MSc.(DS).II/04.23.002 Reg.No. | | | | | | | | |

B

M.Sc. COMPUTER SCIENCE WITH SPECIALIZATION IN DATA SCIENCE

SECOND SEMESTER EXAMINATION, APRIL 2023

22-359-0201 Networks and Data Communications

(Regular)

Time: 3 Hours **Maximum Marks :50**

No	QUESTIONS	MARKS	CO	BL	PL
1	Compare and contrast different encoding standards.	10	1	2	2.6.4
	OR				
2	Discuss the history and development of Computer Networks.	10	1	2	6.3.1
3	Suma wish to send a message to Dhanya. The frames to be transmitted are 11001100, 10101010, 11110000 and 11000011. Use the Checksum method for error detection. Explain the steps and show both Sender and Receiver side computations. Also explain the final inference.	10	2	3	1.2.1
	OR				
4	Explain the concept and working of VLANs.	10	2	2	6.3.1
5	Differentiate between IPv4 and IPv6 addressing.	10	3	2	2.6.4
	OR				
6	What is the purpose of a Distance Vector Routing (DVR) Protocol? With a suitable illustration, explain working of the DVR protocol.	10	3	2	4.4.1
7	Present a detailed overview of Transport Layer Services.	10	4	2	5.6.1
	OR				
8	Examine the Leaky Bucket Algorithm. How does it differ from Token Bucket Algorithm?	10	4	2	2.6.4

9	Consider the URL https://www.cusat.ac.in (cusat.ac.in) - or any such URL, for a generalisation. Investigate the occurrences on the User's side after the URL is entered and the Enter key is pressed. Present an exhaustive write-up on the background operations which gives the user the expected results on the computer screen.	10	5	3	1.7.1
	OR				
10	Write notes on: a) Any four Socket Functions. b) Creating a Socket.	10	5	2	10.4.1

****

M.Sc.(DS).II/04.23.003 Reg.No. | | | | | | | | |

C

M.SC. COMPUTER SCIENCE WITH SPECIALIZATION IN DATA SCIENCE
SECOND SEMESTER EXAMINATION APRIL 2023

22-359-0202 DATABASE MANAGEMENT SYSTEMS
(Regular)

Time: 3 Hours **Maximum Marks :50**

Each question carries 10 Marks

Qn No		Questions	Marks	CO	BL	PI
1	a	Explain the different types of keys in DBMS with examples.	7	CO1	L2	1.7.1
	b	Discuss the relational data model concepts.	3	CO1	L2	1.7.1
		OR				
2	a	Discuss the following with examples. a) Entity integrity constraint. b) Referential integrity constraint.	5	CO1	L2	1.7.1
	b	How the following are represented in ER diagram. Give an example. a) Entity type. b) Weak entity. c) Partial key. d) Multivalued attributes.	5	CO1	L2	1.7.1
3	a	Consider the relations given below and write relational algebra expressions for the following queries: *Student (Rollno, Name, Age, Gender, Address, Advisor)* *Course (Course_id, Cname, Credits)* *Enrollement (Rollno, Course_id, Grade)* a) Name of female students. b) Name of male students along with their advisor. c) Roll number and name of students who have not enrolled for any course.	5	CO2	L3	1.7.1
	b	Given a relation R(P, Q, R, S, T, U, V, W, X, Y) and Functional Dependency set FD = { PQ → R, P → ST, Q→ U, U → VW, and S → XY}, determine whether the given R is in 3NF? If not convert it into 3 NF.	5	CO2	L3	1.7.1
		OR				

4		Consider the following School database : *Student(Student_ID, Stu_Name, Stu_age, Stu_address)* *Enrol(stud_id, subject_id, sem, year, marks)* *Subject(Subject_ID, Subject_Name, sem, year)* Write SQL queries for the following. a) Identify the primary key and foreign key of each table. b) Write the SQL query to find the name of students whose age is greater than 20. c) Write the SQL query to list name of subjects enrolled by student whose id is 10001. d) Write the SQL query to find the total number of subjects in each semester.	10	CO2	L3	1.7.1
5	a	What are the desirable properties of transactions?	4	CO3	L2	1.7.1
	b	What is the condition that should be satisfied by the schedule to be recoverable? Check whether the given schedule is recoverable or not. T1 T2 ---- ---- Read(X) X = + 20 Write (X) Read(X) X = X + 100 Write(X) Commit Commit	6	CO3	L3	1.7.1
		OR				
6	a	Explain the concurrency control based on timestamp ordering.	7	CO3	L2	1.7.1
	b	Give a way to detect a state of deadlock.	3	CO3	L2	1.7.1
7		What is file organization? Explain about the following types of file organizations in detail. 1. Sequential File Organization 2. Hash File Organization	10	CO4	L2	1.7.1
		OR				
8	a	Explain primary indexing and secondary indexing in DBMS.	10	CO4	L2	1.7.1
9	a	Explain the distributed database architectures.	4	CO5	L2	1.7.1
	b	Give key features of NoSQL. When should NoSQL be used?	6	CO5	L2	1.7.1
		OR				

10	a	What is MongoDB? Consider the collection with the name Mylib, and the following 3 documents are there in the collection. {"_id" : ObjectId("5dd10a"), "title" : "Introduction to DBMS", "description" : "Database Overview", "Author" : "Prof. Alice", "pages" : 250 } {"_id" : ObjectId("5dd10b"), "title" : "Introduction to Python", "description" : "Python Overview", "Author" : "Prof. Bob", "pages" : 300 } {"_id" : ObjectId("5dd10c"), "title" : "Introduction to Machine Learning", "description" : "Machine Learning Overview", "Author" : "Prof. Clevin", "pages" : 450 } 1. Display all the documents in the collection Mylib. 2. Display the fields title and author for all the documents in the collection. 3. Insert the following documents, one at a time. • "title": "Deep Learning", description": "Deep Learning Overview", Author": "Prof. Dennis","pages" : 250 • "title": "Computer Vision", description": "Computer Vision Overview", Author" : "Prof. Freddy","pages" : 350 4. Display all the books which is having pages 250. 5. Update the page field of the document to 300 that meets the following criteria: title ="Computer Vision' 6. Delete the collection.	10	CO5	L3	1.7.1

****

M.Sc.(DS).II/04.23.001 Reg.No. | | | | | | | | |

A

M.SC. COMPUTER SCIENCE WITH SPECIALIZATION IN DATA SCIENCE
SECOND SEMESTER EXAMINATION APRIL 2023

22-359-0212 DIGITAL IMAGE PROCESSING

(Regular)

Time: 3 Hours **Maximum Marks :50**

Each question carries 10 Marks

No		QUESTIONS	MARKS	CO	BL	PL
1	a.	Explain image sampling and quantization with suitable examples.	6	CO1	L2	1.4.1
	b.	Explain the spatial convolution with example.	4			
		OR				
2	a.	Explain the smoothening filters with suitable masks.	6	CO1	L2	1.4.1
	b.	Explain contrast stretching with example.	4			
3	a.	Explain Discrete Fourier Transform with an example.	6	CO2	L2	1.4.1
	b.	Explain image sharpening using highpass filters in frequency domain.	4			
		OR				
4	a.	Describe the band and notch filters with examples.	6	CO2	L2	1.4.1
	b.	Summarise the steps for filtering in the frequency domain.	4			
5	a.	Describe image degradation/restoration model with a	6	CO3	L2	1.4.1

	b.	neat diagram. Explain any two noise models.	4			
		OR				
6	a.	Explain Adaptive Median Filter. Give the advantages of Adaptive Median Filter over traditional Median Filter.	6	CO3	L2	1.4.1
	b.	What is noise? How the noise can be reduced?	4			
7	a.	Explain in detail the Marr-Hildreth Edge Detector.	7	CO4	L3	1.4.1
	b.	Differentiate between Region Growing and Region Splitting and Merging Segmentation.	3		L2	
		OR				
8	a.	Explain segmentation using K-Means clustering.	7	CO4	L3	1.4.1
	b.	Give the significance of Image Gradient in detection of edges.	3		L2	
9		Explain in detail the Huffman Coding with example.	10	CO5	L3	1.4.1
		OR				
10		Explain in detail the Run-Length Coding with example.	10	CO5	L3	1.4.1

****

M.Sc.(DS).II/04.23.005 Reg.No. | | | | | | | | |

C

M.SC. COMPUTER SCIENCE WITH SPECIALIZATION IN DATA SCIENCE
SECOND SEMESTER EXAMINATION APRIL 2023

22-359-0204 MACHINE LEARNING

(Regular)

Time: 3 Hours **Maximum Marks :50**

Write any five questions.
Each question carries 10 Marks

No		QUESTIONS	MARKS	CO	BL	PL
1	a.	Which are the two types of machine learning systems classified according to whether or not the system can learn incrementally from a stream of incoming data. Give examples for each one of them.	4	CO1	L2	1.6.1
	b.	Explain in detail the components of learning.	6	CO1	L2	1.6.1
		OR				
2	a.	What do you mean by over fitting and under fitting in machine learning? Give suitable solutions for overcoming over fitting and under fitting.	5	CO1	L2	1.6.1
	b.	For the below given dataset draw a boxplot and mark any outliers with an asterisk. 12,23,28,34,35,37,45,56,109	5	CO1	L3	1.7.1
3	a.	Briefly explain the steps of Apriori algorithm.	5	CO2	L2	1.6.1
	b.	Using Apriori algorithm find the frequent itemset from the below given transaction dataset. Assume minimum support count as 2.	5	CO2	L3	1.7.1

Tid	Items Bought
T1	Coffee, Tea, Bun
T2	Eggs,Tea, Chocolate
T3	Coffee,Eggs,Tea, Chocolate
T4	Eggs, Chocolate
T5	Cream

OR

4	a.	Explain the steps in working of FP growth algorithm.	4	CO2	L2	1.6.1
	b.	Find the frequent itemset from the below given dataset using FP growth algorithm. Assume minimum support threshold is 3.	6	CO2	L3	1.7.1

Tid	List of items
T1	I1,I2,I3
T2	I2,I3,I4
T3	I4,I5
T4	I1,I2,I4
T5	I1,I2,I3,I5
T6	I1,I2,I3,I4

5	a.	Explain how a Decision tree algorithm works.	4	CO3	L2	1.6.1
	b.	Find the first attribute of split if a decision tree is constructed using decision tree algorithm for the below given dataset. Assume *'Play tennis'* is the class attribute.	6	CO3	L3	1.7.1

Day	Outlook	Temp	Humidity	Wind	Play Tennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

OR

6	a.	Briefly explain about SVM classifiers. How SVM classifiers find the best fit hyperplanes in case when the data are linearly separable.	5	CO3	L3	2.5.3
	b.	Find the linear regression equation for the following dataset.	5	CO3	L3	1.7.1

Advertisement	Sales
90	1000
120	1300
150	1800
100	1200
130	1380

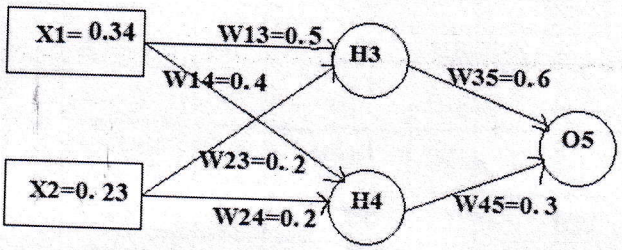
7	a.	Explain briefly the steps in working of K means algorithm.	4	CO3	L2	1.6.1
	b.	Using K means algorithm find the clusters formed by the data objects in the below given dataset. Assume k=2 and let objects A and B be the initial centroids.	6	CO3	L3	1.7.1

OBJECT	X	Y
A	1	1
B	2	1
C	4	3
D	5	4

OR

8	a.	Explain the basic algorithm of agglomerative clustering.	3	CO3	L2	1.6.1
	b.	Using single linkage agglomerative clustering algorithm find the clusters of the data objects in the below given dataset.	7	CO3	L3	1.7.1

SAMPLE NO:	X	Y
P1	0.40	0.53
P2	0.22	0.38
P3	0.35	0.32
P4	0.26	0.19
P5	0.08	0.41
P6	0.45	0.30

9	a.	With a neat diagram explain the working of a neural network.	4	CO5	L2	1.6.1
	b.	Explain different types of neural network architectures.	6	CO5	L2	1.6.1
		OR				
10		Using backpropagation algorithm Show the first iteration of the below given neural Network. Assume the actual output is 1 and learning rate is 0.2.The bias for each hidden nodes is 0.3 and output node is 0.2. 	10	CO5	L3	1.7.1

****