

Question 1 is compulsory

1.	Answer all questions:	[10x2]
		Cos
(a)	Define the property of energy compaction of a unitary transform and give reasons why this property is useful in image processing. Also compare the energy compaction of DCT with respect to DFT.	CO1
(b)	How M-adjacency is different from 8-adjacency and 4-adjacency?	CO2
(c)	If all the pixels in an image are shuffled, will there be any change in the histogram? Explain your answer with example.	CO1
(d)	Let the RGB values of a pixel of an image is 0.4, 0.6 and 0.8 respectively. Find the HSI equivalent of RGB.	CO2
(e)	Compare between image enhancement and image restoration.	CO4
(f)	Explain about down sampling and up sampling?	CO3
(g)	Distinguish between local and global thresholding techniques for image segmentation.	CO2
(h)	Define image opening and closing.	CO3
(i)	Explain relative data redundancy and compression ratio.	CO4
(j)	What do you mean by Lossy compression?	CO4

(Answer any one question from each unit)

Cos

UNIT-I

2(a)	Explain the need of Image transform. Explain two processes.	[5]	CO1
(b)	Explain the basic concept of Sampling and Quantization with neat sketch.	[5]	CO2

3	What is image enhancement? What is its use? Explain why and how histogram equalization improves visibility of an image. Explain with proper example.	[10]	CO2
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UNIT-II

4(a)	Explain any three basic relationships between pixels.	[5]	CO1
(b)	Given $F = \begin{matrix} 2 & 4 & 2 & 4 \\ 4 & 2 & 3 & 2 \\ 2 & 3 & 4 & 3 \\ 4 & 2 & 3 & 2 \end{matrix}$	[5]	CO2
Find 2D forward Walsh and inverse Walsh transforms.			

5(a)	Illustrate the operation of Prewitt mask & Sobel mask operators in edge detection.	[5]	CO3
(b)	Write a note on: Hit or miss transformation	[5]	CO4

UNIT-III

6(a)	Describe Image Degradation and Restoration Model with suitable block diagram.	[5]	CO4
(b)	Deep Learning is a subset of Machine Learning. How Deep learning differs from Machine learning.	[5]	CO4

7(a)	How brain tumour is localized using Image Processing Tools. Discuss.	[5]	CO4
(b)	Define Noise. Why noise modelling is required in image transmission. Describe about two noise models.	[5]	CO3

UNIT-IV

8(a)	Explain the various data redundancies with respect to image compression.	[5]	CO2
8(b)	Discuss different application of image processing on medicine.	[5]	CO4
9(a)	What do you mean by smart Agriculture? How Image processing helps agricultural field.	[5]	CO4
9(b)	Write short Note on: JPEG, PNG and BMP Compression	[5]	CO3

Question 1 is compulsory

1.	Answer all questions:	[10x2]
(a)	What is a surrogate key?	CO-1
(b)	Why qualitative data is represented by discrete values?	CO-1
(c)	What is k-frequent item sets?	CO-2
(d)	What is the role of input and output layers in Multilayer Artificial Neural Network?	CO-2
(e)	Write the features of Data warehouse according to William H. Inmon.	CO-3
(f)	List the major steps involved in KDD process.	CO-3
(g)	List the parameters used to evaluate association rules?	CO-3
(h)	What is Sum of Squared Errors (SSE)?	CO-3
(i)	What is an outlier?	CO-4
(j)	A search criterion retrieves 70% of documents out of which 90% of retrieved documents are relevant. Assuming text database contains 5000 documents out of which 40% are irrelevant.	CO-4

*(Answer any one question from each unit)***COs****UNIT-I**

2(a)	Explain the requirement of Data warehouse tool although data base tools are capable to storing, organizing and providing interactive access method to users.	[3]	CO-1
2(b)	What are the important components of a data warehouse packages? Explain different components of data warehouse architecture with suitable diagram.	[7]	CO-1

3(a)	Define Data Visualization & data transformation? Explain with examples.	[6]	CO-1
(b)	What is the difference between data warehousing and Business Intelligence?	[4]	CO-1

UNIT-II

4(a)	What is noise? Explain data smoothing methods as noise removal technique to divide given data into bins of size 3 by equal frequency bin partitioning, by bin means, by bin medians and by bin boundaries. Consider the data: 10, 2, 19, 18, 20, 18, 25, 28, 22, 33	[6]	CO-2
4(b)	Explain following drill-up, drill-down, slice and dice operations in Data Mining Query Language.	[4]	

5(a)	Explain the following data warehouse components: Staging Area, ETL Layer, Data Storage Layer, Metadata Layer,	[4]	CO-2
5(b)	What is data transformation? Explain the different data transformation approaches for transforming data.	[6]	CO-2

UNIT-III

<p><input checked="" type="checkbox"/> 6(a) State the Apriori Property. Generate large itemsets and association rules using Apriori algorithm on the following data set having minimum support value as 2 and minimum confidence value as 75%.</p>	[5] CO-3										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">TID</th><th style="text-align: left; padding: 2px;">Items Purchased</th></tr> </thead> <tbody> <tr> <td style="padding: 2px;">T101</td><td style="padding: 2px;">Cheese, milk, cookie</td></tr> <tr> <td style="padding: 2px;">T102</td><td style="padding: 2px;">Butter, milk, bread</td></tr> <tr> <td style="padding: 2px;">T103</td><td style="padding: 2px;">Cheese, butter, milk, bread</td></tr> <tr> <td style="padding: 2px;">T104</td><td style="padding: 2px;">Butter, bread</td></tr> </tbody> </table>	TID	Items Purchased	T101	Cheese, milk, cookie	T102	Butter, milk, bread	T103	Cheese, butter, milk, bread	T104	Butter, bread	[5] CO-3
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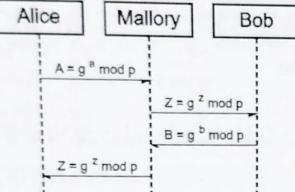
6(b) Explain how Backpropagation algorithm computes errors at output nodes in a Feed forward ANN.

<p>7(a) What is k-NN? Explain with suitable example.</p>	[4] CO-3
<p>(b) What is Bayesian belief network? With suitable example explain in detail.</p>	[6] CO-3

UNIT-IV

<p><input checked="" type="checkbox"/> 8(a) With suitable example explain following similarity distance measuring techniques used in Cluster Analysis.</p> <ul style="list-style-type: none"> i. Minosky Similarity disatancs ii. Cosine Similarity Distrnace iii. Jaccard Similarity Distance 	[5] CO-4
<p><input checked="" type="checkbox"/> 8(b) Write a note on different types Web mining.</p>	[5] CO-4
<p>9(a) Construct the term document frequency matrix for following tokenized the texts. Calculate the similarity of text1 over text3 and text1 over text2– Text1= {Mining, Association, Rules, Database, Use, Apriori, Method, Sometime, Give, Wrong, Result} Text 2= {Mining, Ore, Using, Improper, Method, May, Give, Wrong, Result} Text 3= {Huge, Volume, Data, sufficient, Data, Mining } (b) Write notes on following data bases : Spatial databases, temporal databases</p>	[5] CO-4

Question 1 is compulsory

1.	Answer all questions:	[10x2]
(a)	What do you mean by Cryptanalysis?	COs
(b)	In Cryptography when text is treated at bit level, each character is replaced by how many bits?	1
(c)	In a symmetric key environment, 500 hosts want to communicate with each other. How many keys are required?	1
(d)	 <pre> graph TD Alice[Alice] -- "A = g^a mod p" --> Z1[Z = g^z mod p] Mallory[Mallory] -- "Z = g^z mod p" --> B1[B = g^b mod p] Bob[Bob] -- "B = g^b mod p" --> Z2[Z = g^z mod p] </pre> <p>If $p=7$, $g=3$, $a=2$, $b=5$ and $z=3$ then find out the values of two keys created between Alice and Bob.</p>	1
(e)	For data security, an RSA algorithm with $p=5$, $q=11$, is implemented. What is the value of the decryption key if encryption key is 27.	2
(f)	What is the maximum length of the message (in bits) that can be taken by SHA-1.	2
(g)	Which mode of IPsec should you use to assure the security and confidentiality of data within the same LAN? (i) AH transport mode (ii) ESP transport mode (iii) ESP tunnel mode (iv) AH tunnel mode	1
(h)	What is the impact of SQL injection attack?	1
(i)	Write down the name of two protocols of SSL protocol stack?	2
(j)	Name two network services provided by digital signature.	1

(Answer any one question from each unit)

COs

UNIT-I

2(a)	Briefly discuss the encryption and decryption process of Triple DES algorithm with suitable diagram.	[5]	1
(b)	Suppose the sender and receiver decide on a key say “POINT”. Encrypt the message “DO NOT MOVE TO NORTH” using Playfair cipher	[5]	1

3(a)	What do you mean by symmetric key algorithm? Why Blow-fish is preferred over DES algorithm	[2]	1
(b)	Discuss Blow-fish algorithm with suitable diagram?	[8]	2

UNIT-II

4(a)	What is the purpose of Diffie-Hellman key exchange protocol? Briefly discuss Diffie Hellman Key exchange protocol. What is the drawback of this protocol.	[7]	2
(b)	Calculate the value of symmetric key in Diffie-Hellman key exchange protocol if $g=11$, $p=13$, $x=3$, $y=4$?	[3]	3

5(a)	Differentiate between public key cryptography and secret key cryptography? Write down the steps of RSA algorithm	[5]	2
(b)	Given two prime numbers $P=11$, $Q=13$. Find out the public key, private key pair. Encrypt a message “23”.	[5]	3

UNIT-III

6(a)	What is the difference between MAC and MDC? Describe the process how MDC is converted to MAC. What is HMAC?	[5]	1
(b)	What is the difference between conventional signature and digital signature? What are the methods for achieving digital signature? Which method is more efficient?	[5]	2
7(a)	Define key management. What are the methods of distributing public keys? Briefly discuss any three methods of distributing public keys.	[5]	3
(b)	Write down the properties of hash function. Define Birth day paradox problem? Suppose an algorithm produces a digest of 256 bits then what is the value of k such that if the algorithm will be applied on k number of inputs, then two inputs will provide the same digest	[5]	1

UNIT-IV

8(a)	What is the purpose of IPSec protocol? Briefly discuss the modes of operation in IPSec. Which mode is more secure?	[5]	1
(b)	List out the network services provided by Authentication Header protocol. Briefly discuss Authentication Header Protocol with a suitable diagram	[5]	2
9(a)	What is the purpose of SSL handshake protocol? Briefly discuss SSL handshake protocol with a suitable diagram.	[5]	3
(b)	What are the 5 principles of PGP? What are the vulnerabilities of PGP? Which encryption method is used in PGP?	[5]	2

Full Marks: 60

SUIIT/End Sem /December, 2023/RG/BP/IM
Wireless Sensors Networks
(Subject Code: CSE E16)
B. Tech, CSE (Semester: 7th)

Time: 3.00Hrs

Question 1 is compulsory

1.	Answer all questions:	[10x2]	Cos
	(a) Explain Centroid calculation method for localization.	3	
	(b) Explain GPS.	1	
	(c) Find the difference between Clocks' measured time with respect to real time, assuming $f_0=1, \Delta f=0.02, d_f=0.05$.	2	
	(d) What is Hidden node Problem?	1	
	(e) Explain Braided multipath Routing.	2	
	(f) Explain radio propagation model mathematically.	3	
	(g) What is relay diversity?	1	
	(h) Explain SINR capture model for interface mathematically.	2	
	(i) What is geometric random graph?	1	
	(j) Explain power management in IEEE 802.11.	3	

(Answer any one question from each unit)

Cos

UNIT-I

<input checked="" type="checkbox"/> 2(a)	Explain at least five different fields where sensors are used. Explain the functions of the sensors in each field.	[5]	3
<input checked="" type="checkbox"/> (b)	Discuss the components of WSN. Explain the functions of each component.	[5]	1

<input checked="" type="checkbox"/> 3(a)	Describes Various key design challenges of Wireless Sensor Network	[7]	1
<input checked="" type="checkbox"/> (b)	What is localization in a sensor network. Explain coarse gained localization Techniques.	[3]	3

UNIT-II

<input checked="" type="checkbox"/> 4(a)	What is SINR Model explain briefly. Explain its importance in WSN.	[5]	2
(b)	Explain various parameters that describes the quality of a link in sensor network. Explain Link Quality Model.	[5]	1

5(a)	Describe Hidden Node problem and Its Solution.	[5]	3
(b)	Discuss two tier data dissemination.	[5]	1

UNIT-III

<input checked="" type="checkbox"/> 6(a)	Explain transmitter/receiver -initiated cycle receptions (TICER/RICER) with suitable diagrams.	[5]	2
<input checked="" type="checkbox"/> (b)	Discuss the Asynchronous sleep techniques.	[5]	3

<input checked="" type="checkbox"/> 7(a)	Discuss two tier data dissemination.	[5]	1
<input checked="" type="checkbox"/> (b)	What is BFS/DFS Scheduling?	[5]	3

UNIT-IV

<input checked="" type="checkbox"/> 8(a)	What is reconfigurable MAC protocol (B-MAC) ?	[5]	3
<input checked="" type="checkbox"/> (b)	What is D-MAC?	[5]	3

9(a)	What is Sensor cloud? Explain the data prediction-based sensor cloud.	[5]	2
(b)	Discuss about traditional MAC Protocol. Justify whether it is suitable for WSN or not.	[5]	1

Full Marks: 60

Time: 3.00Hrs

Question 1 is compulsory

1.	Answer all questions:	[10x2] COs
<input checked="" type="checkbox"/>	What are the two parts of a compilation? Explain briefly?	
<input checked="" type="checkbox"/>	What are the functions of lexical analysis phase?	
<input checked="" type="checkbox"/>	For the grammar find Follow(A) : $S \rightarrow AB \mid C$ $A \rightarrow bA \mid a$ $B \rightarrow abbS \mid bS \mid \epsilon$ $C \rightarrow bC \mid \epsilon$	
<input checked="" type="checkbox"/>	What are the problems with Top-Down Parsing?	
<input checked="" type="checkbox"/>	What is left recursion?	
<input checked="" type="checkbox"/>	What are the various methods of implementing three address statements?	
<input checked="" type="checkbox"/>	What is the necessity of dead code elimination?	
<input checked="" type="checkbox"/>	Define Activation record in a compiler?	
<input checked="" type="checkbox"/>	What is S-attributed & L-attributed SDT with Example?	
<input checked="" type="checkbox"/>	What are the characteristics of Peephole Optimisation technique?	

(Answer any one question from each unit)

COs

UNIT-I

2(a)	Explain all the phases of compiler with neat diagram?	[5]	
<input checked="" type="checkbox"/>	Test whether the Grammer is LL(1) or not and construct a predictive pasring table for it. $S \rightarrow AaAb \mid BbBa$ $A \rightarrow \epsilon$ $B \rightarrow \epsilon$	[5]	

3(a)	Explain the structure of the compiler with compilation of $A = B + C * 60$	[5]	
<input checked="" type="checkbox"/>	Test whether the Grammer is LL(1) or not and construct a predictive parsing table for it $S \rightarrow iCtSS' \mid a$ $S' \rightarrow eS \mid \epsilon$ $C \rightarrow b$	[5]	

UNIT-II

4(a)	Construct the LR(0) parsing table for the following grammar. $S \rightarrow L=R$ $S \rightarrow R$ $L \rightarrow *R$ $L \rightarrow id$ $R \rightarrow L$ Check whether this above grammar is LR(0) grammar or not.	[5]	
<input checked="" type="checkbox"/>	Construct the SLR parsing table for the following grammar: $E \rightarrow E+T \mid T$ $T \rightarrow T^*F \mid F$ $F \rightarrow (E) \mid id$	[5]	

5(a)	Construct the LR(0) parsing table for the following grammar $E \rightarrow E + T \mid T$ $T \rightarrow T * F \mid F$ $F \rightarrow (E) \mid id$	[5]	
(b)	Prove that the following grammar is CLR(1) but not LALR(1)? $S \rightarrow Aa \mid bAc \mid BC \mid bBa$ $A \rightarrow d$ $B \rightarrow d$	[5]	

UNIT-III

6(a)	Explain the various types of errors generated during different phases of the compiler. How do we recover from these errors?	[5]	
(b)	Write the quadruple, and triple for the expression: $- (a * b) + (c + d) - (a + b + c + d)$	[5]	

7(a)	What are the various methods of implementing three address statements?	[5]	
(b)	This Grammar is SLR (1) $S \rightarrow AB$ $A \rightarrow a$ $B \rightarrow b$	[5]	

UNIT-IV

8(a)	Construct the DAG for the following basic blocks 1. $t1 := 4 * i$ 2. $t2 := a[t1]$ 3. $t3 := 4 * i$ 4. $t4 := b[t3]$ 5. $t5 := t2 * t4$ 6. $t6 := p + t5$ 7. $p := t6$ 8. $t7 := i + 1$ 9. $i := t7$ 10. if $i <= 20$ goto 1	[5]	
(b)	Write about all issues in code generation. Describe it.	[5]	

9(a)	What is a DAG? Mention its applications.	[5]	
(b)	What is code optimization? Explain Peephole optimization and Loop optimization.	[5]	