International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE Final Examination, Autumn 2021

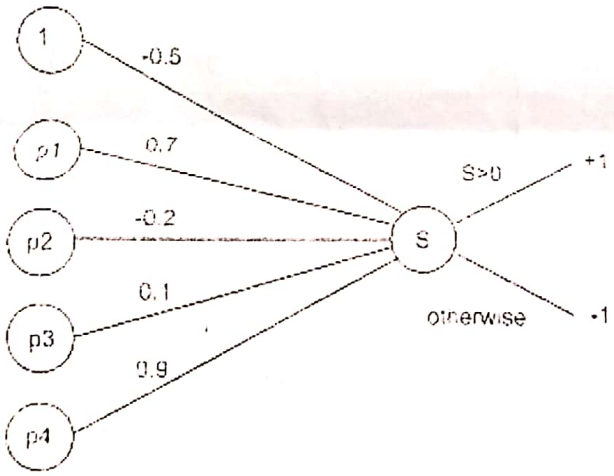
Course Code: CSE-4877 Course Title: Machine Learning and Data Mining

Total marks: 50 *Time: 2 hours 30 minutes*

The figures in the right hand margin indicate full marks.
Course Outcomes and Bloom's Taxonomy Levels are mentioned in additional columns

Group A

1.	a)	Define a data warehouse. Explain its importance for data mining.	CO1	R	4
1.	b)	Compare among three popular schema used in data warehousing.	CO1	U	6
2.	a)	What is neural network? Describe different types of neural network architecture.	CO2	R	3
2.	b)	Suppose we have following network with learning rate 0.1, and p1= -1, p2=1, p3= 1, p4= -1. Initially for this network, output would be -1, but it should be 1. Train the network twice to adjust weight, and for desire output.	CO2	An	7



Or,

2.	a)	How to measure the performance of a classifier? Describe some of the matrics for evaluating classifier performance.	CO2	U	4
2.	b)	What is class imbalance problem in machine learning? How to measure the performance of a class imbalance-learning algorithm? Explain with the help of an example.	CO2	U	6

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Group B

3. a)	What is cross-validation?	CO2	R	2
3. b)	How to compare the performance of two classifiers?	CO2	U	2
3. c)	What are outliers? What are the challenges of outlier detection problems? How to handle those challenges?	CO3	U	6
4. a)	Explain the key difference of Support Vector Machine (SVM) with other classification algorithms.	CO1	U	4
4. b)	Suppose we are given the following positively labeled data points in 2D space: {(3,1), (3,-1), (6,1), (6,-1)} and the following negatively labeled data points in 2D space: {(1,0), (0,1), (0,-1), (-1,0)}. In addition, three support vectors are {(1,0), (3,1), (3,-1),} Apply Support Vector Machine to classify data objects (2,1).	CO3	Ap	6
5. a)	Define a deep neural network? Describe different types of neural network architecture.	CO1	R	4
5. b)	Suppose that the machine learning task is to cluster the following six points (with (x,y) representing location) into three clusters: A1(2,10), A2(2,5), B1(5,8), B2(8,5), C1(4,9), C2(3,2). The distance function is Manhattan distance. Suppose initially we assign A1, B1, and C1 as the center of each cluster, respectively. Use k-means algorithm to produce proper clusters, step by step.	CO3	Ap	6

Or,

5. a)	Why naive Bayesian classification is called "naive"? Briefly outline the major ideas of naive Bayesian classification.	CO1	U	4
5. b)	Define Support and Confidence. Write the Pseudo-code of Apriori algorithm. Apply the algorithm with a minimum support threshold of 50% to the following transaction database:	CO3	Ap	6

TID	Items
T1	{M,O,N,K,E,Y}
T2	{D,O,N,K,E,Y}
T3	{M,A,K,E}
T4	{M,U,C,K,Y}

Find all frequent item sets showing each step.

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Bismillahir Rahmanir Rahim

International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Autumn 2021

Course Code: CSE-4875 Course Title: Pattern Recognition and Image Processing

Total marks: 50 Time: 2.5 hours

[Answer all questions.]

Group A

1. a) "Data is a combination of information and redundant data" – do you agree? Justify your answer with proper example. 3

OR

Write the steps of JPEG algorithm.

b) Consider the text "Dept of CSE". 4

a. What is the probability of occurrence of each character?
b. Using these probabilities, construct the Huffman coding table for transmitting this text?
c. Write the encoded sequence.
d. From encoded sequence do decoding.

c) A source contains four symbols (i, i, u, e) with the corresponding probability of 0.3, 0.2, 0.4, and 0.1 respectively. Construct arithmetic coding to encode and decode a specific word. 4

OR

Encode the following image using LZW coding.

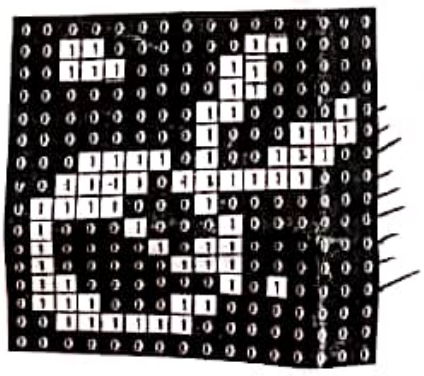
126 75 36 75
126 75 36 75
126 75 36 75
126 75 36 75

2. a) "The shape of structuring element has significant impact of every morphological operation"- Explain the statement with necessary examples. 3

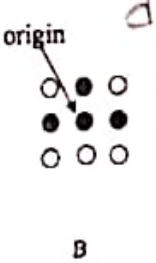
OR

Explain hit or miss transformation in brief with necessary example.

b) Binary Image X and Structuring Element B are given below. 5



X



B

Calculate $Y1 = X \circ B$ Where $\circ$ denotes morphological opening operation..

c) Show the Histogram of a 3-bit image of the following table:

Gray level	0	1	2	3	4	5	6	7
number of pixels	5	4	3	2	1	6	3	2

Group B

3. a) "Segmentation is one of the most important steps in object recognition"-describe in brief. 3

OR

What are edges? How different types of edges can be segmented? Give necessary example.

b) Why edge linking is important in many image processing operations? Explain local edge-linking algorithm. 4

c) What is region? How region can be segmented? Give any algorithm for region segmentation. 3

4. a) i. Represent the boundary in Figure 1 with an eight directional chain code. 5
ii. What does rotational invariant mean in this case? Make the chain code in a rotational invariant.

Figure 1

b) What is LBP? Write the steps to calculate LBP. Give necessary example. 3

OR

Describe your method of computing the skeleton of the images. What kind of structural elements will you be using? What happens when you change the size of the structuring element?

c) Explain String and Tree representation of any object with example. 2

5. a) Build the decision functions and decision boundary for two pattern class w1 and w2. Where two mean vectors m1= [6.1, 1.6, 6] and m2= [1.2, 0.2, 2.0]. Find the class of an unknown pattern X = [3.1, 0.4,2.8] 3

b) How matching by correlation works on pattern recognition? Explain with necessary example. 4

OR

Explain Syntactical pattern recognition. Write the steps to recognize the string in brief.

c) Write the applications of pattern recognition in autonomous car. 3

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International Islamic University Chittagong
Department of Computer Science and Engineering
B. Sc. in CSE Final Examination, Autumn 2021

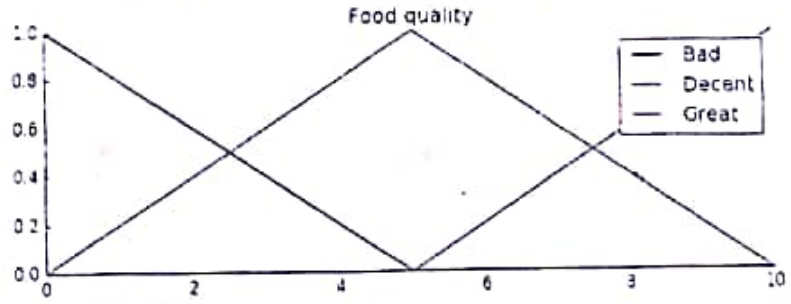
Course Code: CSE 4871 Course Title: Neural Network and Fuzzy System

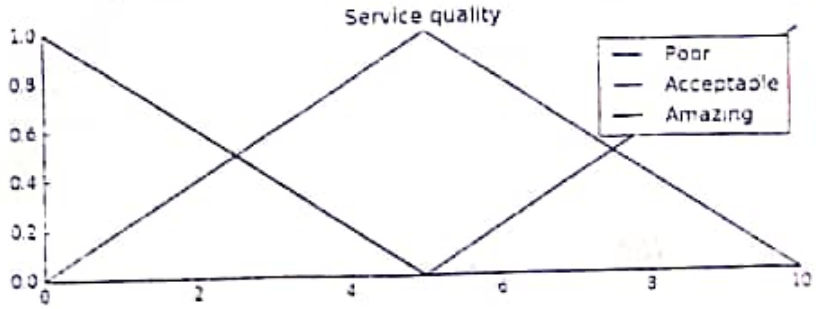
Total marks: 50 *Time: 2 hours 30 minutes*

The figures in the right hand margin indicate full marks.
Course Outcomes and Bloom's Taxonomy Levels are mentioned in additional columns

Group A

1.	a)	You want to solve a classification task. You first train your network on 20 samples. Training converges, but the training loss is very high. You then decide to train this network on 10,000 examples. Is your approach to fixing the problem correct? If yes, explain the most likely results of training with 10,000 examples. If not, give a solution to this problem.	CO1	U	5
		Or,			
1.	a)	Consider a simple Hopfield network made up of four neurons. The synaptic weight matrix of the network is given as: $$W = \begin{vmatrix} 0 & 1 & 1 & -1 \\ 1 & 0 & 1 & -1 \\ 1 & 1 & 0 & -1 \\ -1 & -1 & -1 & 0 \end{vmatrix}$$ Now, for a given input vector (0, 0, 1, 0), enumerate the procedure how the vector (1, 1, 1, 0) will be store in the Hopfield net.	CO1	A	5
1.	b)	Discuss the centroid method for defuzzification with example.	CO5	N	5
		Or,			
1.	b)	Explain the center of sum defuzzification method with example.	CO5	N	5
2.	a)	Given a number between 0 and 10 that represents the quality of service at a restaurant (where 10 is excellent), and another number between 0 and 10 that represents the quality of the food at that restaurant (again, 10 is excellent), what should the tip be if food quality is 8 and service quality is 7? For the purposes of this problem, consider three simple rules: 1. If the food is bad OR the service is poor, then the tip will be low 2. If the service is acceptable, then the tip will be medium 3. If the food is great OR the service is amazing, then the tip will be high.	CO1	E	10





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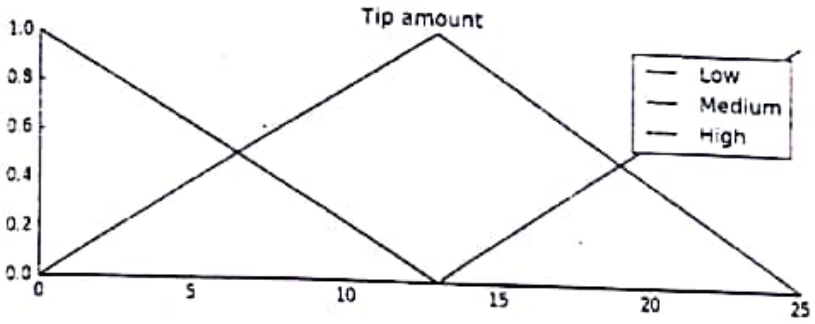


Group B

3.	a)	Define Genetic Algorithm (GA).	CO5	R	2
3.	b)	Given two parents namely P1=01001011 and P2=11010010. Derive two children using cross-over. Assume the cross-over site start from the 3rd gene and ends at 5th gene.	CO5	A	3
3.	c)	Explain the mutation operation of Genetic Algorithm with example.	CO5	N	2
3.	d)	What are the principle stages of genetic algorithm to solve the traveling salesman problem?	CO5	A	3
		Or,			
3.	a)	What do you mean by fuzzy inference? Describe the Generalized Modus Ponens (GMP) using an example.	CO5	N	2.5
3.	b)	Define the fuzzy membership function with example. "Fuzzy set is the generalized version of crisp set." Do you agree with the statement? Justify your answer.	CO5	U	3
3.	c)	Let I and F are two fuzzy sets and they are defined as follows:	CO5	A	4.5

$\tilde{I} = \{(F, 0.4), (E, 0.3), (X, 0.1), (Y, 0.1), (I, 0.9), (T, 0.8)\}$

$\tilde{F} = \{(F, 0.99), (E, 0.8), (X, 0.1), (Y, 0.2), (I, 0.5), (T, 0.5)\}$

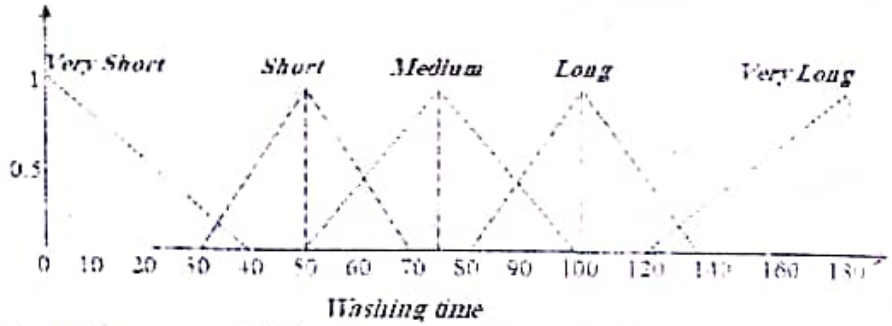
Find the following:

i) $\tilde{I} \cup \tilde{F}$

ii) $\tilde{I} \cap \tilde{F}$

iii) $\tilde{I} - \tilde{F}$

4.	a)	Describe mathematically the membership functions for the variable washing time.	CO2	C	5



4.	b)	What is the purpose of defuzzification? Name at least one method used for defuzzification.	CO2	R	5
5.	a)	Explain adaptive resonance theory (ART) with an example.	CO3	N	3
5.	b)	What are the types of ART architecture? Describe the ART-1 architecture with algorithm.	CO3	N	4
5.	c)	Explain the Boltzmann machine.	CO1	N	3

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International Islamic University Chittagong
Center for General Education (CGED)
Final Examination, Autumn - 2021

Course Code: **URBS – 4802**
Course Title: **Bangladesh Studies and History of Independence**

Full Marks: 50 Time: 2:30 Hours

Answer **any five** of the following questions.
[All questions are of equal value]

1. Analyze the causes of Permanent Settlement in 1793. What was its socio-economic impact on the Society of Bengal?

2. Evaluate the contributions of Nawab Abdul Latif and Syed Ameer Ali to the intellectual and political regeneration of the Muslim society of Bengal.

3. Investigate the causes of the Partition of Bengal in 1905. What was the role of the All Indian National Congress and All Indian Muslim League during the event?

4. Assess the impact of two-century-long British colonial rule on the society of Bengal. How do you explain the colonial legacy on the society of 21st century Bangladesh?

5. Estimate the nature and trend of the Language Movement of 1952. How did it lead to the independence movement of Bangladesh in 1971?

6. What was the historical background of the framing of the constitution of Bangladesh? Elucidate the fundamental principles of state policy and fundamental rights of the citizens in the light of the Constitution.

7. Write short notes on any **two** of the following topics.
   a) Lahore Resolution
   b) Six Points of 1966
   c) Administrative Structure of Bangladesh
   d) Principles of Bangladesh Foreign Policy

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International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE Final Examination, Autumn 2021

Course Code: CSE-4805 Course Title: Social, Professional and Ethical Issues in Computing

Total marks: 50 *Time: 2 hours 30 minutes*

[Answer all the questions; solve any one if an option is given;
Figures in the right hand margin indicate full marks.]

Bloom's Taxonomy Levels of the Questions (Cognitive Domain)						
Letter Symbols	R	U	A	N	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Group-A

			CO	DL
a)	Assume that the family of one of the victims of the Therac-25 has filed three lawsuits. They are suing a hospital that used the machine, the company that made the machine (AECL), and the programmer who wrote the Therac-25 software. As a programmer what you will do?	10	CO4	E
	OR			
	Write the consequences and remedies of three recent cases like Therac-25 case.			
2.				
a)	What are the four factors to consider in deciding whether a use of copyrighted material is a fair use? Describe any one with example.	5	CO1	U
b)	Debate whether software should be copyrightable or should be freely available for copying in context of Bangladesh.	5	CO1	E
	OR			
	A website hosts written works posted by authors. Some people post copyrighted work by other authors without permission. When an author asks the site to remove such material, the site complies and adds the work to its filter database to prevent reposting without permission. An author sues the site claiming the site infringes her copyright by storing her work. Argue the author's case. Argue the site's defense. Evaluate the arguments and decide the case.			

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Group-B

3				
a)	What did the word "hacker" mean in the early days of computing? Is it legal to release a computer virus that puts a funny message on people's screens but does not damage files?	5	CO2	E
b)	What is Ethical hacking? What do you mean by it? Should we learn it? Justify your answer.	5	CO2	E
	OR			
	The terms of use of the website for a rail ticket seller prohibit automated purchases. Should a person who used a software program to purchase a large number of tickets be prosecuted for exceeding authorized access to the site? Why or why not?			
4				
a)	What do you think about staff monitoring system? Is it legal? Justify your answer.	5	CO3	E
b)	Consider an automated system that large companies can use to process job applications. For jobs such as truck drivers, cleaning staff, and cafeteria workers, the system selects people to hire without interviews or other involvement of human staffers. Describe advantages and disadvantages of such a system.	5	CO3	N
5				
a)	What is one important policy decision a company should consider when designing a system to target ads based on email content?	5	CO1	U
b)	Some people fear that development of intelligent robots could have devastating consequences for the human race. Is it ethical to do research aimed at improving artificial intelligence?	5	CO4	E
	OR			
	Suppose you are a programmer, and you think there is a serious flaw in software your company is developing. Who should you talk to about it first?			

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International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Autumn 2021

Course Code: CSE4845 **Course Title: Distributed Database**

Time: 2 hours 30 minutes **Full Marks: 50**

(i) The figures in the right-hand margin indicate full marks

(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs) of the Questions	
CO1	Write allocation during the distributed database design process
CO2	Explore the techniques used for data fragmentation, replication
CO3	Demonstrate how the two-phase commit protocol issued to deal with committing a transaction that accesses databases stored on multiple nodes.
CO4	Apply simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer
CO5	Synthesize the basic concepts of parallel databases, object distributed databases, and multi databases

Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

1. a) Briefly describe the Distributed Query Processing Steps. CO1 R 5

1. b) Write down the steps of transform the query to a normalized form in a query decomposition process. CO2 U 5

2. a) Indicate whether the following schedules can produce anomalies; the symbols ci and ai indicate the result (commit or abort) of the transaction: CO4 App 5

   a. r1(x); w1(x); r2(x); w2(y); a1; c2
   b. r1(x); w1(x); r2(y); w2(y); a1; c2
   c. r1(x); r2(x); r2(y); w2(y); r1(z); a1; c2
   d. r1(x); r2(x); w2(x); w1(x); c1; c2
   e. r1(x); w1(x); r2(x); w2(x); c1; c2

2. b) Consider the Relations: EMP(ENO,· ENAME, TITLE), ASG(ENO,PNO,RESP,DUR) CO2 E 5

The Query is: **"Find the names of employees who are managing a project?"**

And the High level query is:-

```
SELECT ENAME
    FROM EMP,ASG
    WHERE EMP.ENO = ASG.ENO AND DUR > 37
```

Now, write the possible **Transformation** of an SQL-query into a Relational Algebra-query.

OR

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2.	a)	Write down the properties of Transactions? Briefly discuss it.	CO4	App	5
2	b)	Why need the data localization and Mention the issues also.	CO2	E	5

Part-B

3.	a)	Write down the steps of Two Phase Locking Protocol.	CO5	C	5
3.	b)	Classify the following schedule as Non-VSR, VSR or CSR:- a. r1(x); r2(y); w3(y); r5(x); w5(u); w3(s); w2(u); w3(x); w1(u); r4(y); w5(z); r5(z) b. r2(u); w2(s); r1(x); r2(y); w3(y); r5(x); w5(u); w3(s); w2(u); w3(x); w1(u); r4(y); w5(z); r5(z) c. r1(x); r2(y); w3(y); r5(x); w5(u); w3(s); w2(u); w3(x); w1(u); r4(y); w5(z); r5(z); r2(u); w2(s)	CO2	E	5
4.	a)	What do you mean by Local Recovery Management (LRM) in DDBMS? How many ways for the LRM to deal with update/ write operations? Describe it.	CO5	App	5
4.	b)	Write down the Taxonomy of Concurrency control algorithm? Which tool is useful to identify the Deadlocks?	CO2	U	5
5.		Let us consider the case of a real estate agency whose database is composed by the following tables: **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) **AGENDA** (IDAgent, Data, Hour, IDEstate, ClientName) **VISIT** (IDEstate,IDAgent, IDCust, Date, Duration) **SALE** (IDEstate,IDAgent, IDCust, Date, AgreedPrice, Status) **RENT** (IDEstate,IDAgent, IDCust, Date, Price, Status, Time) ***Goal:*** Provide a supervisor with an overview of the situation. The supervisor must have a global view of the business, in terms of the estates the agency deals with and of the agents' work. **Questions:-** a. Design a conceptual schema for the DW. b. What facts and dimensions do you consider? c. Design a Star Schema or Snowflake Schema for the DW.	CO3	An	10

OR

5.	a)	What do you know about the site failures in 2PC protocol?	CO3	An	5
	b)	What is Reliability and Out-of-place Update? Is there a difference between Two-Phase "Locking" and Two-Phase "Commit"?	CO4	App	5

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International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE Final Examination, Autumn 2021

Course Code: MGT-3601 **Course Title: Industrial Management**

Time: 2 hours 30 minutes **Full Marks: 50**

The figures in the right-hand margin indicate full marks

Course Outcomes and Bloom's Taxonomy Levels are mentioned in additional columns

Group A

1(a)	What are the characteristics of a decentralized control system? Elaborate.	CO2	E	05
1(b)	How can a manager determine whether his or her firm needs improvement in control? If improvement is needed, how can the manager tell what types of control needs improvement (operational, financial, structural or strategic)?	CO2	An	05
2(a)	The marketing mix refers to the set of actions, or tactics, that a company uses to promote its brand or product in the market. Explain Four P components of the marketing mix.	CO3	U,R	05
2(b)	The product life cycle is an important concept in marketing. It describes the stages a product goes through from when it was first thought of until it finally is removed from the market. Not all products reach this final stage. Some continue to grow and others rise and fall. Discuss the different stages of Product Life Cycle in brief.	CO3	C	05

OR

2(a)	Marketing is typically seen as the task of creating, promoting and delivering goods and services to consumers and businesses. In fact, marketing involves ten types of entities. Explain all of this and show the example of all 10 entities.	CO3	U,R	05
2(b)	Give an example that shows the difference between Need, Want and Demand in business aspect?	CO3	C	05

Group B

3(a)	Operations Management is a pivotal process in manufacturing firms. The processes of operations management are impacted by five variables which are known as 5Ps of management. Describe five P's of operation management with real field example.	CO2	Ap	05
3(b)	Operations Management solution helps to ensure Safe, Reliable and Efficient plant operations and regulatory compliance by digitization of information related to key Operations Management Practices. This results in improved productivity through standardized work practices, streamlined processes, plus improved communications and coordination across departments. Briefly discuss the operation management system.	CO2	C	05

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OR

3(a)	People require different services and products to satisfy various needs and wants. In this regard, it can be observed that the marketers play a pivotal role in marketing different products and services to various targeted customers. However, some people often confuse the two terms and often use them interchangeably to refer to one thing but a closer analysis between them shows that they are different. Above this aspect distinguish between product and service.	CO2	Ap	05
3(b)	You decide to run a small pilot project for a month, using a new supplier to deliver your products to a small sample of your customers, and you're pleased to see that the feedback from these customers is positive. As a result, you decide to use the new supplier for all your orders. What you have just done is to go once around a loop called the PDCA Cycle, which helps you to strive for continuous improvements to your business. Explain PDCA cycle with an example.	CO2	C	05
4(a)	What is contract? Describe essential elements of contract.	CO1	U	05
4(b)	What are the rules regarding delivery?	CO1	C	05
5(a)	Write short notes on: (Any Four) i) Oil crisis due to Ukraine War ii) Importance of Padma Bridge iii) Chattogram Trade Fair iv) BM Container depot tragedy v) Economic crisis in Srilanka vi) Rohinga problem in Bangladesh	CO2	E	10

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