portray the limitation of Lamport's logical clock that could be solved by vector clocks.  	CO2

		Apply Edge chasing algorithm for the given scenario and identify the presence of deadlocks.	
13.	K3		CO3
		Inspect the given diagram and demonstrate the sequence of events that could happen after the crash.	
14.	K4	<p>Time Axis</p>	CO4
15.	K2	Explain the strict consistency of memory consistency models.	CO5

### PART – C ( $5 \times 10 = 50$ Marks)

16.	K2	Summarize the algorithmic challenges in distributed computing.	CO1
(OR)			
17.	K2	Discuss the physical clock synchronization techniques in detail and mention their limitations.	CO1

		For the given time-space diagram, apply suitable algorithm for the causal ordering of messages	
18.	K3	 <p>The diagram illustrates a time-space grid with three horizontal rows representing processes P1, P2, and P3. The vertical axis represents time steps labeled e11, e21, e31, e12, e22, e32, e13, e33, e14, e23, and e34. Arrows indicate causal dependencies between events. For example, e11 is causally related to e21 and e31. e21 is causally related to e22 and e32. e31 is causally related to e32, e33, and e34. e12 is causally related to e23 and e33. e22 is causally related to e23. e32 is causally related to e33 and e34. e13 is causally related to e24. e23 is causally related to e24. e33 is causally related to e34.</p>	CO2
(OR)			
19.	K3	Apply Chandy Lamport's algorithm for global state recording in a fully connected bidirectional graph with four processes and demonstrate the method with necessary diagrams. Note: Include random transactions between the processes during the run of the algorithm	CO2
(OR)			
20.	K3	Consider a suitable tree topology and apply distributed deadlock detection algorithm for OR resource request model.	CO3
(OR)			
21.	K3	Apply the Lamport's non-token based distributed mutual exclusion algorithm for the scenario in which the order of request for critical section is as follows. $P_3 \rightarrow (P_1 \parallel P_2) \rightarrow P_3$	CO3
(OR)			
22.	K3	Consider a suitable topology with 3 processes A, B & C and assume process A initiates the task. Apply optimized coordinated check pointing algorithm for the above given scenario and demonstrate the actions through necessary diagrams. Include messages wherever necessary.	CO4
(OR)			
23.	K3	Consider 4 cohorts and 1 source in synchronous environment. Apply Byzantine consensus for the following cases and illustrate the result. <ul style="list-style-type: none"> <li>(i) One of the cohorts is malicious.</li> <li>(ii) Two of the cohorts are malicious.</li> <li>(iii) Only the source is malicious.</li> </ul>	CO4
(OR)			
24.	K2	Explain overlay and routing scheme in Tapestry P2P system.	CO5

25.	K2	With a suitable example demonstrate the Lamport's Bakery algorithm used in distributed shared memory.	CO5
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**Course Outcomes:**

- CO1: Realize the foundations of Distributed Systems (K2).
  - CO2: Able to solve synchronization and state consistency problems (K3).
  - CO3: Demonstrate the resource sharing techniques in Distributed systems (K3).
  - CO4: Comprehend the working model of consensus and reliability of Distributed Systems (K3).
  - CO4: Identify the fundamentals of Peer-to-Peer Systems (K2).
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(An Autonomous Institution, Affiliated to Anna University, Chennai)

B.E. / B.Tech. End Semester Theory Examinations, November/December 2022.

Seventh Semester

Computer Science and Engineering

### **UCS1702 MOBILE COMPUTING**

(Regulations 2018)

**Time: Three Hours**

**Answer ALL Questions**

**Maximum:100 Marks**

K1: Remembering

K2: Understanding

K3: Applying

K4: Analyzing

K5: Evaluating

#### **PART – A (10 × 2 = 20 Marks)**

01.	K2	Give the difference between the network 1G, 2G, 2.5G and 3G mobile communications?	CO1
02.	K2	Difference between Hidden and Exposed Terminal, Near and Far Terminals.	CO1
03.	K2	Mention the different entities in a mobile IP.	CO2
04.	K1	Define COA.	CO2
05.	K2	Explain the concept “Fast Retransmit/ Fast Recovery Transmission”?	CO3
06.	K2	What are Advantage and Disadvantage of Mobile TCP?	CO3
07.	K2	What are the two new network elements in GPRS architecture?	CO4
08.	K2	Give the two basic reasons for a handover in GSM.	CO4
09.	K2	Specify the motivation of Monolithic Kernel OS design.	CO5
10.	K2	List the Native libraries in Android architecture.	CO5

#### **PART – B (5 × 6 = 30 Marks)**

11.	K2	Compare SDMA, FDMA, TDMA and CDMA.	CO1
12.	K3	List the entities of mobile IP. Make use of these entities to describe data transfer from a mobile node to a fixed node and vice versa. Why and where is encapsulation needed?	CO2
13.	K4	Analyze on how I-TCP isolates problems on the wireless link. List the main drawbacks of this solution.	CO3
14.	K3	Identify the system used in 2.5G cellular telecommunication. With a neat diagram, explain its architecture.	CO4
15.	K3	Compare Mobile Web vs Native App Vs Hybrid.	CO5

**PART – C ( $5 \times 10 = 50$  Marks)**

16.	K3	Assume two senders A and B want to send data. CDMA assigns the following unique and orthogonal key sequences: key $A_k = 010011$ for sender A, key $B_k = 110101$ for sender B. Sender A wants to send the bit $A_d = 1$ , sender B sends $B_d = 0$ . Apply CDMA technique to identify the value detected by the receivers of sender A and B respectively.  (OR)	CO1
17.	K3	Identify the benefits of reservation schemes. Outline how collisions are avoided during data transmission. Why is the probability of collisions lower, compared to classical Aloha?	CO1
18.	K3	Identify how tunnelling works in general. How does it work for mobile IP using IP-in-IP, minimal, and generic routing encapsulation? Discuss the advantages and disadvantages of these three methods.  (OR)	CO2
19.	K3	Identify a routing protocol which exhibits both proactive and reactive approaches. Explain the protocol with a concrete example.	CO2
20.	K2	Explain in detail about snooping TCP with neat diagram.  (OR)	CO3
21.	K2	Explain in detail about Indirect TCP with neat diagram.	CO3
22.	K3	Consider the following scenario: “A person makes a call from his landline to his friend who uses a mobile phone”. Identify the call type of the GSM and explain with a neat diagram.  (OR)	CO4
23.	K3	Summarize the main features and architecture of third generation mobile phone systems. How do they achieve higher capacities and higher data rates?	CO4
24.	K2	Explain in detail about iOS protocol stack.  (OR)	CO5
25.	K2	Explain in detail about Android protocol stack	CO5

**Course Outcomes:****CO1:** Identify the functionalities of various MAC protocols (K3)**CO2:** Explain the functionalities of mobile network layer and routing in Ad hoc networks (K3)**CO3:** Analyse the transport and application layer protocols (K3)**CO4:** Explain the basics of mobile telecommunication system (K2)**CO5:** Develop a mobile application (K3)

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Seventh Semester

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**UCS1703 GRAPHICS AND MULTIMEDIA**

(Regulations 2018)

Time: Three Hours

**Answer ALL Questions**

Maximum: 100 Marks

K1: Remembering

K2: Understanding

K3: Applying

K4: Analyzing

K5: Evaluating

**PART – A (10 × 2 = 20 Marks)**

01.	K2	Differentiate DDA and Bresenham's Line drawing algorithms.	CO1
02.	K1	Write about raster scan systems.	CO1
03.	K1	List the basic attributes of a straight-line segment.	CO2
04.	K2	Illustrate the reflection of an object about the line $x = y$ in 2D space.	CO2
05.	K1	List out the representation schemes used in 3D objects.	CO3
06.	K1	Draw the 3D transformation pipeline.	CO3
07.	K2	Differentiate diffuse reflection and specular reflection.	CO4
08.	K1	Give some examples of color models.	CO4
09.	K1	Name few multimedia elements.	CO5
10.	K2	Outline the design issues in Multimedia authoring.	CO5

**PART – B (5 × 6 = 30 Marks)**

11.	K3	Make use of the octant symmetry property to construct a procedure for drawing a circle with radius = r and center = (xc, yc).	CO1
12.	K2	Apply Cohen-Sutherland line clipping algorithm to clip a line A(30,60) B(60,25) against a clipping window with $X_{left} = 10$ , $X_{right} = 50$ , $Y_{bottom} = 10$ and $Y_{top}=50$ .	CO2
13.	K2	Describe the transformation from World to Viewing Coordinates in 3D space.	CO3
14.	K2	Explain the steps in the design of an animation sequence.	CO4
15.	K2	Discuss the MPEG compression technique used in multimedia.	CO5

**PART – C (5 × 10 = 50 Marks)**

16.	K3	Use the midpoint method to derive decision parameters that can be used to generate straight line segments with a positive slope.	CO1
(OR)			
17.	K3	Make use of the DDA line drawing algorithm to digitize the line with endpoints A(2,1) and B(10,7).	CO1
(OR)			
18.	K3	Apply a 45° rotation on a triangle A (0,0), B(1,1), C(5,2) about P(-1,-1).	CO2
(OR)			
19.	K3	Apply two successive reflections on a 2D object about either of the coordinate axes and show that it is equivalent to a single rotation about the coordinate origin.	CO2
(OR)			
20.	K2	Discuss in detail about 3D modeling transformations.	CO3
(OR)			
21.	K2	Elaborate the process of clipping of 3D objects using homogeneous coordinates.	CO3
(OR)			
22.	K2	With a detailed background analysis and suitable examples, discuss the process of morphing.	CO4
(OR)			
23.	K2	Explain the components of an illumination model with suitable diagrams.	CO4
(OR)			
24.	K4	In a document imaging system, where would you compress the image in the scanner node, in host system, or in the storage node? Examine the implications of where compression and decompression take place in a document imaging system.	CO5
(OR)			
25.	K4	Justify how a video conferencing application can be related to hypermedia messaging. Discuss the implications of building a system where the user starts with video conferencing and switches to integrated stored messaging.	CO5

**Course Outcomes:**

- CO1: Apply the algorithms to manipulate output primitives such as line, circle, ellipse (K3)
- CO2: Demonstrate transformations, representations and clipping on 2D objects and map window to viewport transformations (K3)
- CO3: Apply three Dimensional concepts like representations, geometric transformations, and projections (K3)
- CO4: Understand the working of different illumination and color models used to render an animation scene (K2)
- CO5: Understand different types of multimedia file formats, compression techniques and design basic 3D Scenes using Blender(K2).

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Seventh Semester

Computer Science and Engineering

**UCS1704 MANAGEMENT AND ETHICAL PRACTICES**

(Regulations 2018)

Time: Three Hours

Answer ALL Questions

Maximum:100 Marks

K1: Remembering

K2: Understanding

K3: Applying

K4: Analyzing

K5: Evaluating

**PART – A (10 × 2 = 20 Marks)**

01.	K1	What are the roles of manager in an organization?	CO1
02.	K2	Distinguish between systems approach and contingency approach for international business.	CO1
03.	K2	Interpret the importance of departmentalization in an organization	CO2
04.	K2	Outline the hurdles of effective communication	CO2
05.	K1	What is the need for Ethics in the Engineering?	CO3
06.	K2	Explain micro-ethics and macro-ethics with an example.	CO3
07.	K2	Distinguish between responsibility and authority with an example.	CO4
08.	K1	What is a copyright of a product?	CO4
09.	K1	What is whistle blowing?	CO5
10.	K2	Explain about protecting privacy in cybersecurity ethics.	CO5

**PART – B (5 × 6 = 30 Marks)**

11.	K2	Outline the different types of planning in an organization.	CO1
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		Analyze the given situation and derive your inference about what could be done to prevent this from happening?	
12.	K4	<p>A doctor discharged a staff member who had been working for him for nine months. She then claimed that her civil rights were violated and that she was discriminated against because of her age. She was 46 years old. During an investigation, the doctor was asked to provide copies of her performance evaluations to justify the contention that the discharge was based on her performance, not her age. No performance evaluations were given to any employees. This claim led to an out-of-court settlement.</p> <p><b>Considerations</b></p> <p>The employee had been with the doctor for nine months and had not received a performance appraisal. She claimed that she was not aware that her performance was not satisfactory and was surprised when she was terminated. She alleged that the sole reason for her discharge was her age — that the doctor wanted to hire a younger person. The doctor said she had been warned on several occasions, but nothing had been documented. This is not an isolated incident; such claims are made against doctors every day.</p>	CO2
13.	K4	Examine the list of consensus and controversy behaviors that could exist in the production environments where employees form the unions in an organization.	CO3
14.	K4	<p>Dr. Ramerio is a leading researcher in her field. She oversees a laboratory with 5 full-time employees and three graduate assistants. She has been given funding to create a position for a laboratory manager. The responsibilities of the manager position include overseeing the budget, developing operating procedures, scheduling work, ordering supplies, and taking care of personnel matters. Dr. Ramerio would like to hire her husband in this position. To avoid issues of nepotism, she asked her colleague, who is also the assistant department head, to chair the search committee and to recommend the top candidate to the department head. The top candidate turns out to be Dr. Ramerio's husband. Dr. Ramerio is not involved with the search committee and does not interview any of the candidates. The department head approves the hiring of her husband. Again, to avoid violating the nepotism policy, the responsibility for evaluating and recommending salary increases for her husband is delegated to the assistant department head.</p> <p>Examine the given scenario and infer whether there is conflict of interest. Justify your answer?</p>	CO4
15.	K2	Classify the three ethical frameworks with appropriate diagrams.	CO5

**PART – C (5 × 10 = 50 Marks)**

16.	K2	Summarize about decision making process with suitable example.	CO1
(OR)			
17.	K2	Explain about the evolution of management thought in different experts.	CO1
18.	K4	<p>You're the squadron executive officer and 2d Lt Brown's reporting official. Lieutenant Brown, who was a physical education major in college, has been on active duty for 1 year and is assigned as an administrative officer in a tactical fighter squadron. He wanted to be an Air Force pilot, but there was no demand for pilots when he joined the Air Force. He accepted an assignment as an Force Support officer and completed AFROTC and his technical school, hoping to be accepted for undergraduate pilot training (UPT) later. He hasn't been accepted and was notified a month ago that there probably won't be any openings in UPT for at least 1 more year. He isn't satisfied with his present assignment and, to this point, has not shown any interest in his job. He refuses to get involved in any decision making or management problems in his unit. He tells his NCOs to handle all problems and not to get him involved since he's only interested in becoming a pilot. He has also displayed this same attitude to your supervisor, the squadron commander, and a lieutenant colonel.</p> <p>In addition, 2d Lt Brown feels the Air Force isn't putting his education to proper use, because his degree is in physical education. He's an exceptional athlete and was recently selected as the most valuable player on the base softball team, which he also coaches. Because of his athletic ability and the success of the team, he's very popular with many of the key personnel on base who speak very highly of him to his commander.</p> <p>Lieutenant Brown spends most of his off-duty time, and a considerable part of each duty day, organizing and participating in the base athletic program. Last week, 2d Lt Brown's unit was inspected by a standardization team from higher headquarters, which identified an absence of supervision in 2d Lt Brown's area of responsibility.</p> <p>Inspect the given scenario and the squadron commander asks you what you think should be done about the situation. How will you resolve this problem?</p>	CO2
(OR)			
19.	K4	Seth Kehne, the owner of Lawn Butler in East Tennessee, started his company in 1999. He watched it grow slowly from a small side business, then	CO2

		<p>suddenly he realized revenue had doubled. But because the growth was gradual, he never took steps to put a management system in place for a larger company. With everyone reporting to Kehne, he was stretched thin. It limited the company's growth because managers didn't feel they had the freedom to do their jobs without his approval. Plus, as the chief executive officer, Kehne was working too many hours "<i>managing instead of delegating.</i>"</p> <p>Analyze and identify the steps involved in effective delegation of tasks to the team members for the given scenario.</p>	
20.	K3	<p>A woman is sexually harassed by a top-level senior executive in a large company. She sues the company, and during settlement discussions she is offered an extremely large monetary settlement. In the agreement, the woman is required to confirm that the executive did nothing wrong, and after the agreement is signed the woman is prohibited from discussing anything about the incident publicly. Before the date scheduled to sign the settlement agreement, the woman's lawyer mentions that she has heard the executive has done this before, and the settlement amount is very large because the company probably had a legal obligation to dismiss the executive previously. The company, however, wants to keep the executive because he is a big money maker for the company.</p> <p>Identify the issues of integrity, ethics and law posed in the case study? Examine the scenario and identify the options does the woman have, and what should she do and why?</p>	CO3
(OR)			
21.	K3	Identify the ethics of Machine Learning algorithms to be applied on the design of autonomous vehicles.	CO3
22.	K4	<p>Consider a person working in a XYZ, company. His role started off as a receptionist, then expanded over time to bookkeeping, payroll, invoicing, and computer maintenance. He did not have any formal qualifications to undertake this role. He had a long-standing history of financial difficulty and accumulating debt. There was also a long-standing gambling addiction that worsened over time. He was having problems at work managing the load, and to assist in coping with the stresses, he would gamble at night. The cycle of excessive gambling and alcohol abuse got out of hand. All of the money he took from the workplace was gambled away.</p>	

		Examine the given scenario and identify the type of white-collar crime committed by a person in the company. Derive your inference and the steps to be taken by the company to prevent such crimes in future.	CO4
(OR)			
23.	K4	<p>Cheryl Spragg, an employee of Richemont (UK), which owns luxury brands including Cartier and Montblanc, was spied on by her employer, denied the opportunity to progress within the company and was bullied by HR and other staff members as a result of her skin colour.</p> <p>Following a back injury, Richemont placed Cheryl under close surveillance for a number of days, following her to a wedding and even receiving images of her home and garden. Undoubtedly, this act was unnerving, intimidating and upsetting for her. Cheryl was also refused internal progression on the basis that she was black and had applied for the same post on three different occasions, with all three of the recruitment decisions being made by the same people. It was found that the company preferred white Europeans and the judge ruling in Cheryl's claim against race discrimination in the workplace agrees that this was an act of direct discrimination since there was a lack of transparency and properly structured processes for scoring, marking and record-keeping as well as a complete absence of interview records. The HR team had no equality and diversity training and there were no black staff members at a senior level or on the HR team.</p> <p>In addition, Cheryl had been subject to bullying when other staff members refused to enter a lift with her which was found as a violation of her dignity. These employees were said to have laughed and pulled faces when Cheryl held the lift door open for them – they walked straight passed and waited for another lift to come. This incident meets the very definition of harassment under the Equality Act 2010. When Cheryl complained to the HR department about the various events which she considered to be discriminatory, she was told to look for a new job and was accused of causing her colleagues distress. She was even told in an email from the HR team that she wasn't the only 'black member of staff' within her team and no other racism allegations had been raised in the past.</p> <p>Cheryl files the case against the company, after the judge heard Cheryl's case and considered the evidence, she won her claim and was awarded compensation for the traumatic and humiliating experience.</p> <p>Analyze the given scenario and answer the following questions</p> <p>i. Identify the type of discrimination at the workplace</p>	CO4

		<p>ii.List down the activities carried out by staff members of a company towards Cheryl.</p> <p>iii.Is the suggestion given by the HR department acceptable? Comment on your answer.</p> <p>iv.Is the action taken by the Cheryl correct? Comment on your answer.</p> <p>v.Identify the type of problem could Cheryl face in future when she applies for new job opportunities at different companies.</p>	
24.	K2	Explain the five phases in dealing with Intrusion from both attacker and defender perspective.	CO5
(OR)			
25.	K2	Interpret the importance of fostering responsibility and asserting ownership in an organization to prevent cybersecurity attacks.	CO5

### Course Outcomes:

CO1: Describe basic and applied fields of Management (K2)

CO2: Describe and practice Managerial skills (K3)

CO3: Describe and practice Engineering Ethics and Human Values (K3).

CO4: Describe and use safety, responsibility, and rights (K3)

CO4: Describe ethical issues in cybersecurity (K2).

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Seventh Semester

Computer Science and Engineering

### **UCS1729 DATA WAREHOUSING AND DATA MINING**

(Regulations 2018)

Time:Three Hours

Answer ALL Questions

Maximum:100 Marks

K1: Remembering

K2: Understanding

K3: Applying

K4: Analyzing

K5: Evaluating

#### **PART – A (10 × 2 = 20 Marks)**

01.	K2	With an example explain the need of a data warehouse.	CO1
02.	K1	What do you understand from the term multi dimensional data.	CO1
03.	K3	Consider a supermarket with 100 products. The basket of customer1 has sugar, coffee, tea, rice, eggs. The basket of customer2 has sugar, coffee, bread, biscuit. Make use of the information to find the similarity between the two customers.	CO2
04.	K3	Identify the following attributes as binary, discrete or continuous 1. Age in years 2. Brightness as measured by a light meter 3. Bronze, silver and gold medals as awarded at Olympics 4. Temperature in Kelvin Scale	CO2
05.	K1	List the metrics along with formula used to frame the rules in Association Rule Mining.	CO3
06.	K1	In Association Rule Mining what is the need for antimonotonicity property?	CO3
07.	K1	Which is more advantageous pre pruning or post pruning?	CO4
08.	K2	Compare eager learners with lazy learners.	CO4
09.	K2	Outline the pseudo code to do partition clustering for a data set of your choice.	CO5
10.	K2	Justify the statement: Clustering is a form of learning by observation.	CO5

#### **PART – B (5 × 6 = 30 Marks)**

11.	K2	Compare OLTP with OLAP.	CO1
12.	K3	Construct the KDD process for the supermarket usecase.	CO2

		The following contingency table summarizes supermarket transaction data, where hotdogs refer to the transactions containing hotdogs, hotdogs* refers to the transactions that do not contain hotdogs, similarly hamburgers refer to the transactions containing hamburgers, and hamburgers* refers to the transactions that do not contain hamburgers.																																		
13.	K3	<table border="1"> <thead> <tr> <th></th> <th>hotdogs</th> <th>hotdogs*</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>hamburgers</td> <td>2000</td> <td>500</td> <td>2500</td> </tr> <tr> <td>hamburgers*</td> <td>1000</td> <td>1500</td> <td>2500</td> </tr> <tr> <td>Total</td> <td>3000</td> <td>2000</td> <td>5000</td> </tr> </tbody> </table> <p>Make use of the above information, show that the association rule “<b>hotdogs =&gt; hamburgers</b>” is strong for given minimum support threshold of 25% and a minimum confidence threshold of 50%.</p>		hotdogs	hotdogs*	Total	hamburgers	2000	500	2500	hamburgers*	1000	1500	2500	Total	3000	2000	5000	CO3																	
	hotdogs	hotdogs*	Total																																	
hamburgers	2000	500	2500																																	
hamburgers*	1000	1500	2500																																	
Total	3000	2000	5000																																	
14.	K3	Utilize the given data and calculate the entropy for the fruits with colors Y-Yellow and G-Green.	CO4																																	
		<table border="1"> <thead> <tr> <th>Color</th> <th>Y</th> <th>Y</th> <th>G</th> <th>G</th> <th>Y</th> <th>Y</th> <th>Y</th> <th>Y</th> <th>G</th> <th>Y</th> <th>Y</th> <th>Y</th> <th>Y</th> <th>Y</th> <th>Y</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>Edible</td> <td>+</td> <td>-</td> <td>+</td> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> <td>+</td> <td>-</td> <td>-</td> <td>-</td> <td>+</td> <td>+</td> <td>+</td> </tr> </tbody> </table>		Color	Y	Y	G	G	Y	Y	Y	Y	G	Y	Y	Y	Y	Y	Y	Y	Edible	+	-	+	-	+	+	+	-	-	+	-	-	-	+	+
Color	Y	Y	G	G	Y	Y	Y	Y	G	Y	Y	Y	Y	Y	Y	Y																				
Edible	+	-	+	-	+	+	+	-	-	+	-	-	-	+	+	+																				
15.	K3	Consider the points in 1-D space having the values 1, 2, 3, 8, 9, 10, and 25 respectively. Apply K-Means algorithm to partition the data points into 2 clusters and repeat the process for 2 iterations.	CO5																																	

### PART – C (5 × 10 = 50 Marks)

16.	K2	Explain conceptual modeling of data warehouse and also draw the snowflake schema for the employee payroll of an organization	CO1																		
		(OR)																			
17.	K2	Explain the various types of multidimensional model along with its purpose	CO1																		
18.	K3	<p>The stock prices of the two companies are as given in the table. Apply appropriate technique to draw a conclusion on the stock price as whether they rise or fall together.</p> <table border="1"> <thead> <tr> <th>TIME</th> <th>COMPANY1</th> <th>COMPANY2</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>6</td> <td>20</td> </tr> <tr> <td>2</td> <td>5</td> <td>10</td> </tr> <tr> <td>3</td> <td>4</td> <td>14</td> </tr> <tr> <td>4</td> <td>3</td> <td>5</td> </tr> <tr> <td>5</td> <td>2</td> <td>5</td> </tr> </tbody> </table> <p style="text-align: right;"> <math>(1,2) \quad (3,2)</math>  <math>\sqrt{(3-1)^2 + (8-2)^2}</math>  <math>= \sqrt{4 + 36}</math>  <math>= \sqrt{40}</math> </p>	TIME	COMPANY1	COMPANY2	1	6	20	2	5	10	3	4	14	4	3	5	5	2	5	CO2
TIME	COMPANY1	COMPANY2																			
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3	4	14																			
4	3	5																			
5	2	5																			
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19.	K3	Consider the below dataset with missing values. Discuss different methods used to find and fill the missing values. Identify the appropriate method for filling the values based on the samples belonging to the same class.	CO2																																																				
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20.	K2	Explain Apriori algorithm and identify the ways to improve the efficiency of Apriori algorithm	CO3																																																				
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21.	K2	Explain with an example how association rules are framed using FP growth algorithm	CO3																																																				
22.	K3	Apply the Bayesian classification method for the training data set given below. Identify the class labels for the given test tuple <Red, Domestic, SUV>	CO4																																																				
		<table border="1"> <thead> <tr> <th>Sample</th><th>Color</th><th>Type</th><th>Origin</th><th>Stolen</th></tr> </thead> <tbody> <tr><td>1</td><td>Red</td><td>Sports</td><td>Domestic</td><td>YES</td></tr> <tr><td>2</td><td>Red</td><td>Sports</td><td>Domestic</td><td>NO</td></tr> <tr><td>3</td><td>Red</td><td>Sports</td><td>Domestic</td><td>YES</td></tr> <tr><td>4</td><td>Yellow</td><td>Sports</td><td>Domestic</td><td>NO</td></tr> <tr><td>5</td><td>Yellow</td><td>Sports</td><td>Imported</td><td>YES</td></tr> <tr><td>6</td><td>Yellow</td><td>SUV</td><td>Imported</td><td>NO</td></tr> <tr><td>7</td><td>Yellow</td><td>SUV</td><td>Imported</td><td>YES</td></tr> <tr><td>8</td><td>Yellow</td><td>SUV</td><td>Domestic</td><td>NO</td></tr> <tr><td>9</td><td>Red</td><td>SUV</td><td>Imported</td><td>NO</td></tr> <tr><td>10</td><td>Red</td><td>Sports</td><td>Imported</td><td>YES</td></tr> </tbody> </table>		Sample	Color	Type	Origin	Stolen	1	Red	Sports	Domestic	YES	2	Red	Sports	Domestic	NO	3	Red	Sports	Domestic	YES	4	Yellow	Sports	Domestic	NO	5	Yellow	Sports	Imported	YES	6	Yellow	SUV	Imported	NO	7	Yellow	SUV	Imported	YES	8	Yellow	SUV	Domestic	NO	9	Red	SUV	Imported	NO	10	Red
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23.	K3	If the support vectors S1(1,0), S2(3,1) and S3(3,-1) S1 belongs to negative class and S2, S3 belongs to positive class. Utilize the information to find the weights W1, W2 and bias b for $\alpha_1=3.5$ , $\alpha_2=.75$ and $\alpha_3=.75$ and also explain the support vector machine for linearly separable data sets.	CO4																																				
24.	K3	A pizza chain wants to open its delivery centres across a city. What do you think would be the possible challenges and propose a solution.	CO5																																				
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25.	K3	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>0</td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td>9</td><td>0</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>3</td><td>7</td><td>0</td><td></td><td></td></tr> <tr><td>4</td><td>6</td><td>5</td><td>9</td><td>0</td><td></td></tr> <tr><td>5</td><td>11</td><td>10</td><td>2</td><td>8</td><td>0</td></tr> </table> <p>Construct the dendrogram by applying Agglomerative clustering algorithm using complete linkage.</p>		1	2	3	4	5	1	0					2	9	0				3	3	7	0			4	6	5	9	0		5	11	10	2	8	0	CO5
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### Course Outcomes:

- CO1: Design a Data warehouse system and perform business analysis with OLAP tools.
  - CO2: Apply suitable pre-processing techniques.
  - CO3: Apply frequent pattern and Association Rule Mining techniques for data analysis.
  - CO4: Apply appropriate classification techniques for data analysis.
  - CO5: Apply clustering techniques using appropriate tools.
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