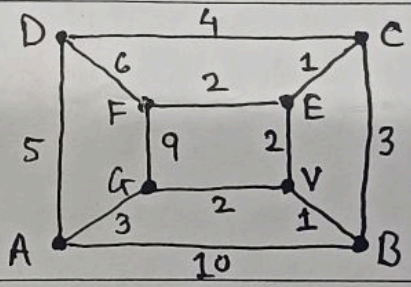
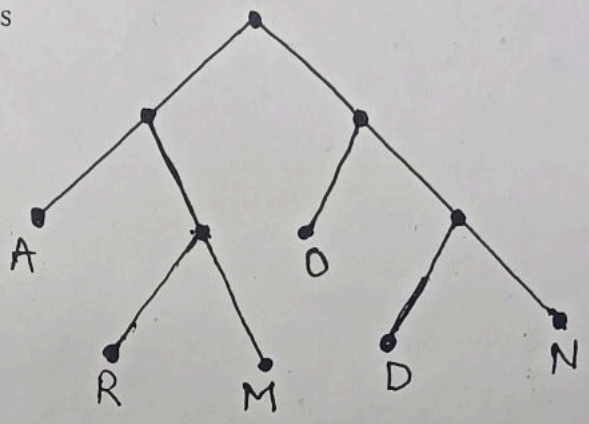
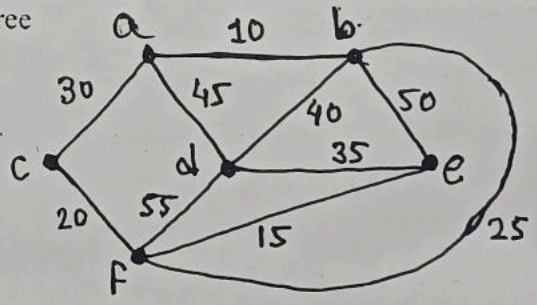
SOMAIYA VIDYAVIHAR UNIVERSITY

18·11·2024 (E)

Semester: July 2024– November 2024		
Maximum Marks: 50 **Examination: End-Semester Examination** **Duration: 2 Hrs.**		
Programme code: 04 **Programme: B. Tech in Information Technology**	**Class: SY**	**Semester: III (SVU 2023)**
Institute/School/Department: K. J. Somaiya School of Engineering	**Name of the department: Information Technology**	
Course Code: 216U04C301	**Name of the Course: Discrete and Applied Mathematics**	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	
i)	Find Inverse Laplace Transform of $cot^{-1}(s+1)$	05
ii)	If $f, g, h : R \to R$ are defined as $f(x) = x + 2$, $g(x) = \frac{1}{x^2+1}$, $h(x) = 3$, Find (a) $g \circ h \circ f(x)$ (b) $h \circ g \circ f(x)$ (c) $g \circ f^{-1} \circ f(x)$	05
iii)	Solve travelling Sales-person problem for the adjacent graph treating v as the starting vertex. 	05
Q.2	Attempt any **one**	**10**
i)	(a) Find $L[(1 + 2t + t^2)H(t-2)]$ (b) Prepare table with respect to multiplication modulo 9 in $Z_9 - \{0\}$. Check whether it is a semigroup, Monoid or Group?	
ii)	Find Fourier series for $f(x) = \begin{cases} x & for\ 0 < x \le \pi \\ 2\pi - x & for\ \pi \le x < 2\pi \end{cases}$ Using Parseval's Identity deduce that $\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots\dots\dots$	
Q.3	Attempt any **one**	**10**
i)	(a) Find $L^{-1}\left(\frac{1}{(s^2+1)(s^2+4)}\right)$ (b) If R^* is the set of all real numbers except zero and if $a * b = 2ab$. Prove that $(R^*, *)$ is an abelian group.	

ii)	(a) For the following set of weights construct optimal binary tree 10, 30, 5, 15, 20, 25,32 . Also find weight of the optimal tree (b) Check whether $f: Z \to Z$ defined as $f(x) = \frac{4x+3}{5x-2}$ is bijective. Hence find f^{-1} if possible.	
Q.4	Attempt the following	10
	(a) Using the adjacent tree encode each of the following words (i) ROAD (ii) DOOR (iii) RANDOM (iv) RAMA (v) ROAM  (b) Show that the relation $R = \{(a, b)$ such that $2a + 3b$ *is divisible by* 5 , $a, b \in Z\}$ is an equivalence relation	
Q.5	Attempt any **two**	
i)	Obtain the minimum spanning tree And its weight using Kruskal's algorithm for the adjacent graph. 	05
ii)	Let $A = \{1, 2, 3, 4, 6, 9, 12, 18, 36\}$ and R be the relation 'is divisible by' i.e. aRb *if* a *divides* b. Obtain the relation matrix and draw the Hasse diagram.	05
iii)	Find Half range Cosine series of $f(x) = a - x$ in the interval $(0, a)$	05

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Semester: July 2024– November 2024		
Maximum Marks: 50 **Examination: End-Semester Examination** **Duration: 2 Hrs.**		
Programme code: O4 **Programme: BTech. IT**	**Class: SY**	**Semester: III (SVU2023)**
Institute/School/Department: K. J. Somaiya School of Engineering	**Name of the department: IT**	
Course Code: 216U04C303	**Name of the Course: Database Management Systems**	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) *Assume suitable data* wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	
i)	What is data independence? Explain Logical data independence in DBMS.	**05**
ii)	Discuss the overlapping and disjoint constraint in brief.	**05**
iii)	Explain Security in database.	**05**
Q.2	Attempt any **one**	**10**
i)	A **cricket tournament management** system is being developed to track **teams**, **players**, **matches**, and **venues**. Here are the requirements: 1. Each **team** has a unique **team ID**, **team name**, and **home city**. 2. Each **player** has a unique **player ID**, **name**, **date of birth**, **batting style**, **bowling style**, and **role** (e.g., batsman, bowler, all-rounder). 3. Each **match** has a unique **match ID**, **date**, **start time**, and is played at a specific **venue**. 4. Each **venue** has a **venue ID**, **venue name**, **location**, and **capacity**. 5. A team consists of multiple players, and each player belongs to only one team. 6. Each match is played between two teams, and the results include details such as **winning team**, **runs scored by each team**, and **man of the match**. 7. Players participate in multiple matches, and performance statistics are tracked for each player per match, including **runs scored**, **wickets taken**, **catches**, and **balls faced**. Design an ER diagram to represent this cricket management system, capturing entities like *Team*, *Player*, *Match*, *Venue*, and their relationships, as well as attributes for each entity and any relationship attributes where applicable.	
ii)	A company database maintains information about employees, departments, and projects. Each employee has attributes like employee ID, name, department ID, and salary. Each department has attributes like department ID and department budget. Each project is associated with a department and has attributes like project ID, project name, and budget. The company has the following business rules: • Whenever a new employee is added to a department, the department	

	budget should be reduced by 5% of the employee's salary. • If an employee's salary is updated, the department budget should be adjusted accordingly. • If an employee is removed, the department budget should be increased by 5% of the employee's salary. Write SQL code to create triggers that implement each of these rules in the database. Explain the purpose of each trigger and describe how it ensures that the department budget is accurately maintained.	
Q.3	Attempt any **one**	**10**
i)	Illustrate the concept of cluster index and secondary index.	
ii)	Write a short note on query optimization. with example.	
Q.4	Attempt the following	**10**
	Describe the Two phase locking protocol with its advantages and disadvatages.	
Q.5	Attempt the following	**10**
	1. What are conditions of view serilizabiity? 2. Explain the states of transaction with diagram.	

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SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: July 2024– November 2024		
Maximum Marks: 50 Examination: End-Semester Examination		Duration: 2 Hrs.
Programme code: 04 Programme: B. Tech Information Technology	Class: SY	Semester: III (SVU 2023)
Institute/School/Department: K. J. Somaiya School of Engineering	Name of the department: IT	
Course Code: 216U04C304	Name of the Course: Data Communication and Networking	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	
i)	Explain any five networking devices and also write the name of layer where they are useful.	05
ii)	Explain any five factors that determine whether a communication system is LAN or MAN.	05
iii)	Describe Peer to Peer paradigm with neat diagram and examples.	05
Q.2	Attempt any **one**	10
i)	Alice and Bob are connected to their organization mail server via LAN or WAN. Alice wants to send a mail to Bob over the internet. Draw neat diagram for Email architecture showing one way email exchange with proper labelling. Explain the architecture, specifically the application programs/protocol used at various stages.	
ii)	Explain Nonpersistent V/S Persistent HTTP connections with suitable diagram? Also write the formats of the request and response messages.	
Q.3	Attempt any **one**	10
i)	A Slotted ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. What is the throughput if the system (all stations together) produces a) 1000 frames per second b) 500 frames per second c) 250 frames per second	
ii)	Explain any two guided and three unguided medium with their advantages and disadvantages.	
Q.4	Attempt the following	10
	A company is granted the site address 201.70.64.0 (class C). The company needs six subnets. How many addresses are there in each subnet and design the complete subnets diagram.	
Q.5	Attempt the following	10
	What is Congestion? List the different open loop and closed loop congestion control policies. Explain any one in each category.	

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27-11-2024(E)

Maximum Marks: 50	Semester: July 2024– November 2024 Examination: End-Semester Examination	Duration: 2 Hrs.
Programme code: 04 Programme: BTech IT	Class: SY	Semester: III (SVU2023)
Institute/School/Department: K. J. Somaiya School of Engineering	Name of the department/Section/Center: IT	
Course Code: 216U04C305	Name of the Course: Digital Systems	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	
i)	Represent $(10101100)_2$ in Octal, Hexadecimal, Decimal, BCD and Gray code (show all the conversion steps)	05
ii)	Realize **Y=(A'B+AC')** using any one type of Universal gate	05
iii)	Simplify **Y=A.B.C +A.B.C' + A'. B.C+ A'.B** using Boolean Lavvs	05
Q.2	Attempt any **one**	10
i)	Design a fire alarm and water sprinkler activation system for a Fireworks shop. Make and mention the necessary assumptions	
ii)	Design a combinational logic circuit for 2 bit magnitude comparator.	
Q.3	Attempt any **one**	10
i)	Design a MOD5 synchronous down counter. Avoid the lockout conditions.	
ii)	Explain a 3 bit Serial in Parallel out shift register with neat diagram and data input of 101011	
Q.4	Attempt the following	10
	Draw and explain the memory hierarchy.	
Q.5	Attempt the following	10
	Explain the functional block diagram of 8086.	

30-11-2024 (E)

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Semester: July 2024– November 2024		
Maximum Marks: 50 **Examination: End-Semester Examination**		**Duration: 2 Hrs.**
Programme code: 04 / 42 **Programme: B. Tech. IT / AI & DS**	**Class: SY**	**Semester: III (SVU 2023)**
Institute/School/Department: **K. J. Somaiya School of Engineering**	**Name of the department:** IT / AI & DS	
Course Code: 216U04C302 & 216U42C302	**Name of the Course: Data Structures**	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	
i)	Explain space and time complexity and What is importance of Big Oh 'O' notation ?	05
ii)	Distinguish Between BFS & DFS with example	05
iii)	Write notes on Dictionary ADT and application of Dictionaries	05
Q.2	Attempt any **one**	10
i)	Construct an AVL Tree for the following sequence **52, 39, 45, 13, 9, 29, 33, 63, 10, 43** Further mention the type of Rotation and the balance factors in each intermediated step	
ii)	Explain Josephus problem in detail. Consider a scenario where n=7 ranging from 1 to 7 and k=2 using queue as data structure.Illustrate & find the winner if the starting is done from 1.	
Q.3	Attempt any **one**	10
i)	Write algorithm for Bubble sort. Sort the given numbers using Bubble sort. Show the output after every pass. **29, 42, 99, 62, 55, 10, 81, 39**	
ii)	Write notes on Collision handling techniques in hashing with example	
Q.4	Attempt the following	10
	Write a Pseudo code/algorithm for PUSH and POP operations for implementation of Dynamic Stack using Linked List.	
Q.5	Attempt the following	10
	A binary search tree has 9 nodes. The pre-order traversals yield the following sequence of nodes - **30 , 20 , 10 , 15 , 25 , 23 , 39 , 35 , 42.** Find the in-order and post-order of the same BST and also step wise construct final BST corresponding to these traversals. Also state height and total leaf node in the tree.	

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29.11.2024 (E)

Semester: July 2024– November 2024		
Maximum Marks: 50 Examination: End-Semester Examination		Duration: 2 Hrs.
Programme code: 12 Programme: Honour Programme in Cyber Security B. Tech in Information Technology	Class: SY	Semester: III (SVU- 2023)
Institute/School/Department: K. J. Somaiya School of Engineering	Name of the department : IT	
Course Code: 216H12C301	Name of the Course: Cyber Laws	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	10
i)	Explain three categories of cybercrimes with examples.	05
ii)	Write about the notable features of ITAA 2008 and the sections amended.	05
iii)	Explain Copyright and its pertaining ACT with example.	05
Q.2	Attempt any **one**	10
i)	Describe Section 66 and its subsections(any four) with real life examples.	10
ii)	List Intellectual Property Rights. Describe Patent Rights and its corresponding ACT with real life example.	
Q.3	Attempt any **one**	10
i)	Considering a Hospital Management System, categorise the different types of data stored and elaborate the rights of patients under GDPR. Also mention the penalties applicable in case of violation.	
ii)	Considering an E-commerce website, Justify the applicability of GDPR and describe the stakeholders involved as per the regulation.	
Q.4	Attempt the following a)Describe the Importance of Privacy Policies. Write down policy of any social media platform. b)Explain the importance of Email security and Retention policy for a Logistic company with example.	10
Q.5	Write short note on any two a)Differentiate between Trademark and TradeSecret b) E-discover and Electronic Evidence c) Types of E-contract d) Digital Signature	10

SOMAIYA VIDYAVIHAR UNIVERSITY

29·11·2024 (E)

Semester: July 2024– November 2024		
Maximum Marks: 50 **Examination: End-Semester Examination**		**Duration: 2 Hrs.**
Programme code: 66		
Programme: Honour in Artificial Intelligence	**Class: SY**	**Semester: III(SVU 2023)**
Institute: K. J. Somaiya School of Engineering	**Name of the department: IT**	
Course Code: 216h66C301	**Name of the Course: Fundamentals of Data Science**	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question Statement	Max. Marks
Q.1	Attempt any **two**	
i)	What is a data set? List the types of data sets (any4).Elaborate any two.	05
ii)	What is a Scatter plot? Draw neat diagram to interpret a) Perfect positive correlation b) Perfect negative correlation c) Low degree of positive correlation d) No correlation	05
iii)	What is binning? Given the sorted data for price (in dollars) : 4, 8, 15, 21, 21, 24, 25, 28, 34 a) Partition into (equal-frequency) bins. b) For the bins obtained in (a) perform smoothing by bin means.	05
		10
Q.2	Attempt any **one**	
i)	What is normalization? Explain data transformation by normalization.	
ii)	What is sampling? Explain data reduction techniques by sampling.	
		10
Q.3	Attempt any **one**	(10)
i)	Find the (a) median wage and (b) Quartile Deviation	

Wages(in Rs)	No of employees
2000-3000	3
3000-4000	5
4000-5000	20
5000-6000	10
6000-7000	5

ii)	(a) For a distribution Karl Pearson's coefficient of Skewness is 0.64, standard deviation is 13 and mean is 59.2 Find mode and median.	(05)

	(b) Compute the Skewness of A and B Q_1 M Q_3 Series A 40 60 80 Series B 62.85 65.25 72.15 Comment on the result.	(05)
Q.4	Attempt the following	10
	(i) What is a similarity Coefficient? Consider following two binary vectors X= (1,0,0,0,0,0,0,0,0,0) Y= (0,0,0,0,0,0,1,0,0,1) Calculate Simple Matching Coefficient and Jaccard Coefficient.	(05)
	(ii) Compute the min EDIT distance table using minimum number of operation for STR1 : abcfg and STR2: adceg	(05)
Q.5	Attempt the following	10
	(i)List the different visualization techniques. Explain any one.	(05)
	(ii) What is dashboard? Explain with respect to types, design, scope and usage.	(05)