



MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)  
B.Tech. V Semester End Examinations  
(Computer Science and Engineering (AI & ML))  
(Model Question Paper)

MR-22

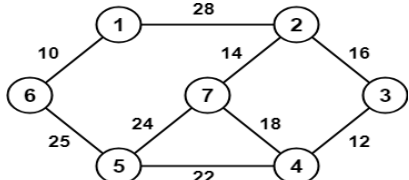
Subject Title: Design and Analysis of Algorithms  
Time: 3 hours

Subject Code: CM501PC  
Max. Marks: 60

Note: Answer ALL Questions  
Part-A (10 x 1 = 10 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	In what way a time complexity differs from space complexity.	1	1	1	1
1. b)	Define $\theta$ -notation? Give one Example.	1	1	1	1
<b>Unit-II</b>					
1. c)	Define Find Operation.	1	2	2	1
1. d)	Write Control Abstraction of Greedy method?	1	3	2	1
<b>Unit-III</b>					
1. e)	Define Optimal binary search.	1	2	3	1
1. f)	Define All pairs shortest path problem.	1	3	3	1
<b>Unit-IV</b>					
1. g)	List the applications of Backtracking?	1	2	4	1
1. h)	Write the Control Abstraction of Least – Cost Branch and Bound.	1	2	4	1
<b>Unit-V</b>					
1. i)	Define NP-Complete	1	4	5	1
1. j)	What is the relation between NP-hard and NP-complete?	1	4	5	1

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	$f(n)=O(g(n))$ , $f(n)=\Omega(g(n))$ and $f(n)=\Theta(g(n))$ , illustrate these relations in estimating the time complexities with suitable examples	5	1	1	1
2. b)	Apply divide and conquer to search an element 'k' in an array a[1:n] using binary search and explain the algorithm.	5	1	1	1
<b>OR</b>					
2. c)	Solve using Master theorem i) $T(n)=2T(n/4)+\sqrt{n}$ ii) $T(n)=7T(n/2)+n^2$	5	1	1	1
2. d)	$L=\{2,12,18,3,34, 27, 56, 4, 8, 3, 10\}$ write and explain the merge sort Algorithm that outputs the sorted list of elements.	5	1	1	1
<b>Unit-II</b>					
3. a)	Discuss about Set representations? Write Algorithms for Union and Find in Set?	5	2	2	1
3. b)	State the Job – Sequencing with deadlines problem. Find an optimal sequence to the n = 5 Jobs where profits (P1, P2, P3, P4, P5) = (20, 15, 10, 5, 1) and deadlines (d1, d2, d3, d4, d5) = (2, 2, 1, 3, 3).	5	3	2	1
<b>OR</b>					
3. c)	Solve 0/1 Knapsack instance: n = 5, (p1, p2,.. p5) = (10,15,6,8,4), (w1,w2,...,w5) = (4,6,3,4,2) and m=12. And find an optimal solution of the same.	5	2	2	1
3. d)	Write down Kruskal's Algorithm for finding the Minimum Spanning Tree of a connected graph. Execute your algorithm on the following graph. 	5	3	2	1

P.T.O.

<b>Unit-III</b>					
4. a)	Draw an Optimal Binary Search Tree for n=4 identifiers (a1,a2,a3,a4)=(do,if, read, while) P(1:4)=(3,3,1,1) and Q(0:4)=(2,3,1,1,1)	5	2	3	1
4. b)	Formulate the Knapsack problem with greedy method and find the optimal solution for n=7, m=15, (p1-p7)=(10,5,15,7,6,18,3), (w1-w7)=(2,3,5,7,1,4,1)	5	3	3	1
<b>OR</b>					
4. c)	Solve Travelling Salesperson Problem $\begin{bmatrix} \infty & 5 & 1 & 10 & 6 \\ 1 & \infty & 4 & 12 & 7 \\ 3 & 6 & \infty & 4 & 16 \\ 7 & 1 & 3 & \infty & 9 \\ 16 & 12 & 7 & 6 & \infty \end{bmatrix}$	5	2	3	1
4. d)	Construct a system with multiple devices connected parallel in three stages. The costs of the devices are 25, 10 and 15 respectively. The cost of the system is to be no more than 100. The reliability of each device type is 0.8, 0.7 and 0.4 respectively.	5	3	3	1
<b>Unit-IV</b>					
5. a)	Given a set of non-negative integers {10, 7, 5, 18, 12, 20, 15}, and a value sum 35, determine if there is a subset of the given set with sum equal to Given sum.	5	2	4	1
5. b)	Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for n=4, m=15,(p1,p2,p3,p4)=(10,10,12,18), (w1,w2,w3,w4) = (2, 4, 6, 9). Draw the portion of the state space tree and find optimal solution.	5	2	4	1
<b>OR</b>					
5. c)	Write and explain the iterative back tracking algorithm. Draw the state space tree for 4-queens problem and give the solution tuples	5	2	4	1
5. d)	Draw the portion of state space tree generated by LCBB for the 0/1 Knapsack instance: n = 5, (p1, p2,.. p5) = (10,15,6,8,4), (w1,w2,..,w5) = (4,6,3,4,2) and m=12. And find an optimal solution of the same.	5	2	4	1
<b>Unit-V</b>					
6. a)	Prove, if any NP-complete problem belongs to class P, then is P = NP?	5	4	5	1
6. b)	Write a non-deterministic algorithm of sorting the list of elements	5	4	5	1
<b>OR</b>					
6. c)	Define NP- Hard and NP – Complete Problems.	5	4	5	1
6. d)	What are the steps used to show a given problem is NP-Complete?	5	4	5	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome



Subject Title: Computer Networks

Time: 3 hours

Subject Code: CS502PC

Max. Marks : 60

Note: Answer ALL Questions

Part-A (10 x 1 = 10 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	Contrast between Connection oriented and Connection less service?	1	2	1	1
1. b)	List the names of the layers of OSI / ISO Model?	1	1	1	1
<b>Unit-II</b>					
1. c)	Define Bit stuffing?	1	1	2	1
1. d)	List the carrier sense multiple access protocols?	1	1	2	1
<b>Unit-III</b>					
1. e)	Define congestion?	1	1	3	1
1. f)	State the differences between IPV4 and IPV6?	1	1	3	1
<b>Unit-IV</b>					
1. g)	List the Transport Service primitives?	1	1	4	1
1. h)	Sketch the UDP header?	1	2	4	2
<b>Unit-V</b>					
1. i)	Demonstrate about DNS?	1	2	5	1
1. j)	Compare FTP and TFTP?	1	2	5	1

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Compare LAN, MAN and WAN?	5	2	1	1
2. b)	Explain in detail about the OSI Model with a neat sketch?	5	2	1	2
<b>OR</b>					
2. c)	Compare and contrast the OSI and TCP/IP reference models.	5	2	1	1
2. d)	Summarize about twisted pair cables and coaxial cables with neat diagram.	5	2	1	2
<b>Unit-II</b>					
3. a)	What is framing? Explain various framing techniques of Data Link Layer	5	1	2	1
3. b)	Explain the CRC error detection technique using generator polynomial $x^4+x^3+1$ and data 11100011.	5	2	2	2
<b>OR</b>					
3. c)	Explain about GBN Sliding Window Protocol.	5	2	2	1
3. d)	Compare and contrast Pure ALOHA and Slotted ALOHA channel allocation Methods.	5	2	2	1
<b>Unit-III</b>					
4. a)	What are the design issues of Network Layer? Explain in detail.	5	1	3	1
4. b)	Define congestion. Write about congestion control policies	5	1	3	1
<b>OR</b>					
4. c)	Demonstrate how to make routing table using distance vector routing and list down the limitations.	5	2	3	2
4. d)	Given a network address of 192.168.100.0 and a subnet mask of 255.255.255.192. a) How many subnets are created? b) How many hosts are there per subnet?	5	1	3	1
<b>Unit-IV</b>					

5. a)	Illustrate the connection establishment and release in transport layer.	5	2	4	2
5. b)	How crash recovery is managed at the transport layer?	5	1	4	1
<b>OR</b>					
5. c)	What are the services provided by transport layer to the upper layers?	5	2	4	1
5. d)	Describe in brief about TCP segment Header	5	2	4	1
<b>Unit-V</b>					
6. a)	What is DNS? What are the services provided by DNS?	5	1	5	1
6. b)	Write notes on SMTP?	5	3	5	1
<b>OR</b>					
6. c)	How would you summarize the concepts of E-mail, its architecture and services?	5	2	5	1
6. d)	Elaborate on SNMP with an example.	5	4	5	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome



**MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)**  
**B.Tech. V Semester End Examinations**  
**(Common to IT & CSM)**  
**(Model Question Paper)**

**MR-22**

**Subject Title: Machine Learning**  
Time: 3 hours

**Subject Code: CM502PC**  
Max. Marks : 60

*Note: Answer ALL Questions*  
*Part-A (10 x 1 = 10 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	What is the main goal of machine learning?	1	1	1	1,2,12
1. b)	What is Overfitting?	1	1	1	1,2,12
<b>Unit-II</b>					
1. c)	What metric is commonly used to determine the best split in a decision tree?	1	2	2	1,2,3,12
1. d)	What is the main disadvantage of k-NN in terms of computational efficiency	1	1	2	1,2,3,12
<b>Unit-III</b>					
1. e)	What problem does the Exclusive-OR (XOR) function present for a single-layer perceptron?	1	1	3	1,2
1. f)	What is the primary goal of the backpropagation algorithm	1	1	3	1,2,12
<b>Unit-IV</b>					
1. g)	What is a Bayesian Belief Network?	1	2	4	1,2,3,12
1. h)	What is the objective of a Support Vector Machine?	1	1	4	1,2,3,12
<b>Unit-V</b>					
1. i)	Differentiate between hierarchical and partitional clustering.	1	1	5	1,2,3,12
1. j)	What is a centroid in the context of the k-means algorithm?	1	2	5	1,2,3,12

*Part-B (5 x 10=50 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Explain the differences between supervised, unsupervised, and reinforcement learning with examples of each.	5	1	1	1,2,12
2. b)	Define the confusion matrix and explain its significance in evaluating classification models. Discuss the different metrics that can be derived from the confusion matrix.	5	2	11	1,2,12
<b>OR</b>					
2. c)	Compare and contrast Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA) in the context of dimensionality reduction.	5	2	1	1,2,12
2. d)	Explain the concept of cross-validation and its importance in evaluating machine learning models. Provide an example of how k-fold cross-validation is performed.	5	3	1	1,2,12
<b>Unit-II</b>					
3. a)	Explain the process of constructing a decision tree using the basic decision tree learning algorithm. Discuss the role of Information Gain in this process.	5	3	2	1,2,3,12
3. b)	Discuss the differences between lazy learning and eager learning in the context of instance-based learning. Provide examples of each.	5	3	2	1,2,3,12

**P.T.O.**

<b>OR</b>																																																																																
3. c)	Find the Entropy and Information Gain for the given dataset.	5	3	2	1,2,3,12																																																																											
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Outlook</th> <th>Temperature</th> <th>Humidity</th> <th>Wind</th> <th>Play tennis</th> </tr> </thead> <tbody> <tr><td>Sunny</td><td>Hot</td><td>High</td><td>Weak</td><td>No</td></tr> <tr><td>Sunny</td><td>Hot</td><td>High</td><td>Strong</td><td>No</td></tr> <tr><td>Overcast</td><td>Hot</td><td>High</td><td>Weak</td><td>Yes</td></tr> <tr><td>Rain</td><td>Mild</td><td>High</td><td>Weak</td><td>Yes</td></tr> <tr><td>Rain</td><td>Cool</td><td>Normal</td><td>Weak</td><td>Yes</td></tr> <tr><td>Rain</td><td>Cool</td><td>Normal</td><td>Strong</td><td>No</td></tr> <tr><td>overcast</td><td>Cool</td><td>Normal</td><td>Strong</td><td>Yes</td></tr> <tr><td>Sunny</td><td>Mild</td><td>High</td><td>Weak</td><td>No</td></tr> <tr><td>Sunny</td><td>Cool</td><td>Normal</td><td>Weak</td><td>Yes</td></tr> <tr><td>Rain</td><td>Mild</td><td>Normal</td><td>Weak</td><td>Yes</td></tr> <tr><td>Sunny</td><td>Mild</td><td>Normal</td><td>Strong</td><td>Yes</td></tr> <tr><td>Overcast</td><td>Mild</td><td>High</td><td>Strong</td><td>Yes</td></tr> <tr><td>Overcast</td><td>Hot</td><td>Normal</td><td>Weak</td><td>Yes</td></tr> <tr><td>Rain</td><td>Mild</td><td>High</td><td>strong</td><td>No</td></tr> </tbody> </table>					Outlook	Temperature	Humidity	Wind	Play tennis	Sunny	Hot	High	Weak	No	Sunny	Hot	High	Strong	No	Overcast	Hot	High	Weak	Yes	Rain	Mild	High	Weak	Yes	Rain	Cool	Normal	Weak	Yes	Rain	Cool	Normal	Strong	No	overcast	Cool	Normal	Strong	Yes	Sunny	Mild	High	Weak	No	Sunny	Cool	Normal	Weak	Yes	Rain	Mild	Normal	Weak	Yes	Sunny	Mild	Normal	Strong	Yes	Overcast	Mild	High	Strong	Yes	Overcast	Hot	Normal	Weak	Yes	Rain	Mild	High	strong	No
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3. d)	Explain the k-nearest neighbors algorithm in detail, including how it works and its application in classification tasks.	5	4	2	1,2,3,12																																																																											
<b>Unit-III</b>																																																																																
4. a)	Explain the perceptron learning algorithm and how it adjusts weights during training. Illustrate with an example.	5	2	3	1,2,3,12																																																																											
4. b)	Describe the process of initializing weights in neural networks. Why is proper weight initialization important, and what are some common strategies?	5	2	3	1,2,3,12																																																																											
<b>OR</b>																																																																																
4. c)	Provide an illustrative example of how a neural network, particularly an MLP, can be applied to face recognition. Describe the key steps involved.	5	4	3	1,2,3,12																																																																											
4. d)	Compare and contrast the use of radial basis functions (RBF) and multi-layer perceptrons (MLP) in neural networks. When would you prefer one over the other?	5	2	3	1,2,3,12																																																																											
<b>Unit-IV</b>																																																																																
5. a)	Explain Bayes' Theorem and its significance in Bayesian learning. Provide an example to illustrate how it is applied in machine learning.	5	2	4	1,2,3,12																																																																											
5. b)	Provide an example of how SVMs can be used in a real-world application, such as image classification. Explain the steps involved from data preprocessing to model evaluation	5	3	4	1,2,3,12																																																																											
<b>OR</b>																																																																																
5. c)	Discuss the Naïve Bayes classifier and its application in text classification. What are the key assumptions,	5	2	4	1,2,3,12																																																																											
5. d)	Describe the SVM algorithm, including its training process and how it deals with both linearly separable and non-linearly separable data.	5	2	4	1,2,3,12																																																																											
<b>Unit-V</b>																																																																																
6. a)	Explain the k-means clustering algorithm. Provide a step-by-step example of how it works on a small dataset.	5	3	5	1,2,3,12																																																																											
6. b)	Discuss the concepts of bagging and boosting in ensemble learning. How do these methods improve model performance?	5	3	5	1,2,3,12																																																																											
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6. c)	Compare and contrast hierarchical clustering with k-means clustering. What are the advantages and limitations of each method?	5	3	5	1,2,3,12																																																																											
6. d)	Provide an example of how reinforcement learning can be applied to a real-world problem, such as robot navigation. Describe the key components involved.	5	2	5	1,2,3,12																																																																											

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

*Note: Answer ALL Questions**Part-A (10 x 1 = 10 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	Define Business Economics	1	1	1	1
1. b)	What is meant by National Income?	1	1	1	7
<b>Unit-II</b>					
1. c)	Describe Cross Elasticity of Demand	1	2	2	12
1. d)	What are the Determinants of supply?	1	1	2	7
<b>Unit-III</b>					
1. e)	Explain Monopolistic Competition	1	2	3	7
1. f)	What is meant by Marginal Cost?	1	1	3	11
<b>Unit-IV</b>					
1. g)	Describe Accounting Equation	1	2	4	11
1. h)	What is meant by Materiality Convention?	1	1	4	8
<b>Unit-V</b>					
1. i)	Explain Liquidity	1	2	5	11
1. j)	List Profitability ratios	1	1	5	11

*Part-B (5 x 10=50 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Explain different sources of capital.	5	2	1	1
2. b)	Describe the advantages and disadvantages of sole proprietorship.	5	2	1	7
<b>OR</b>					
2. c)	Explain the nature and scope of Business Economics.	5	2	1	7
2. d)	Differentiate between Private Limited Companies and Public Limited Companies	5	4	1	7
<b>Unit-II</b>					
3. a)	Describe Law of Demand and its exceptions	5	2	2	11
3. b)	Explain the Determinants of Supply and supply function.	5	2	2	7
<b>OR2</b>					
3. c)	The quantity demanded for the product X is 30 units, when the price is Rs.15. The quantity demanded increased to 40 units, as price decreased to Rs. 10. Compute Price Elasticity of demand.	5	3	2	2
3. d)	Explain different methods of Demand Forecasting	5	2	2	12
<b>Unit-III</b>					
4. a)	How can a producer determine the least-cost combination of inputs?	5	1	3	3
4. b)	Differentiate between perfect competition and monopoly competition.	5	4	3	8
<b>OR</b>					
4. c)	Explain Law of Variable Proportions with the help of graph.	5	2	3	7
4. d)	Describe various Pricing strategies used by modern business organizations.	5	2	3	5
<b>Unit-IV</b>					
5. a)	Classify the following accounts into various (Personal, Real or Nominal) types of accounts. i) Salary account ii) Outstanding wages account iii) Rent account	5	2	4	11

	iv) Bank account v) Insurance prepaid vi) Drawings account vii) Bad debts account viii) Machinery account ix) Furniture account x) Patents account																																																													
5. b)	Journalise the following transactions: Jan 1, 2021 Commenced with Cash Rs. 8,00,000 Jan 3, 2021 Purchased Goods worth Rs. 1,50,000 Jan 8, 2021 Sold Goods to Mr. Ramu Rs. 1,10,000 Jan 30, 2021 Salaries paid Rs. 40,000 Jan 30, 2021 Rent paid Rs. 20,000	5	3	4	11																																																									
<b>OR</b>																																																														
5. c)	Explain Double Entry System and its advantages	5	2	4	11																																																									
5. d)	Prepare Trading and Profit and Loss account from the following information.  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3" style="text-align: center;">Trial Balance as on 31.03.2021</th> </tr> <tr> <th style="text-align: center;">Particulars</th> <th style="text-align: center;">Debit(₹)</th> <th style="text-align: center;">Credit(₹)</th> </tr> </thead> <tbody> <tr> <td>Capital</td> <td></td> <td style="text-align: right;">1,00,000</td> </tr> <tr> <td>Purchases</td> <td style="text-align: right;">40,000</td> <td></td> </tr> <tr> <td>Furniture</td> <td style="text-align: right;">30,000</td> <td></td> </tr> <tr> <td>Interest received</td> <td></td> <td style="text-align: right;">3,000</td> </tr> <tr> <td>Cash</td> <td style="text-align: right;">15,000</td> <td></td> </tr> <tr> <td>Debtors</td> <td style="text-align: right;">27,000</td> <td></td> </tr> <tr> <td>Office Stationery</td> <td style="text-align: right;">3,000</td> <td></td> </tr> <tr> <td>Machinery</td> <td style="text-align: right;">70,000</td> <td></td> </tr> <tr> <td>Bank Loan</td> <td></td> <td style="text-align: right;">5,000</td> </tr> <tr> <td>Bills Payable</td> <td></td> <td style="text-align: right;">2,000</td> </tr> <tr> <td>Opening Stock</td> <td style="text-align: right;">10,000</td> <td></td> </tr> <tr> <td>Sales</td> <td></td> <td style="text-align: right;">90,000</td> </tr> <tr> <td>Wages paid</td> <td style="text-align: right;">600</td> <td></td> </tr> <tr> <td>Salaries paid</td> <td style="text-align: right;">2,500</td> <td></td> </tr> <tr> <td>Electricity charges</td> <td style="text-align: right;">1,200</td> <td></td> </tr> <tr> <td>Insurance paid</td> <td style="text-align: right;">700</td> <td></td> </tr> <tr> <td style="text-align: right;">Total</td> <td style="text-align: right;">2,00,000</td> <td style="text-align: right;">2,00,000</td> </tr> </tbody> </table> <p><b>Adjustments:</b> i) Closing Stock ₹ 12,000 ii) Depreciate Machinery @10% p.a. iii) Salaries outstanding ₹ 500</p>	Trial Balance as on 31.03.2021			Particulars	Debit(₹)	Credit(₹)	Capital		1,00,000	Purchases	40,000		Furniture	30,000		Interest received		3,000	Cash	15,000		Debtors	27,000		Office Stationery	3,000		Machinery	70,000		Bank Loan		5,000	Bills Payable		2,000	Opening Stock	10,000		Sales		90,000	Wages paid	600		Salaries paid	2,500		Electricity charges	1,200		Insurance paid	700		Total	2,00,000	2,00,000	5	3	4	11
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Machinery	70,000																																																													
Bank Loan		5,000																																																												
Bills Payable		2,000																																																												
Opening Stock	10,000																																																													
Sales		90,000																																																												
Wages paid	600																																																													
Salaries paid	2,500																																																													
Electricity charges	1,200																																																													
Insurance paid	700																																																													
Total	2,00,000	2,00,000																																																												
<b>Unit-V</b>																																																														
6. a)	How accounting ratios are useful in the inter-firm comparison.	5	1	5	10																																																									
6. b)	From the given Balance Sheet calculate: a) Debt-equity ratio b) Liquidity ratio c) Fixed assets to current assets ratio and d) Fixed assets to Net worth ratio.  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4" style="text-align: center;">Balance Sheet</th> </tr> <tr> <th style="text-align: center;">Liabilities</th> <th style="text-align: center;">Rs.</th> <th style="text-align: center;">Assets</th> <th style="text-align: center;">Rs.</th> </tr> </thead> <tbody> <tr> <td>Share Capital</td> <td style="text-align: right;">1,00,000</td> <td>Goodwill</td> <td></td> </tr> <tr> <td></td> <td style="text-align: right;">0</td> <td></td> <td style="text-align: right;">60,000</td> </tr> </tbody> </table>	Balance Sheet				Liabilities	Rs.	Assets	Rs.	Share Capital	1,00,000	Goodwill			0		60,000	5	3	5	10																																									
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	Retained Earnings	10,000	Machinery	1,00,000				
	Profit and loss a/c	40,000	Stock	30,000				
	Secured loans	80,000	Debtors	70,000				
	Creditors	40,000	Furniture	10,000				
	Provision for taxation	30,000	Cash	30,000				
		3,00,000		3,00,000				

**OR**

6. c)	Differentiate Liquidity ratios and leverage ratios.	5	4	5	11																																												
6. d)	<p>The Balance Sheet of ABC Limited as on 31-03-2018 was as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Liabilities</th> <th style="width: 15%;">Amount (₹)</th> <th style="width: 30%;">Assets</th> <th style="width: 15%;">Amount (₹)</th> </tr> </thead> <tbody> <tr> <td>Equity Share Capital</td> <td>1,40,000</td> <td>Plant and Machinery</td> <td>1,24,000</td> </tr> <tr> <td>Reserves and Surplus</td> <td>1,28,000</td> <td>Land and Buildings</td> <td>1,30,000</td> </tr> <tr> <td>Debentures</td> <td>1,32,000</td> <td></td> <td>26,000</td> </tr> <tr> <td>Creditors</td> <td>26,000</td> <td>Furniture &amp; Fixtures</td> <td>2,000</td> </tr> <tr> <td>Bank overdraft</td> <td>4,000</td> <td>Stock</td> <td>22,000</td> </tr> <tr> <td>Provision for Taxation:</td> <td>6,000</td> <td>Debtors</td> <td>4,000</td> </tr> <tr> <td>Outstanding Expenses</td> <td>2,000</td> <td>Investments</td> <td>12,000</td> </tr> <tr> <td>Bills payable</td> <td>2,000</td> <td>(Short-term)</td> <td>65,000</td> </tr> <tr> <td></td> <td>440,000</td> <td>Cash</td> <td>55,000</td> </tr> <tr> <td></td> <td></td> <td>Cash at Bank</td> <td>440,000</td> </tr> </tbody> </table> <p>From the above, compute and interpret  a) Current Ratio b) Quick Ratio c) Absolute Liquid Ratio d) Debt-Equity Ratio e) Proprietary Ratio.</p>	Liabilities	Amount (₹)	Assets	Amount (₹)	Equity Share Capital	1,40,000	Plant and Machinery	1,24,000	Reserves and Surplus	1,28,000	Land and Buildings	1,30,000	Debentures	1,32,000		26,000	Creditors	26,000	Furniture & Fixtures	2,000	Bank overdraft	4,000	Stock	22,000	Provision for Taxation:	6,000	Debtors	4,000	Outstanding Expenses	2,000	Investments	12,000	Bills payable	2,000	(Short-term)	65,000		440,000	Cash	55,000			Cash at Bank	440,000	5	3	5	11
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M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome



**MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)**  
**B.Tech. V Semester End Examinations**  
**((Computer Science and Engineering (AI & ML))**  
**(Model Question Paper)**

**MR-22**

**Subject Title:** Elements of Data Science  
**Time:** 3 hours

**Subject Code:** CM513PE  
**Max. Marks:** 60

*Note: Answer ALL Questions*  
**Part-A (10 x 1 = 10 Marks)**

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	What is meant by Data Science?	1	1	1	1
1. b)	Define the term Datafication?	1	1	1	1
<b>Unit-II</b>					
1. c)	Define Data set with an example.	1	1	2	1
1. d)	Compare Attribute and Measurement.	1	2	2	2
<b>Unit-III</b>					
1. e)	Apply arithmetic operators on two vectors.	1	3	4	2
1. f)	Write an R Code to get structure of data frame?	1	1	4	2
<b>Unit-IV</b>					
1. g)	Compare Relational operator and logical operator in R language	1	2	4	2
1. h)	What is function scoping in R language	1	1	4	1
<b>Unit-V</b>					
1. i)	What is data reduction? List out different data reduction strategies.	1	1	5	1
1. j)	Analyze importance of stick figure visualization technique?	1	3	5	1

**Part-B (5 x 10=50 Marks)**

Q. No.	Stem of the Question	M	L	CO	PO																																								
<b>Unit-I</b>																																													
2. a)	Briefly explain about the activities or lifecycle of Data science with neat diagram.	5	1	1	1																																								
2. b)	Analyze about the hype created in Big data and Data science with actual	5	3	1	1																																								
<b>OR</b>																																													
2. c)	What is operator? Explain different operators in R-Programming.	5	2	1	1																																								
2. d)	Explain in detail about data types in R language.	5	2	1	1																																								
<b>Unit-II</b>																																													
3. a)	Define Data set with an example.	5	1	2	1																																								
3. b)	Explain how to estimate the central tendency of the data using mean, mode and median with example.	5	1	2	1																																								
<b>OR</b>																																													
3. c)	Let a hospital tested the age and body fat data for 18 randomly selected persons with the following result.	5	5	2	2																																								
	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><b>age</b></td> <td>23</td> <td>23</td> <td>27</td> <td>27</td> <td>39</td> <td>41</td> <td>47</td> <td>49</td> <td>50</td> </tr> <tr> <td style="padding: 2px;"><b>%fat</b></td> <td>9.5</td> <td>26.5</td> <td>7.8</td> <td>17.8</td> <td>31.4</td> <td>25.9</td> <td>27.4</td> <td>27.2</td> <td>31.2</td> </tr> <tr> <td style="padding: 2px;"><b>age</b></td> <td>52</td> <td>54</td> <td>54</td> <td>56</td> <td>57</td> <td>58</td> <td>58</td> <td>60</td> <td>61</td> </tr> <tr> <td style="padding: 2px;"><b>%fat</b></td> <td>34.6</td> <td>42.5</td> <td>28.8</td> <td>33.4</td> <td>30.2</td> <td>34.1</td> <td>32.9</td> <td>41.2</td> <td>35.7</td> </tr> </table>					<b>age</b>	23	23	27	27	39	41	47	49	50	<b>%fat</b>	9.5	26.5	7.8	17.8	31.4	25.9	27.4	27.2	31.2	<b>age</b>	52	54	54	56	57	58	58	60	61	<b>%fat</b>	34.6	42.5	28.8	33.4	30.2	34.1	32.9	41.2	35.7
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(a) Calculate the mean, median and standard deviation of age and %fat.																																													
Draw the boxplot for age and %fat																																													
3. d)	What is the importance of basic statistical description of the data.	5	1	2	2																																								
<b>Unit-III</b>																																													
4. a)	Analyze different ways to create vector and access the elements of	5	3	3	2																																								

**P.T.O**

	vector along with R Code.				
4. b)	What is data frame? Explain sub setting of data frames and extending data frames with R Code.	5	1	3	1
<b>OR</b>					
4. c)	Explain different ways to create list and access the elements of list along with R Code.	5	1	3	2
4. d)	List out the applications of vectors, matrix, data frame and factors	5	3	3	1
<b>Unit-IV</b>					
5. a)	Compare logical and relational operators in R-language.	5	3	4	1
5. b)	Develop a program in R language for Calculator program.	5	3	4	1
<b>OR</b>					
5. c)	Co-relate R language functions with Data Analytics	5	3	4	1
5. d)	Illustrate mathematical operations in R-language	5	3	4	2
<b>Unit-V</b>					
6. a)	Illustrate different types of attributes with operations and transformations that can be applied.	5	3	5	2
6. b)	Distinguish between Histograms and Scatter plots in visualizing the data distribution.	5	4	5	2
<b>OR</b>					
6. c)	Explain Principle Component Analysis and its role in Data Science.	5	1	5	1
6. d)	Distinguish between Pixel Oriented Visualization and Icon based Visualization technique.	5	3	5	2

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