Department of Computer Science and Engineering
Jashore University of Science and Technology
Semester Final Examination-2022
B.Sc. (Engg.) 4th Year 1st Semester, Session: 2017-18

Course Code: CSE 4103 **Time: 3.00 hours**

Course Title:Bio-Medical signal and Image Processing **Marks: 72**

[N.B. Answer any 6 set questions from following 8 set questions. The figures in the margin indicate full marks.]

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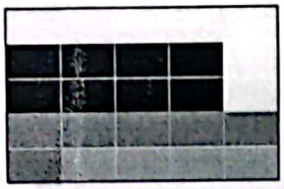
1. a) Show Block diagram of a typical biomedical signal/image processing system. 6
   b) Differentiate between 1-D and 2-D signal with examples. 6

2. a) What are the main differences among analog, discrete and digital signals. Explain with proper example. 6
   b) The following figure contains 4 gray levels, 0 to 3, corresponding to the lightest gray color to the darkest gray color. Calculate the histogram of this image. Show the histogram in a graph. 6



3. a) Consider an exponentially decaying signal $g(t) = e^{-t}$, $t \geq 0$. Calculate the Fourier transform of this signal. 6
   b) Explain the properties of Linear Systems. How to find internal characteristics of a Linear system using Convolution. 6

4. a) How to use FT for finding Nyquist rate to sample a continuous signal? 6
   b) Describe Bit-level Slicing with proper example. Distinguish between lossy and lossless compression in image processing. 6

5. a) What is the principal objective of image enhancement? What do you mean by Histogram of a digital image? What is its application? 6
   b) What are the basic differences of Low Pass filter, High Pass filter and Band Pass Filter from the perspective of Application? 6

6. a) What are edges of an Image? What are different types of edges? Why do we need to detect edges? List out some masks for edge detection. 6
   b) How does Prewitt operator detect Horizontal and Vertical edges? 6

7. a) What are the sources of noise in radiographic Image? Write down the working principle of median filter. Which one is better–median or average filter and why? 6
   b) What are the principles of Nuclear Magnetic Resonance Imaging? 6

8. a) Explain the various stages of a Medical Image processing applications? List out the hardware components required to process medical Images? 6
   b) What are the components of radioisotope Imaging equipment? Write down the necessary conditions of the transformation function used in Histogram Equalization technique. 6

The End

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Course Code: CSE 4111 **Time: 3.00 hours**
Course Title: Technology Transfer Policy and Professional Ethics **Marks: 72**

[N.B. Answer any 6 set questions from following 8 set questions. The figures in the margin indicate full marks.]

1.	a)	Explain the two objectives of studying professional ethics.	4
	b)	In which perspectives morality differs from ethics?	4
	c)	What does it mean by human value? Discuss about the core human values.	2+2
2.	a)	What is ethics? What are the different branches of ethics?	2+2
	b)	What is Engineering ethics? What kind of ethical behavior we should expect from an engineer?	3
	c)	Explain the steps involved to deal with an ethical issue.	5
3.	a)	Write a short note on technology entrepreneurship and innovation?	3
	b)	Explain the 4 models of technology transfer.	6
	c)	Describe the role of intellectual property in protecting innovation..	3
4.	a)	Explain the steps involved to solve moral dilemma.	4
	b)	In what aspects Kohlberg and Gilligan's ethical theories differ?	4
	c)	Define the following terms: (i) Golden Mean ethics (ii) Rights based ethics (iii) Duty based ethics (iv) Utilitarian ethics	4
5.	a)	Describe exponential growth models and exponential decay models for system dynamics with an example.	6
	b)	What are the commonly required statistics for system simulation?	4
	c)	What do you mean by discrete system simulation?	2
6.	a)	What is a profession? What are the main criteria of a profession?	1+2
	b)	What does it mean by professionals? Explain the models of a professional engineer.	1+4
	c)	What is professionalism? Describe the virtues related to responsible professionalism.	4
7.	a)	Briefly explain the top personality traits of engineers.	4
	b)	Describe the responsibilities of engineers.	8
8.		Discuss Code of Ethics for Educators on the following areas. i. Ethical Conduct toward Students. ii. Ethical Conduct toward Practices and Performance. iii. Ethical Conduct toward Professional Colleagues. iv. Ethical Conduct toward Parents and Community.	12

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Course Code: CSE 4109 **Time: 3.00 hours**

Course Title: Data Warehouse and Mining **Marks: 72**

[N.B. Answer any 6 set questions from following 8 set questions. The figures in the margin indicate full marks.]

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1. (a) Explain the architecture of a typical data mining system. 4

(b) Given the following data (age of the 141 people in an area): 8

Range of Age	*1-10*	*11-20*	*21-30*	*31-40*	*41-50*	*51-60*	*61-70*	*71-80*
No. of People	*5*	*6*	*11*	*21*	*35*	*30*	*22*	*11*

Deduce the Pearson's coefficient of Skewness. Also interpret the value of the coefficient you derived.

2. For the given data for age: 11, 12, 11, 12, 16, 16, 15, 17, 18, 21, 26, 18, 21, 28, 28, 31, 38, 41, 44, 50, 25, 74, 72. 05+04+03

a) Use smoothing by bin means to smooth these data, use a bin depth of 6
5. Illustrate your steps.
b) How might you determine outliers in the data?
c) What other methods are there for data smoothing?

3. (a) Suppose that, a renowned fast-food company has got following data (Choice of youth and non-youth between pizza and cake) through a survey among 1140 people in an area adjacent to our university: 1+3

	Pizza	*Cake*
Youth	*520*	*120*
Non-Youth	*60*	*440*

Deduce the contingency table and (by calculating Pearson chi-square statistic) find out whether any correlation prevails between choosing food items and age of the people.

(b) Following are two relational schemas from two geographically distant data sources: 4

Data Source 1:
Goods (GoodsCode, Name, Description, Warnings, Notes, CatalogueID)
ReleasedVersion (GoodsCode, ReleasedVersionCode, Size, Color, Name, Description, Stock, Price)

Data Source 2:
Product (ProductCode, Name, Size, Color, ProductIntro, Type, Price, InventoryQuantity)
Type (TypeCode, Name, Description)

Perform a view-based integration operation (create a global relational schema) using Global as View (GAV).

(c) Compare and contrast OLAP and OLTP. 2

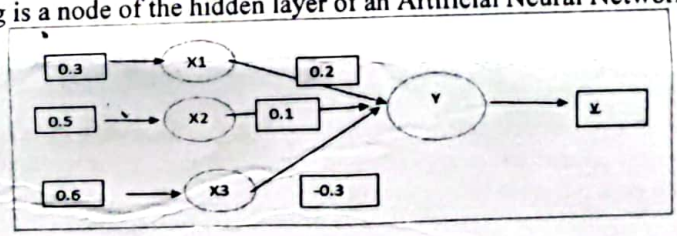
(d) Explain Materialized data integration. 2

4. Let us consider the case of a real estate agency whose database iscomposed by the following tables: 3*4 =12

OWNER (IDOwner, Name, Surname, Address, City, Phone)
ESTATE (IDEstate, IDOwner, Category, Area, City, Province, Rooms, Bedrooms, Garage, Meters)
CUSTOMER (IDCust, Name, Surname, Budget, Address, City, Phone)
AGENT (IDAgent, Name, Surname, Office, Address, City, Phone)
SALE (IDEstate, IDAgent, IDCust, TimeID, AgreedPrice, Status)
TIME (TimeID, Day, Month, Year)

To construct a Data warehouse for the agency:
i. Design a conceptual schema (Attribute tree and Fact schema) for sales.
ii. Design a Star Schema and a Snowflake Schema.

5. (a) For the agency mentioned in the question no 4. create a data cube (fact: sales) using Data Mining Query Language (DMQL). 4
(b) Explain the application area of Dimensional Fact Model (DFM) and Entity-Relationship (ER) model. 2
(c) Explain the following activation functions: 4
I. ReLU
II. Sigmoid
III. Tanh
IV. Softmax
(d) Following is a node of the hidden layer of an Artificial Neural Network (ANN). 2



Calculate the value of output (small y) using sigmoid activation function.

6. (a) Explain Support and Confidence 2
(b) Prove the Apriori property 2
(c) Suppose following is the set of sales transactions of a super-shop company 4+4

TransactionID	*Itemset*
T1	*6,7,8,5,4,10*
T2	*3,8,7,5,4,10*
T3	*6,1,5,4*
T4	*6,9,2,5,10*
T5	*2,8,8,5,4*

I. Generate the candidate itemset and frequent itemset with minimum support count 3.
II. Generate Association rules from the frequent itemset you generated.

7. (a) Suppose following is a data table of number of pensand correspondingtotal price (BDT): 3+3

No of pen	1	2	3	4	5
Total Price	2	5	11	8	14

I. Calculate the best fit line and predict the price of a package containing 8 pens.

II. Also estimate the goodness of fit (R-Squared value)

7. Givenfollowing data table of a survey among businessmen. "Business experience", "Competition", "Business Type" are feature attributes while "Profit" is the target class attribute. 6

Business experience	Competition	Business Type	Profit
Old	Yes	Software	Down
Old	No	Software	Down
Old	No	Hardware	Down
Mid	Yes	Software	Down
Mid	Yes	Hardware	Down
Mid	No	Hardware	Up
Mid	No	Software	Up
New	Yes	Software	Up
New	No	Hardware	Up
New	No	Software	Up

Construct a decision tree using ID3

8. Divide the following binary featured (X_1, X_2) data instances into two clusters using k-means algorithm until convergence 6

X_1	1	2	2	3	4	5
X_2	1	1	3	2	3	5

(b) Differentiate K-Means and DBSCAN 2

(c) Following is the part of Irish Dataset: 4

InstanceID	Sepal Length (cm)	Sepal Width (cm)	Petal Length (cm)	Petal Width (cm)
F1	7	3.2	4.7	1.4
F2	6.4	3.2	4.5	1.5
F3	5.1	3.5	1.4	0.2
F4	4.9	3	1.4	0.2

Construct a similarity matrix using Euclidian distance.

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Semester Final Examination-2022

4th Year 1st Semester, Session: 2017-18

Course Code: CSE 4101 Time: 3.00 hours

Course Title: Simulation and Modeling Marks: 72

[N.B. Answer any 6 set questions from following 8 set questions. The figures in the margin indicate full marks.]

1. a) Define system? Write the components of a system with an example. (4)
   b) Explain the characteristics of a System. (4)
   c) Define the following terms with example: (2+2)
   i) Open System ii) Closed System

2. a) What are the significances of modeling a system? (2)
   b) Define a model? Differentiate static and dynamic model. (5)
   c) Draw a flowchart that shows the steps in a simulation study. (5)

3. a) Write exponential growth models and exponential decay models for system dynamics with an example. (6)
   b) Briefly explain the commonly required statistics for system simulation? (4)
   c) What do you mean by discrete system simulation? (2)

4. a) What does it mean by GPSS? (2)
   b) Draw a proper block diagram to explain action times in GPSS. (4)
   c) A machine tool in a manufacturing shop is turning out parts at the rate of one every 5 minutes. As they are finished, the parts go to an inspector, who takes 4±3 minutes to examine each one and rejects about 10% of the parts, each part will be represented by one transaction, and the time unit selected for the problem will be 1 minute. Now, draw the block diagram for this manufacturing shop and also describe the different blocks. (6)

5. Consider a loading dock that has room for one truck and no places for trucks to wait. If a truck is at the dock, all other arriving trucks go to other loading docks. When a train arrives, it is either turned away or begins unloading immediately. Trucks arrive in Poisson fashion at a mean arrival rate of $\lambda = 2$ per hour, while loading or unloading is modeled as a random variable exponentially distributed with mean $\mu^{-1} = 120$ minutes, so that the service rate is $\mu = 0.5$ per hour. Since there is a very large population of potential arriving trucks, the system is modeled as an M/M/1/1/∞ queue. Find the steady state characteristics (proportion of time the server is busy) of the system. Suppose at time 0, the dock is empty, that the interarrival times in minutes are generated as A1 = 10, A2 = 25, A3 = 5, A4 = 15, A5 = 20, and that the service times in minutes are generated as S1 = 35, S2 = 20, S3 = 60, S4 = 15, S5 = 134. Draw the history of the loading dock and also find the server utilization for the system. (12)

6. a) What is SIMSCRIPT? Elaborate the important features of SIMSCRIPT? (4)

b) Explain SIMSCRIPT execution cycle. (4)
c) Write a program to test the uniformity test of n numbers using chi square test. (4)

7. a) What is random number? List down the characteristics of a good random number. (2+2)
b) Explain LCG? What are the conditions to find full cycle random number from this algorithm? (5)
c) Develop an algorithm to generate 10 random numbers. (3)

8. a) What is continuous simulation? Discuss it with an example. (4)
b) Define calibration? Explain it with necessary diagram. (5)
c) What is physical time? Differentiate physical and simulation time? (3)

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B.Sc. (Engg.) 4th Year 1st Semester, Session: 2017-18

Course Code: CSE 4107 **Time: 3.00 hours**

Course Title: Web Engineering **Marks: 72**

[N.B. Answer any 6 set questions from following 8 set questions. The figures in the margin indicate full marks.]

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1. (a) Define markup language with example? Mention 3 popular markup languages 3
   (b) What is scripting language? What are the types of scripting languages? Describe with examples. 5
   (c) Discuss the role of a server in web applications. Write name of 4 popular servers 4

2. (a) Describe HTML elements and attributes? What are the properties of HTML elements and HTML attributes? 8
   (b) Write short notes on 'ul', 'li', 'ol', 'dl', 'dt' and 'dd' html tags 4

3. (a) Write an HTML Code with styles to produce the following table 8

A	B	C	D
1	2	3	
	4	5	6
7	8	9	10

   (b) Can you embed a html page into another html page? Discuss with example 4

4. (a) You are appointed as Team Leader for a web-based application for online admission process of first year B.Sc. Engg., find all the stake holder for this and give a simple format of application form that will be displayed on screen (Please do not write any code). 6
   (b) Differentiate between Get and Post method for a web-based application; write a simple code to explain the same. 6

5. (a) Explain the positioning in CSS. Justify the statement "sticky is a toggle between relative and fixed" 6
   (b) How can we manage the overflows with CSS? 4
   (c) Write notes on z-index 2

6. (a) Discuss the 'onchange' and 'onload' JavaScript event 3
   (b) Write a JavaScript function to read all values from a html dropdown and print them sorted alphabetically 6
   (c) Discuss the difference between Class and Module in JavaScript 3

7.	(a)	Design a server-side program to input an image from a HTML form and store it on local storage	6
	(b)	What are the super global variables? Why are they important?	3
	(c)	Write server-side scripting a program to scrap all the images from a html page	3
8.	(a)	Your university is planning to provide web space for each student, where students can create their web page and access essential information, email, or other applications. Consider the student's requirements related to this project, specify the Web Engineering team, requirement specifications, necessary Architecture, user interface, and Database Design (Please do not specify/write any code)	10
	(b)	List client-side technologies.	2