

B.Sc. (Engineering) 3<sup>rd</sup> Year 1<sup>st</sup> Semester Final Examination-2022

Dept. of Computer Science and Engineering

Islamic University, Kushtia

Course Code: MATH -3109

Course Title: Complex Analysis, Laplace and Fourier Transforms

01Z-ZoL8

W2-W7  
W2-W7

Time- 04 hours

Full Marks-70

Answer any five questions!

1. a) Define Deleted  $\delta$ -neighbourhood. State and Prove the necessary condition of Cauchy-Riemann equations. 5
- b) If  $f(z) = \frac{(x^3 - y^3) + i(x^3 + y^3)}{x^2 + y^2}$ ,  $z \neq 0$ , then show that  $f(z)$  satisfies the Cauchy-Riemann equations. 4
- c) Define harmonic function. If  $f(z) = u(x, y) + iv(x, y)$  is a analytic function in a region  $R$  and the derivative of  $u$  and  $v$  are continuous in  $R$ , then prove that  $u$  and  $v$  are harmonic in  $R$ . 5
2. a) Define Isolated singularity. Locate and name the singularities in the finite  $z$  plane of the function  $f(z) = \operatorname{Sec}(1/z)$  and determine whether they are isolated singularities or not. 5
- b) Define removable singularity. Prove that  $f(z) = \frac{\sin \sqrt{z}}{\sqrt{z}}$  has a removable singularity at  $z = 0$ . 4
- c) If  $f(z)$  is analytic in a region  $R$  and  $f'(z) \neq 0$ , then prove that  $w = f(z)$  is a conformal mapping in  $R$ . 5
3. a) Define bilinear transformation. Find a bilinear transformation which maps points  $z_1, z_2, z_3$  of the  $z$ -plane into points  $w_1, w_2, w_3$  of the  $w$ -plane respectively. 4
- b) Prove that  $\int zdz = \frac{b^2 - a^2}{2}$   $\frac{\partial}{\partial z} w = \frac{\partial}{\partial z} z$   $w = mz$   
 $z = v/V$
- c) State and prove Cauchy Goursat theorem for the triangle. 7
4. a) What is the maximum modulus theorem? Prove the maximum modulus theorem. 6
- b) What is Rouche's theorem?  $|f(z)| > |g(z)|$  3
- c) Prove the Rouche's theorem.  $|f(z) - g(z)| < \epsilon$  5
5. a) Define Fourier series and evaluate the Fourier co-efficient of Fourier series. 5
- b) Expand in Fourier series of the function  $f(x) = x$ ,  $0 < x < 4$  with period 4 and hence show that  $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \dots$  4
- c) Represent the Fourier series of the function  $f(x) = \begin{cases} 0 & ; -\pi \leq x \leq 0 \\ \pi & ; 0 < x < \pi \end{cases}$  4
6. a) What is Fourier transform? How does it extend the concept of Fourier series? 5
- b) Explain how the Fourier transform is utilized in signal processing. 4
- c) Find the Fourier transform of the function  $f(x) = \begin{cases} 1-x^2 & ; |x| < 1 \\ 0 & ; |x| > 1 \end{cases}$  5
7. a) Define Laplace transformation. Find the Laplace transformation of  $F(t) = e^{it}$  6
- b) Find the Laplace transformation of  $\frac{dy}{dt}$ ,  $\frac{d^2y}{dt^2}$  and  $\frac{d^3y}{dt^3}$  4
- c) If  $L\{F(t)\} = f(s)$  then prove that  $L\left\{\frac{F(t)}{t}\right\} = \int_s^\infty f(s)ds$  4
8. a) What is argument principle? 5
- b) How do you use the argument principle? 4
- c) What is contour integration? 5

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3<sup>rd</sup> Year 1<sup>st</sup> Semester B.Sc.(Eng.) Examination 2021

Department of Computer Science and Engineering

Islamic University, Kushtia

Course No: MATH 3109

Course Title: Complex Analysis, Laplace and Fourier Transform

Time: 04 hours

*[Answer any five questions]*

Full Marks: 70

1. a) Define a complex number and complex function with example. Why do we need to use complex number? 4  
b) Define single and multi-valued function. 4  
c) Define Branch point. 2  
d) Define Continuity and Differentiability of a function with example. 4
  
2. a) What is analytic function? Write its properties. 6  
b) Let  $f(z) = (x - iy)/(x^2 + y^2)$ . Show that this function is analytic. 4  
c) What is power series? Radius of convergence of a power series. 4
  
3. a) Define harmonic function? What is the condition of harmonic function? 4  
b) What is mobious transformation? 4  
c) How can we find mobious transformation? 4  
d) What is region of convergence of a power series? 2
  
4. a) What is Holomorphic function? 3  
b) Write the differences between simple function and holomorphic function. 4  
c) What is integral formula? 2  
d) Prove that Cauchy Integral Formula with example. 5
  
5. a) Describe the complex integration formula and explain the complex integration steps? 6  
b) What are the "zeros" of the analytic function? Explain using an example? 3  
c) Explain Laurent series. 5
  
6. a) What is Maximum modulus Theorem? Prove Maximum modulus Theorem. 6  
b) What is Rouche's Theorem? 3  
c) Prove Rouche's Theorem. 5
  
7. a) What is residue theorem? Write its uses. 7  
b) Explain contour integration? 7
  
8. a) What is Fourier transform and why do we use it? 4  
b) What is the inverse Fourier sine and cosine transform formula? Explain. 6  
c) State the Convolution theorem. 4

**B.Sc. (Engineering) 3<sup>rd</sup> Year 1<sup>st</sup> Semester Final Examination-2022**  
Dept. of Computer Science and Engineering  
Islamic University, Kushtia  
**Course Code: CSE 3101, Course Title: Database Management System**

Time- 04 hours

Full Marks-70

[Answer any five questions]

1. a) Explain atomicity problem of file processing system. 4  
b) Define database <sup>instance</sup> stance and database schema. 3  
c) Who are the database users? Classify them. 4  
d) Explain the purpose of DML and DDL. 3
2. a) What do you mean by Entity set and Relationship set? 3  
b) Describe major components of an E-R diagram. 4  
c) Explain different types of attributes. How they represented in E-R diagram? 4  
d) Define super key, candidate key and primary key 3
3. a) Define relational algebra. Discuss in detail the operations SELCT, PROJECT and UNION with suitable example. 6  
b) What is view? How can it created? Explain with an example. 4  
c) Explain your concept about natural join. 4
4. a) Explain different parts of SQL. 3  
b) What are the default domain types of SQL standard? What is user defined domain types? 5  
c) Define Aggregate functions. 3  
d) Explain Nested Sub query with example in SQL. 3
5. a) Define indexing? 2  
b) What do you mean by dense index and sparse index? 3  
c) Why do we need Multilevel Indices? 4  
d) Explain the structure of B<sup>+</sup> tree. 5
6. a) Define Transaction. 2  
b) Explain different states of transaction. 4  
c) Explain why concurrency control is necessary? 5  
d) Describe ACID properties. 3
7. a) Explain different type of database system architectures. 6  
b) Draw and explain different architectural models for parallel machines. 5  
c) What do you mean by data server and transection server? 3
8. a) Differentiate between integrity and security with the example. 5  
b) Create two table course(CID, Course, Dept) and HoD(Dept, Head) using SQL language with all constraints [Primary Key, Foreign Key and Referential Integrity]. Assume the types of attributes by our own. 5  
c) Define database trigger. Explain the trigger mechanism with an example. 4

3<sup>rd</sup> Year 1<sup>st</sup> Semester B.Sc.(Eng.) Examination 2021  
 Department of Computer Science and Engineering  
 Islamic University, Kushtia  
 Course No: CSE 3101  
 Course Title: Database Management Systems

Time: 04 hours

[Answer any five questions]

Full Marks: 70

- |  |   |
|--|---|
| 1. a) Define DBMS. What is the main goal of it? ①  | 4 |
| b) Explain the disadvantages of file processing system. ①  | 4 |
| c) Describe different levels of data abstraction. ⑦  | 4 |
| d) Define Instance and Schema. ⑦   | 2 |
| 2. a) What is data abstraction? ①  | 3 |
| b) What do you mean by mapping cardinalities? Describe mapping cardinalities for binary relationship. ①  | 4 |
| c) Define weak entity set and strong entity set. How they showed in E-R diagram. ②   | 4 |
| d) Explain Participation Constraints of an entity set. ②   | 3 |
| 3. a) Define data model. Give the names of some data models. ①   | 3 |
| b) Explain different types of attributes and their representation in E-R diagram. ①  | 4 |
| c) Explain natural join operation of relational algebra. ②   | 4 |
| d) Consider the following schemas:<br><i>employee (person-name, street, city)</i><br><i>works (person-name, company-name, salary)</i><br><i>company (company-name, city)</i><br><i>manages (person-name, manager-name)</i> | 3 |
| Write the relational algebra expression to find the names of all managers and the number of employees' works under him.  |   |
| (4) a) Write the basic structure of SQL and explain each part. 4   | 4 |
| b) How can you create a relation using SQL? Explain with example. 4  | 3 |
| c) How can you i) INSERT ii) DELETE and iii) UPDATE tuples by SQL? 4   | 3 |
| d) Consider the database of the fig. 1<br><i>employee (employee_name, street, city)</i><br><i>works (employee_name, company_name, salary)</i><br><i>company (company_name, city)</i>                                       | 4 |
| <i>Fig. 1</i>  |   |
| i. Find all employees who earn more than the average salary of all employees of their company.   |   |
| ii. Assume that the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.   |   |
| 5. a) What do you mean by indexing?  | 2 |
| b) Define primary index and secondary index.   | 3 |
| c) Describe the structure of a B <sup>+</sup> tree.  | 6 |
| d) Explain insert operation on a B <sup>+</sup> tree.  | 3 |
| 6. a) What is referential integrity? Explain the basic concept of it. 6  | 4 |
| b) Define database trigger. Explain the trigger mechanism. 6   | 5 |
| c) What is Database security?  | 3 |
| d) What is assertion? 6  | 2 |
| 7. a) Describe different types of database system architectures. 18  | 5 |
| b) Explain Client-Server systems. 18   | 5 |
| c) What do you mean by data server and transaction server? 18  | 3 |
| d) Define scaleup and speedup. 10  | 2 |
| 8. a) Explain different types of RAID organization.  | 6 |
| b) Describe the ACID properties. 15  | 4 |
| c) Explain state of Transaction. 15  | 4 |

ANSWERING THE CHALLENGE

3  
2  
5  
6

- (a) What are logical triggers? Explain the basic concept.
- (b) Define database trigger. Explain the trigger mechanism with example.
- (c) What is cursor? Why they are used in PLSQL?
- (d) Who is responsible for maintaining data in database?

- 卷之三

What is relational algebra? Explain fundamental operations in relational algebra.

- Ergonomics in Design 199

(d) Consider the following relational database

(4) Current address of the  
employee (employee name, street, city,  
work telephone, name, company name, salary  
current telephone number)

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# Sheet should

Third Year B.Sc. (Honours) Final Semester 2017  
Course No. CS5301  
Computer Database Management System

Semester 5

Time - Hand

Answer the following questions:

Explain salient features of the processing system for managing Database management system? → **5 page Book**

Define database server and database schema.

Explain triggers, explain its types.

What is SQL query?

Explain the basic structure of relational data model.  
Consider the following entities:  
Employee (Employee ID, Employee Name, Salary)  
Workshop (Workshop ID, Workshop Name, Address, City, State, Zip Code)

Define relational algebra. What are the fundamental operations of relational algebra?

Define primary key and secondary key.

Define foreign key and primary key.

Define the relational algebra expression for finding the employees who have more than 5 years of experience and their average salary is more than 50000.

Explain the different types of triggers.

Explain Denormalization concept in DBMS  
Define Aggregation function. Define the main advantage of denormalization.

TH

What do you mean by foreign key?

Define primary index and secondary index.

What do we mean by referential integrity?

Explain transaction.

Explain different states of transaction.

Describe ACID properties

Explain implementation method of atomicity. → **sheet**

What are triggers and why they are used?

Describe the basic parts of a trigger and discuss the syntax for creating a trigger.

Explain different types of database management systems.

Describe Distributed Database Architecture.

State advantages and disadvantages of Distributed Database management.

What do you mean by denormalization and normalization factors?

referential

18 chapter

Who are the  
plain concurrent  
DBMS? Explain

- Ques 1
- Define DBMS? What is the main goal of it? 1
- Explain atomicity and security problem of file system 1
- Describe the functions of DBA ~~DBA~~ 1
- Explain data abstraction. 1
- Define entity set and relationship set. 2
- Differentiate between primary key and foreign key. Give examples. 2
- Describe the mapping cardinalities used in a binary relationship set. 2
- Define the concept of aggregation. Using this concept write two examples. 2
- Explain the basic structure of relational data model. 2
- Define relational algebra. Describe the Fundamental Operations of relational algebra. 3
- Explain natural join operation of relational algebra. 4
- Write the basic structure of SQL and explain each part. 4
- Consider the following schemas:
- Account (account\_number, branch\_name, balance)
- Borrower(customer\_name, loan\_number, amount)
- Loan(branch\_name, loan\_number, amount)
- Write SQL statements for the following:
- To find the names of all customers who have a loan at the "kushtia" branch. 2
  - To find the names of all customers who have a loan and find the amount of the loan. 2
  - To find the largest account balance. 2
- Write with example how can you implement rename operation and Cartesian product operation in SQL. 5
- Define integrity constraint. 2
- What do you mean by domain constraint? 3
- What is referential integrity? Explain the basic concept of it. 4
- Define database trigger. Explain the trigger mechanism. 6
- What is indexing? 2
- What do you mean by dense index and sparse index? 4
- Is it possible in general to have two primary indices on the same relation for different search keys? Explain your answer. 3
- Briefly explain hash index. 4
- What is meant by transaction? 5
- What are the states that involve in transaction? Describe it with state diagram. 5
- List the ACID properties of transaction. 4
- Explain shadow copy scheme. 15
- Describe different type of database system architectures. 15
- Explain the structure of parallel database. 3
- Define scaleup and speedup. 2
- Explain disadvantages of Distributed database architecture. 3

[Answer any five questions]

1. What is DBMS? State some applications of DBMS.  
 2. Explain concurrent access anomalies of file system. - *Ans*  
 3. Define the functions of DBA.  
 4. Who are the database users? Classify them.

*Ans*

1. Define database instance and database schema.  
 2. (a) Define different type database language.  
 (b) Explain super key, candidate key and primary key.  
 3. Define Participation Constraints of an entity set.

3 4 4

1. Define data model. Give the names of some data model.  
 2. Describe major components of an E-R diagram.

4 4

1. Explain natural join operation of relational algebra.  
 2. Consider the following schemas:

*Employee (person-name, company-name, street, city)*  
*works (person-name, company-name, salary)*  
*company (company-name, city)*  
*manages (person-name, manager-name)*

3 4 4

1. Write the relational algebra expression to find the names of all manager and the number of employees works under him.

3

1. Explain the different parts of SQL. ✓  
 2. Explain Default domain types of SQL standard. ✓

*SQL*

4 4 4

1. Define view. Give an SQL statement to create a view.  
 2. Define the following terms:  
 i) Specialization and ii) Generalization.

3 5 2

*Integrity*

3 5

1. Define DDL and DML.  
 2. Describe the uses of triggers. ✓  
 3. What built-in domain types are supported by standard SQL?

5 2

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Time: 04 hours

[Answer any five questions]

Full Marks

1.	What is DBMS? What is the main goal of it? Mention the advantages and disadvantages of file system. Describe different level of data abstraction. What is data independency? Explain physical and logical data independency.	3 4 4 4
2.	Define entity set and relationship set. Explain different types of attributes and their representation in E-R diagram. Define weak entity set and strong entity set. How they showed in E-R diagram? Explain mapping cardinalities for binary relationship.	3 4 4 4
3.	Explain the basic concepts of relational data model. What is query language? Classify them.	4 3
M	Explain Cartesian product operation of relational algebra. Consider the following schemas: employee (person-name, street, city) works (person-name, company-name, salary) company (company-name, city) manages (person-name, manager-name)	4 4

Write the relational algebra expression to find the names of all employees who live in the same city and on the same street and do as a manager.

(a)	Define Transaction.	✓	2
(b)	Explain different states of transaction.	✓	5
(c)	Explain why concurrency control is necessary?	✓	4
(d)	Describe ACID properties.	✓	4

5.	Describe following topics of SQL	6
	(i) Modification of the database (ii) Domain type in database (iii) Schema definition in SQL	6

6.	Consider the following relational database	3x3
	employee (Person_name, Street, City)	
	works (Person_name, Company_name, Salary)	
	Company (Company_name, City)	

Give an expression in the relational algebra for each request.

- (i) Find the names of all employees who live in the city of 'Dhaka' and also find their company name and city, where "Dhaka" is one of the cities in the table of employee and company.
- (ii) Modify the database so that the company 'BRB' moves their factory from 'Kushtia' to 'Chittagong'.
- (iii) Find the staffs and their addresses who work in the company 'MRS' and who does not live in the city 'Kushtia'.

6.	(a) Describe different types of database system architectures.	✓	5
	(b) Explain client-server systems.	✓	5
	(c) What do you mean by data server and transaction server?	✓	3
	(d) Define scaleup and speedup.	✓	2

7.	(a) What do you mean by domain and domain constraints? What are the differences between a primary index and secondary index? Explain multilevel indices.	3 3+3
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7.	Explain and compare different index update techniques.	6
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8.	(a) What are triggers and why they are used? (b) Describe the basic parts of trigger and show the syntax for creating a trigger. (c) What is a cursor? Why they are used in PL/SQL?	5 6 4
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6.	What is a cursor? Why they are used in PL/SQL?	4
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[Answer any five of the following questions. Figures in the right margin indicate marks]

1. a) What is a variable in the context of statistics, and how is it different from data points or observations? 3

- b) Define categorical (qualitative) and numerical (quantitative) variables. Provide examples of each. 8

- c) What is a nominal variable, and how is it used in statistics? Provide examples of nominal variables. 3

2. a) What is the fundamental difference between a parameter and a statistic in statistics? 4

- b) What is a population in statistics, and how does it differ from a sample? 5

- c) Classify each variable as qualitative or quantitative. 5

- A. Number of apples sold in Surva market every one hour. 4

- B. Ranking of tennis players. 4

- C. Colours of caps sold out from a shop. 4

- D. Time it takes to cut the lawn. 4

- E. Classification of children in a day care centre as infant, toddler, preschool 4

- a) Describe measures of central tendency, including the mean, median, and mode, and provide examples of when to use each. 4

- b) Calculate the mean for the following dataset: 12, 15, 18, 22, 28, 31, 34, the Median for the following dataset: 17, 23, 29, 29, 35, 42, 51, 58, and mode for the dataset: 8, 12, 12, 16, 20, 20, 20, 24 6

- c) Classify each of the following attributes as either categorical or numerical! For those that are numerical, determine whether they are ratio or interval and for those that are categorical, determine whether they are nominal or ordinal. 5

- A. Marital status of patients at a medical clinic. 4

- B. Thickness of the gelatine coating of a vitamin E capsule. 4

- C. Temperature inside ten refrigerators at a supermarket. 4

- D. Ratings of eight local soccer players (poor, fair, good, excellent). 4

4. a) Define Poisson probability distribution. Discuss about the mean and variance of Poisson distribution. 5

- b) Prove that the Poisson distribution is the limiting case of binomial distribution stating the required condition. 5

- c) The average number of homes sold by the Acme Realty company is 2 homes per day. What is the probability that exactly 3 homes will be sold tomorrow? 4

5. a) Define correlation and regression in statistics. What are the main objectives of these analytical techniques? 4

- b) How is the correlation coefficient calculated, and what does it indicate? 4

- c) Explain the difference between positive and negative correlation and provide examples of each. 4

- d) Calculate the correlation coefficient for the following data: 4

No. of absence, x	6	2	15	9	12	5	8
Final exam mark, y	82	86	43	74	58	90	78

6. a) What is simple linear regression, and how does it differ from correlation? 3

- b) Differentiate between simple linear regression and multiple linear regression. 3

- c) Explain the concept of overfitting in regression analysis. 4

- d) What do you mean by hypothesis testing? What is the difference between type-1 and type-2 errors 4

7. a) Explain Binomial probability distribution. Write the properties of Binomial distribution. 4

- b) Find out the moments, skewness, Kurtosis of the binomial distribution. 4

- c) The probability that randomly chosen sales prospects will make a purchase is 0.20. If a sales representative calls on six prospects then find the following probabilities: 5

- i) The probability that exactly four sales will be made. 4

- ii) The probability that fewer than 4 sales. 4

- The probability that fewer than 4 sales. 4

- What is the statistical test? Write down the steps of the test statistic. 3

- Differentiate between chi-square distribution and normal distribution. 3

- What is ANOVA? Give example. How does the two-way ANOVA differ from the one-way ANOVA? 5

8. a) Write the application of the chi-square distribution 5

[Answer any five of the following questions. Figures in the right margin indicate marks]

- a) What is meant by frequency distribution? What are the graphs used in representing frequency distribution? Briefly describe. (5)
- b) What are the various measures of location of a distribution and to what purpose are they used? Define mean, median and mode. Write down the merits and demerits of mode. (3)
- c) Define Population, Sample, Parameter and Statistics with examples. (2)
- Difference between Sample and Population (2)
- Explain whether each of the following constitutes a population or a sample.

A) Number of fish caught by all participants in a fishing trip. (2)

B) Yield of sweet potatoes per acre for 10 pieces of land. (2)

C) Ages of all players in a rugby team. (2)

D) Number of traffic offences by 200 drivers in Vanuatu. (2)

③ a) What do you understand by measures of Central tendency?

In each of the following statements, tell whether descriptive or inferential statistics have been used.

A) In the year 2020, 20000 students will be enrolled at USP. (2)

B) Research stated that the shape of a person's ears is related to the person's aggression. (2)

C) The national average annual medicine expenditure per person is \$1057. (2)

D) Indicate which of the following variables are quantitative and which are qualitative. Classify the

qualitative variables as discrete or continuous and classify the qualitative variables as nominal or ordinal. (5)

A) Number of road accidents in a year. (2)

B) The time a student takes to walk to school. (2)

C) Religion of people in Fiji. (2)

D) Length of jump by athletes in long jump event. (2)

E) Number of errors on each page of a book. (2)

F) Grades of students at USP (A+, A, B+, B, etc.). (2)

G) Shoe size of a person. (2)

H) Education level of a sugarcane farmer. (2)

④ a) What is the Scale of Measurement? Explain four types of Scales with Examples

b) Explain Three types of Average- Mean, Median and Mode.

c) Indicate the appropriate mode types of the followings:

i. 0,2,3,4,4 (2)

ii. 0,2,3,3,3,4,4 (2)

iii. 0,2,3,2,3,4,4 (2)

iv. 0,2,3,3,3,4,4,0 (2)

v. 0,2,3,3,3,4,4,0 (2)

d) Differentiate Between Desires and Percentiles

⑤ a) Define correlation and regression. Prove that correlation coefficient is independent of change of origin and scale.

b) Define partial correlation and multiple correlations. Define their coefficients.

c) Calculate the coefficient of correlation and obtain the lines of regression for the following data:

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15
Difference between raw moment and central moment									

6 a) What do you mean by skewness? Discuss different types of skewness with necessary graph.

b) Define Binomial Distribution? Write the conditions of Binomial Distribution.

c) The mean and variance of a binomial distribution are 4 and 4/5 respectively. Find the standard deviation, mode, and median of the distribution.

7 a) Define Poisson Function iii)  $P(X=0)$  iv)  $P(X \geq 1)$

b) Explain the Probability mass function of binomial distribution

c) Explain the Chi-square distribution. Write its properties

d) Write the application of Chi-Square Distribution

8 a) What is the relationship between Poisson distribution and binomial distribution?

b) What is the Chi-square distribution. Write its properties

c) Explain the Chi-square distribution with parameter  $\lambda$  such that  $P(X=1)=(0.2)$

d) Write the application of Chi-Square Distribution

Full Marks: 70

Time: 4 hours

Answer any five questions

1. (a) Explain the difference between computer architecture and computer organization. 5  
 (b) What is Bus? What are different types of buses used in computer system? 1+3  
 (c) Explain Instruction cycle state diagram with interrupt. 5
2. (a) Define instruction format. What are the different types of fields that are part of instruction? 2+2  
 (b) Define three address instruction and two address instruction with example. Evaluate the arithmetic statement  $A = (A * B) / C$  using zero address instruction. 4+3  
 (c) How many  $128 \times 8$  RAM chips are needed to provide a memory capacity of  $4096 \times 16$ ? 3
3. (a) Describe the internal organization of a CPU. 5  
 (b) What is addressing mode? Describe implied, immediate, register direct and indexed addressing mode with example. 1+6  
 (c) Consider the binary number 10110011. Find the values of left arithmetic shift and right arithmetic shift. 2  
 (A B \* C)
4. (a) What is normalized floating point number? 2  
 (b) Write the basic rules of floating point arithmetic. 3  
 (c) Describe the Booth's algorithm for twos complement multiplication with example. 6  
 (d) Draw the hardware for addition and subtraction. 3
5. (a) What do you mean by memory hierarchy? Explain the factors which affect memory hierarchy. 4  
 (b) Explain the organization and operations of cache memory. 5  
 (c) What is Dynamic memory? Discuss a typical dynamic memory circuit. 5
6. (a) Compare hardwired control unit and micro-programmed control unit. 3  
 (b) Discuss design methods of Hardwired control unit. 5  
 (c) Explain basic concepts of micro-programmed control unit. What is multiplier control unit? 4+2
7. (a) Describe the several physical forms that are available for establishing an interconnection network. 6  
 (b) Explain the characteristics of multiprocessors. 4  
 (c) What is DMA? Explain. 4
8. Write short notes on the followings:  
 (i) RISC processor 5  
 (ii) Status register 4  
 (iii) 8255 PPI 5

**Full Marks: 70**  
Answer any five questions

- (a) Define computer architecture and computer organization. 4  
 (b) Describe the internal register of a computer. 4  
 (c) Draw and explain the instruction cycle state diagram. 6

*Instruction State Diagram*  

$$Y = \frac{A - B + C * (D * E - F)}{G + H * K}$$

- i. Using a general register computer with three-operand instructions.

- ii. Using a general register computer with one-operand instructions.

- iii. What are the different types of flags in 8085 microprocessor? Explain.

- (a) Describe the main structural components of a processor. 5  
 (b) How many 512x 8 RAM chips are needed to provide a memory 3

- (c) What do you mean by addressing mode? Write the difference 6 between direct and indirect addressing modes.

- 4 (a) Explain the IEEE 754 standardization of 32-bit representation of floating point number with an example. 4  
 (b) What is normalized floating point number? Write the basic rules of 2 + floating point arithmetic. 4  
 (c) Design a 4 bit arithmetic circuit which performs the basic arithmetic operations. 4

5. (a) What do you mean by memory hierarchy? Explain the factors which affect memory hierarchy. 4  
 (b) Explain the organization and operations of cache memory. 5  
 (c) What is Dynamic memory? Discuss a typical dynamic memory circuit. 5

6. (a) Write the difference between hardware control unit and 6 microprogram control unit.  
 (b) Describe different types of micro-programmed control unit. 6  
 (c) Define micro-instruction and control memory. 2

7. (a) What is bus arbitration? Write the name of various bus arbitration techniques. 6  
 (b) What is interrupt? Discuss the steps when CPU responds to an interrupt 5 question.  
 (c) Distinguish between DMA and interrupt with the help of instruction 4 cycle.

8. (a) What do you mean by peripheral device? Explain the block 5 diagram of peripheral device.  
 (b) Explain the structure of I/O module. 6  
 (c) Define Isolated I/O and Memory Mapped I/O. 3

Full Marks: 70

Answer any five questions

Time: 4 hours

- ~~1~~ ~~Q1.~~ (a) Explain the difference between computer architecture and computer organization. 4  
 (b) Explain different functional units of a computer. 6  
 (c) What is Bus? Describe different types of buses in computer architecture. 4

- ~~2~~ ~~Q2.~~ (a) Write a program to evaluate arithmetic statement:  
 $X=(A+B) * (C+D)$  8

- i. Using a general register computer with three-operand instructions. 4  
 ii. Using a general register computer with two-operand instructions. 6  
 iii. Using a general register computer with one-operand instructions.  
 iv. Using a stack organized computer with zero address instructions (stack instructions). 4

- (b) Describe addressing modes. 6

- ~~3~~ ~~Q3.~~ (a) Draw and explain the block diagram of an ALU. 6  
 How many 64×8 RAM chips are needed to provide a memory capacity of 2048 bytes? 2

- (c) Write down the function of control unit. 4  
 (d) What do you mean by Microinstruction Format? 2

- ~~4~~ ~~Q4.~~ (a) Explain the working principle of CPU with flowchart. 4  
 (b) Explain floating-point representation of data with an example. What are the advantages of floating-point number representation? 4  
 (c) Explain 2's complement method for representing signed number. 3  
 (d) What do you mean by normalization of a floating-point number? 3

- ~~5~~ ~~Q5.~~ (a) What do you mean by seek time and latency time? 3  
 (b) What is microcomputer memory. Write the characteristics of memory systems. 4

- (c) Briefly explain how cache memory works. 5  
 (d) What is virtual memory? 2

- ~~6~~ ~~Q6.~~ (a) Write the difference between hardware control unit and microprogram control unit. 6

- (b) Define different types of micro-programmed control Unit 6  
 (c) Define micro-instruction and control memory. 2

- ~~7~~ ~~Q7.~~ (a) What do you mean by peripheral device? Explain the block diagram of peripheral device. 5  
 (b) What is I/O module? Explain the functions of I/O module. 6  
 (c) Distinguish between Isolated I/O versus Memory Mapped I/O. 3

- ~~8~~ ~~Q8.~~ (a) What are the advantages of DMA system over the programmed I/O method? 5  
 (b) Describe how data are transferred in DMA system 4  
 (c) Explain how CPU responds to an interrupt 5

## 2<sup>nd</sup> year B.Sc. (Honors') Final Examination-2018

Department of Computer Science and Engineering (CSE)

Islamic University, Kushtia.

Course Code: CSE 207

Course Title: Computer Architecture and Organization

Time: 04 Hours

Full Marks: 75

Answer any five questions.

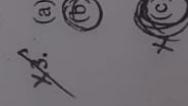
1.  (a) What is register? Explain in what the bits of status register are set or reset as a result of an operation. ✓ 6  
 (b) Describe the interaction between hardware and software in a computer system. ✓ 3  
What do you mean when any one describe about a computer as "It is core i3, 3.2 GHz, 512 MB RAM, 80GB HDD with 937 MHz Intel chip?"
2.  (a) Define Throughput and Response Time. ✓ 3
3.  (a) Define with example of floating-point representation. Describe about floating point arithmetic with proper examples. ✓ 4  
 (b) Explain in details about fraction and real numbers. ✓ 4
4.  (a) Show the complete step-by-step multiplication process for two sample numbers  $X = 1011$  and  $Y = 1101$ . ✓ 7
5.  (a) What are the functions of ALU? ✓ 2  
 (b) Explain the design of 32-bit ALU in details. ✓ 6  
 (c) Describe the working of a carry-look ahead adder. ✓ 7
6.  (a) Explain the need for having a hierarchical memory organization and explain the hierarchy in detail with a block diagram. ✓ 4  
 (b) Design a 2048 × 8 bit memory chip. ✓ 3  
 (c) Why is SRAM faster than DRAM? ✓ 3
7.  (a) Briefly explain cache organization with cache addressing scheme. ✓ 5
8.  (a) What is pipeline processor? Describe the data and control path techniques in pipelining. ✓ 7  
~~(b) Distinguish between hardware control and microprogram control. What are the advantages and disadvantages of each method?~~
9.  (a) Write the control word for the following micro instruction: i) R1 ← R1-R2 ii) R6 ← input iii) R3 ← shr R2. ✓ 3
10.  (a) Write IEEE standard for floating point format. Explain the floating point addition and subtraction. ✓ 6  
How many addressing modes are available in computer system? Describe in detail the different types of addressing modes with an example.
11.  (a) Represent 01011001.0110 using 32-bit in normalized and biased exponent form (assume 8-bit for exponent). ✓ 3
12.  (a) What are the functions of DMA? Write some merits and demerits of DMA. ✓ 4  
 (b) Briefly explain the working principle of a DMA controller. ✓ 7  
 (c) Comparisons between memory-mapped I/O and I/O mapped I/O
13.  (a) What is bus? Discuss the bus organization of a computer. ✓ 6  
 (b) Describe internal organization of a SCSI processor. ✓ 6  
 (c) Compare the RISC and VLSI architecture. ✓ 3



- Define and explain your concept about Data and Information. ✓ 3  
 What do you mean by stored program computer? ✓ 3  
 Write some characteristics of second-generation computers. ✓ 6  
 Explain pipelined instruction processing. ✓ 3



- What do you mean by computer and computer architecture? Draw and describe the basic architecture of a computer. ✓ 7  
 Briefly discuss the implementation of a floating point operation. ✓ 4  
 What do you mean by normalization of a floating point number? ✓ 4



- Explain the working principle of CPU with flowchart. ✓ 5  
 What do you mean by normalization of floating point numbers? Explain the IEEE 754 standardization of 32-bit representation of floating numbers with an example. ✓ 5  
 Give the basic format of an instruction. How many types of instructions are available? ✓ 5

4. a) Design and draw a n-bit arithmetic circuit which performs the basic arithmetic operations. ✓ 3  
 b) What modification is necessary if we want to get logic operation from this circuit? ✓ 2

- c) What is meant by bit slice ALU? ✓ 2  
 5. a) Describe the interaction between data and control unit and the signals used for their interaction. ✓ 4  
 b) Define control word and micro-instruction. Write the control word for the following micro-instructions:  
 i) R1 ← R1-R2 ii) R6 ← input iii) R3 ← shrR2 ✓ 5

- c) What is pipeline processor? Explain the operation of pipeline microprogram control unit. ✓ 6

6. a) Define the term i) Control word ii) Micro program iii) Microinstruction ✓ 5  
 b) What steps involved in designing hardware controlled system? ✓ 5  
 c) Write a Micro program, which count the total number of 1's in a given character. Let the character is stored in Register R7. ✓ 5

7. a) What do you mean by Cache memory? What are the reasons for using Cache memory? ✓ 5  
 b) What do you mean by Memory Hierarchy? Explain the factors, which affect Memory Hierarchy. ✓ 5  
 c) Explain first fit and best fit method. ✓ 5

8. a) Explain memory mapped I/O and I/O mapped I/O. ✓ 5  
 b) Describe the internal organization of RISC processor. ✓ 5  
 c) What is interrupt? Discuss the steps when the CPU responds to an interrupt request. ✓ 5  
 2+3

# 2<sup>nd</sup> Year final Examination 2016

Department of Computer Science and Engineering (CSE)  
Islamic University, Bangladesh.

Course Code: CSE 207

Course Title: Computer Architecture and Organization

Time: 04 Hours

Full Marks: 75

Answer any five questions.

1. a) Explain your concept about computer architecture and organization? Draw and describe the basic architecture of a computer. ✓  
b) Differentiate between computer architecture and computer organization. ✓  
c) Briefly explain computer structure and functions with flow diagram. ✓

2. a) Explain the design process of an accumulator. ✓  
b) Explain IEEE standard floating point format with proper examples. ✓  
c) Show the complete step-by-step multiplication process for two sample numbers X = 1011 and Y = 1101. ✓

3. a) What do you mean by central processing unit? 2  
b) Draw and discuss the internal bus organization of a processor unit. 6  
c) Explain the operation:  $R_i \leftarrow R_2 + R_j$ . 4  
d) Give block representation of a typical fixed point ALU. 3

4. a) What do you mean by memory hierarchy? Explain the factors which affect memory hierarchy. 4  
b) Design a 1024x8 bit memory chip. 4  
c) Differentiate between SRAM and DRAM. 4  
d) Why and where is used cache memory in computer system? 3

5. a) What is pipeline processor? Discuss merits and demerits of pipeline processor. 5  
b) Distinguish between hardwire control and microprogram control. What are the advantages and disadvantages of each method? 7  
c) Write the control word for the following micro instruction: i) R1  $\leftarrow$  R1-R2 ii) R6  $\leftarrow$  input 3  
iii) R3  $\leftarrow$  shr-R2. ✓

6. a) Write down the various types of interface used in communication between CPU and I/O devices. 4  
b) What is the need for interrupt? Discuss different steps when CPU responds to an interrupt request. 6  
c) Compare between RISC and CISC processors. Describe the register set of RISC processor. 5

7. a) Define addressing mode? Describe in detail the different kinds of addressing modes with an example. 7  
b) What are the functions of accumulator? Draw the block diagram of an accumulator based microprocessor unit. 8

8. Write short notes any three : 3x5  
a) Memory paging  
b) Input-Output interface  
c) BUS  
d) DMA

=15

**2<sup>nd</sup> Year B.Sc. (Hon's) Final Examination-2015**

Dept. of Computer Science and Engineering

Islamic University, Kushtia

**CSE 207: Computer Architecture and Organization**

Full Marks: 75

Time: 4 hours

*Answer any five questions*

(Figures in the right margin indicate marks)

**X1.** (a) Explain your concept about computer architecture? Draw and describe the basic architecture of a computer. 7

**b** What do you mean by normalization of floating point numbers? 3

**c** Briefly discuss the implementation of floating point operation. 5

**X2. (a)** Explain the design process of an accumulator. 5

**b** Explain IEEE standard floating point format with proper examples. 4

**c** Show the complete step-by-step multiplication process for two sample numbers X = 6  
1011 and Y = 1101. ✓

**X3. (a)** What are the functions of ALU? 2

**b** Draw and describe the block diagram of ALU. 6

**c** Draw a 4-bit accumulator showing the internal connection between the stages. 7

**X4. (a)** What do you mean by memory hierarchy? Explain the factors which affect 4  
memory hierarchy.

**b** Design a 1024×8 bit memory chip. 4

**c** Differentiate between SRAM and DRAM. 4

**d** Why and where is used cache memory in computer system? 3

**5. (a)** What is pipeline processor? Explain the operation of pipeline micro program control 7  
unit.

**b** Distinguish between hardware control and microprogram control. What are the 5  
advantages and disadvantages of each method?

**c** Write the control word for the following micro instruction: 3

i) R1 ← R1-R2

ii) R6 ← input

iii) R3 ← shr R2.

**X6. (a)** What do you mean by DMA? Explain the working principle of a DMA controller. 6

**b** What are the usual definition of the terms CISC and RISC? Describe internal 7  
organization of CISC.

**c** Write some merits using DMA. 2

**7. (a)** Define addressing mode? Describe in detail the different kinds of addressing 7  
modes with an example.

**b** What are the functions of accumulator? Draw the block diagram of an 8  
accumulator based microprocessor unit.

**X8. (a)** Write short note on any <sup>three</sup> two of the following 3×5=15

i) Memory Paging

ii) Cache Memory

iii) Interrupt

iv) Virtual Memory

- a) Explain your concept about computer architecture? Draw and describe the basic Architecture of a computer. ✓

b) Describe the interaction between hardware and software in a computer system ✓

c) Write some characteristics of fifth generation computer. ✓

- a) Define with example of floating-point representation. Describe about floating point arithmetic.

b) Explain IEEE standard floating point format with proper examples.

c) Show the complete step-by-step multiplication process for two sample numbers  $X = 1011$  and  $Y = 1101$ .

- ~~Q3.~~ a) Explain the need for having a hierarchical memory organization and explain the hierarchy in detail with a block diagram.

b) Design a  $1024 \times 8$  bit memory chip.

c) Differentiate between SRAM and DRAM. ✓

d) Why and where is used cache memory in computer system?

4. a) Describe the interaction between data and control unit and the signal used for their interaction.  
 b) Define control word and micro instruction. Write the control word for the following micro instruction:  
 i)  $R1 \leftarrow R1 - R2$  ii)  $R6 \leftarrow \text{input}$  iii)  $R3 \leftarrow \text{shrR2}$ .

- Q** What is pipeline processor? Explain the operation of pipeline microprogram control unit.

- X5/ a) What is DMA? How a DMA controller transfer data from memory to I/O device.  
b) Describe the internal organization of a RISC processor.  
c) Distinguish between RISC and CISC processors.

- Q6. a) Define Access time, Seek time, Volatile memory and Rotational delay.  
b) Explain the design process of an accumulator.  
c) Design a Carry-Look ahead Adder and explain its operation.

- X7. x) Define addressing mode? Describe in detail the different kinds of addressing modes with example.

b) What are the functions of accumulator? Draw the block diagram of an accumulator based microprocessor unit.

- ~~Q8~~ Write short on any three of the followings :

- Status register
  - ii. Virtual memory

Xiii. Bus Organization

  - iv. Cache memory
  - v. Interrupt

B.Sc. (Engineering) 2<sup>nd</sup> Year 2<sup>nd</sup> Semester Final Examination-2021  
 Department of Computer Science and Engineering  
 Islamic University, Kushtia  
 Course no: CSE 2207

Full Marks: 70

Course Title: Numerical Methods

Time: 4 hours

Answer any five questions

- Q1.**
- a) Why do we use the numerical methods and analysis? 3  
 b) Define round off error and Truncation error? 3  
 c) Describe the bisection method to determine the roots of a non-linear equation. 3  
 d) Define i) algebraic ii) Transcendental equation with example. 3
- Q2.**
- a) What are the characteristics of polynomial equations? 2  
 b) Explain the method of False position for determine the roots of a equation. 4  
 c) Solve the equation using method of false position:  $x^2 - x - 1 = 0$  5  
 d) Write the Merits and demerits of false position method. 3
- Q3.**
- a) Define Interpolation and Extrapolation with example. Why is interpolation needed? 5  
 b) Express  $\Delta^4 y_0$  in term of ordinates. 4
- Q4.**
- a) Define Divided differences. State any two properties of divided difference 4  
 b) State Newton's divided difference interpolation formula. 3  
 c) Find the divided differences of  $f(x) = x^3 + x + 2 = 0$  for the arguments 1.5, 2, 2.5, 3, 3.5, 4 4  
 d) Write Lagrange interpolation formula. 3
- Q5.**
- a) What do you mean by numerical differentiation? 3  
 b) Write down the formula the first derivative using Newton's forward difference at  $x = x_0$  3  
 c) Find the first derivative of the function tabulated below, at the point  $x = 2.5$ . 8
- | X      | 0 | 1 | 2  | 3  | 4  | 5   | 6   |
|--------|---|---|----|----|----|-----|-----|
| $f(x)$ | 2 | 3 | 10 | 29 | 66 | 127 | 218 |
- Q6.**
- a) What do you mean by numerical integration? Discuss the principle of integration method. / 4  
 b) What is the focal error term in Trapezoidal formula? Write the order of the errors of trapezoidal rule. / 5
- Q7.**
- a) What are Differential Equations? Explain Various Types of Differential Equations. 5  
 b) How we solve First order linear differential equation? 3  
 c) What is initial value problem and boundary value problem? 3  
 d) Solve  $(2x^3 + 4y)dx + (4x + y - 4)dy = 0$  3
- Q8.**
- a) Solve  $(2x^2 + y^2 + x)dx + 2xydy = 0$ . 3  
 b) Explain Taylor series method for solving ODE. 4  
 c) Use the Runge-Kutta second and fourth-order method to find  $y(0.1)$  and  $y(0.2)$ ; given  $\frac{dy}{dx} = y - x$  where  $y(0) = 2$ . 7

*Answer any five questions*

1. (a) What are the advantages of numerical method?  
 (b) What is a algebraic and transcendental equation? Give an example.  
 (c) Derive an expression for determining the root of equation using the method of false position  
 (d) Use the method of false position to find a real root of the equation  $x^3 - 2x - 5 = 0$

2. (a) State the condition for convergence of iterative method.  
 (b) Describe the bisection method for determining the root of a non-linear equation.

3. (a) Explain Newton-Raphson method for solving a non-linear equation.  
 (b) Use Newton-Raphson method to find a root of  $x^5 - 5x + 3 = 0$   
 (c) Write the criteria for convergence of this method.  
 (d) Point out the limitation of this method.

4. (a) Write the principle of integration method.  
 (b) Describe the trapezoidal rule for computing integral.

5. (a) Evaluate  $\int_0^{\pi/2} \cos x dx$  correct to three decimal places using trapezoidal rule with h=0.25.  
 (b) Deduce Simpson's 1/3 rule and 3/8 rules of determining the numerical integration.

6. (a) Evaluate  $I = \int_0^1 (1+x)x^2 dx$  taking h = 0.25  
 (b) Using i) Analytically ii) Single application of Simpson's 1/3 rule

7. a) What do you mean by degree and order of differential equation?  
 b) Explain how to use Taylor series to solve differential equations.

8. a) Use Taylor series to solve the following equation:  
 $\frac{dy}{dx} = xy$  with  $y(1) = 5$ , for  $x=2$  and  $3$ .  
 b) Distinguish between interpolation and extrapolation?  
 c) Derive Lagrange interpolation formula.  
 Evaluate y for  $x=1.2$  from the following data:

x	0	1	2	3	4
y	1	0	1	10	33

9. a) Explain second order Runge-Kutta method for solving Ordinary differential equation. Given  $\frac{dy}{dx} = y - x$  with  $y(0) = 2$ . Find  $y(0.1)$  and  $y(0.2)$  using Runge-Kutta fourth order method.  
 b) What is meant by an r-order Runge-Kutta method?

# SOMA

## ANALYTICAL AND NUMERIC METHOD AND ERROR

- ✓ What is a numerical method? What is the difference between analytical and numerical methods?
- ✓ What is convergence in numerical methods?
3. Why are numerical methods used? Write some applications of numerical method.
4. What are the different types of numerical solutions in numerical math?
5. What's the difference between axioms and postulates?
6. Write some merit and demerit of analytical solution and numerical solution.
7. Why do we use the numerical methods and analysis? **2021**
8. Define round off error and Truncation error? **2021**
9. What are two types of errors involving in Numerical computations?
10. What are the sources of errors in the numerical method by using an example?
- 11.

## ROOTS OF EQUATIONS

- 12.
- ✓ Define i) algebraic ii) Transcendental and iii) Polynomial equation with example. **2021 / 2020**
- ✓ 13. What are the characteristics of polynomial equations? Classify polynomial equation. **2021**
- ✓ 14. Describe the bisection method to determine the roots of a non-linear equation. **2021**
- ✓ 15. Calculate a real root of the following function using bisection method correct upto 3 significant figures.  $x^2 - e^x = 3$
- ✓ 16.  $f(x) = x^2 - 2 = 0$ . Solve using bisection method ( $3 \leq x \leq 1.5$ ). Ans : 1.414213562373095
- ✓ 17. Explain the method of False position for determining the roots of polynomials and transcendental equations. **2021**
- ✓ 18. Write the Merits and demerits of false position method. **2021**
- ✓ 19. Using false position Correct 4 decimal points for the function  $x^3 - 4x - 9 = 0$ . (Ans:- 2.7065). **Ans 2021**
- ✓ 20. Deduce the Newton-Raphson Method to find the solution of the equation  $f(x)=0$ .
- ✓ 21. Write down the condition and rate for convergence of Newton Raphson of the equation  $f(x)=0$
- ✓ 22. Discuss advantages and disadvantages Newton Raphson method.
- ✓ 23.  $f(x) = x^3 - 15x + 10 = 0$ . Solve using Newton Raphson Method. Take  $x_0 = 2.25$ . Ans : 3.482612919322588
- ✓ 24. Use Newton-Raphson method to find a root of  $x^3 - 2x - 5 = 0$ . **20**
- 25.
- 26.

## INTERPOLATION

- 27.
- ✓ 28. Define Interpolation and Extrapolation with example. Why is interpolation needed? **2021**
- ✓ 29. What are the different methods of interpolation? What are the uses of interpolation?
- ✓ 30. When to use Newton's forward interpolation and when to use Newton's backward interpolation?
- ✓ 31. State Gregory-Newton forward difference interpolation formula.
- ✓ 32. Express  $\Delta^4 y_0$  in term of ordinates. **2021**
- ✓ 33. Discuss the Newton's forward difference formula for Interpolation.
- ✓ 34. Define Divided differences. State any two properties of divided difference.
- ✓ 35. State Newton's divided difference interpolation formula.
- ✓ 36. Derive Lagrange interpolation formula and state its uses. **2021**
- ✓ 37. Write some advantages and disadvantages of Lagrange's Interpolation Formula
- ✓ 38. Given  $f(0) = -1$ ,  $f(1) = 1$ ,  $f(2) = 4$ , find the Newton's interpolating polynomial equation.
- ✓ 39. Find the divided differences of  $f(x) = x^3 + x + 2$  for the arguments 1, 3, 6, 11
- ✓ 40. Find the polynomial through  $(0, 0)$ ,  $(1, 1)$  and  $(2, 20)$  using Lagrange's method.
- ✓ 41. Write the polynomial  $f(x)$  and hence find  $f(5)$ . Using Lagrange's method.  $x : 1, 3, 4, 6, y : -3, 0, 30, 132$
- 42.

## NUMERICAL DIFFERENTIATION

- 43.
- ✓ 44. What do you mean by numerical differentiation.
- ✓ 45. Write down the formula the first derivative using Newton's forward difference at  $x = x_0$ . **2021**

46.	Write down the first two derivatives of Newton's forward difference formula at the point $x = x_0$
47.	Find the first derivative of the function tabulated below, at the point $x = 2.5$ : $\begin{array}{ccccccc} x & : & 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ f(x) & : & 2 & 3 & 10 & 29 & 66 & 127 & 218 \end{array}$ <span style="float: right;">2021</span>
48.	
49.	<b>NUMERICAL INTEGRATION</b>
50.	What do you mean by numerical integration? Discuss the principle of integration method. <span style="color: red;">2021</span> <span style="color: blue;">20</span>
51.	Write down the Newton-Cote's formula for the equidistant ordinates.
52.	What is the local error term in Trapezoidal formula. Write the order of the errors of trapezoidal rule. <span style="color: red;">2021</span>
53.	State the formula for trapezoidal rule of integration. <span style="color: red;">20</span>
54.	When does Trapezoidal rule gives exact result.
55.	Evaluate $\int_0^1 \frac{1}{(1+x)} dx$ , correct to three decimal places using trapezoidal rule with $h = 0.25$ . <span style="color: red;">2021</span> <span style="color: blue;">20</span>
56.	
57.	Write down the order of the errors of Simpson's one third rule.
58.	When do you apply Simpson's 1/3 rule? When does Simpson rule gives exact result?
59.	How Simpson's 1/3 rule differs from Trapezoidal rule? Drive the formula for Simson's 1/3 rule.
60.	Write down the Simpson's 1/3 - Rule in numerical integration.
61.	Compare trapezoidal rule and Simpson's one third rule.
62.	State Simpson's three eight rule. On what type of intervals, Simpson's three-eight rule can be applied.
63.	Compare Simpson's 3/8 rule and Simpson's one third rule.
64.	Evaluate $\int_1^3 \frac{1}{x} dx$ by Simpson's rule with 4 strips. Determine the error by direct integration.
65.	Evaluate the integral $\int_0^{\pi} (5 + 2 \sin x) dx$ i) Analytically ii) Multiple application of Simpson's $\frac{1}{3}$ rule with $n = 4$ .
66.	
67.	<b>DIFFERENTIAL EQUATIONS</b>
68.	What are Differential Equations? Explain Various Types of Differential Equations. <span style="color: red;">2021</span>
69.	Define order and degree of Differential Equation <span style="color: red;">20</span>
70.	How we solve First order linear differential equation? <span style="color: red;">2021</span>
71.	What is initial value problem and boundary value problem? <span style="color: red;">2021</span>
72.	Solve $(x^2 + y^2)dx - 2xydy = 0$ , Solve $(2x^3 + 4y)dx + (4x + y - 1)dy = 0$ . <span style="color: red;">2021</span>
73.	Solve $(2x^2 + y^2 + x)dx + xydy = 0$ , Solve $(x^3 + y^3)dx - xy^2dy = 0$
74.	Explain Taylor series method for solving ODE. <span style="color: red;">2021</span>
75.	From Taylor series for $y(x)$ , find $y(0.1)$ , if $y(x)$ satisfies $y' = x - y^2$ and $y(0) = 1$
76.	Let $y' = -y$ with the condition $y(0) = 1$ . Solve using Euler Method.
77.	Deduce second order Runge-Kutta method for solving Ordinary differential equation. <span style="color: red;">20</span>
78.	Discuss Range-Kutta fourth order method for solving ordinary differential equations
79.	Use the Runge-Kutta second and fourth-order method to find $y(0.2)$ and $y(0.3)$ ; given $\frac{dy}{dx} = 1 + y^2$ , where $y=0$ when $x=0$ . <span style="color: red;">2021</span>

B.Sc. (Engineering) 2<sup>nd</sup> Year 2<sup>nd</sup> Semester Final Examination-2021

Department of Computer Science and Engineering

Islamic University, Kushtia

Course no: HUM 2211

Course Title: Business and Communication Law

Full Marks: 70

Time: 4 hours

Answer any five questions

1. a) Narrate the different senses of Engineering Ethics. 4  
b) What are the essential roles exhibited by the Engineer's Code of Ethics? Are there any limitations of this code? 4+5
2. a) Mention the categories of civic virtues. 4  
b) Write down the must-have characteristics of a leader to practice 'Empathy' in the workplace. 5  
c) "Honesty is a virtue, and it is exhibited in truthfulness and trustworthiness." - Explain the statement. 5
3. a) As a citizen of Bangladesh which fundamental rights are guaranteed in the constitution for—8+6  
you? Should freedom of speech be an absolute right? 6+4
4. a) Describe the laws regarding cyber terrorism and causing damage to any computer systems. Will it be considered a crime to spread rumors by hurting religious sentiments through social media? 6+4  
b) State the provisions of the Digital Security Act, 2018 in this regard. 4
5. a) Define the Negotiable Instrument with its characteristics. 4  
b) How many kinds of Negotiable Instruments are there? – Discuss. 6  
c) What are the differences between Bill of Exchange and Cheque? 4
6. a) Is Drug addiction an ethical failing? How do professional ethics and values come into play with regard to drug addiction? 4+4  
b) What are the punishments of drug offenses prescribed under the "Māuokdrobo Nirom An, 2018"? 6
7. a) Define fundamental rights. What are the differences between fundamental rights and human rights? 2+4  
b) State in brief the fundamental rights as stipulated in the Constitution of Bangladesh. 8
8. a) What is intellectual property? What are the exclusive rights enjoyed by the copyright holder? 4+5  
b) Write down the restrictions to the registration of similar or deceptfully similar trademarks under the Trade Marks Act, 2009. 5

205

correct  
people

**Course Title: Business and Communication Law**

Time: 04 hours

[Answer any five questions]

Full Marks: 70

- (Q) a) Do you have any idea about critical information infrastructure? Mention the punishment for illegal access to any critical information infrastructure. 4
- b) Is the modification of computer source code an offense? Explain with reference to the punishment for it. 4
- c) Describe the laws regarding illegal damage to computers, computer systems, and digital devices 6

2. What do you mean by company? Discuss the salient features of private and public company. "Directors are trustees for their company." – Discuss. 14

- (Q) a) Write down the penal provisions of offenses related to the State under the Digital Security Act, 2018. 5

- b) State the offense and punishment for committing cyber terrorism under the above-mentioned Act. 5
- c) Mr. X Publishes and broadcasts some information on the website in an electronic format that hurts the religious values or sentiments of a group of citizens in Bangladesh. What is the saying of the Digital Security Act, 2018 in this circumstance? 4

4. State what is meant by wages according to payment of wages Act. Who is responsible for payment and time of wages under the act? 14

- (Q) a) Narrate the legal provisions of employment and working hours of children and adolescents under the Labor Act, 2006. 6

- b) Is there any prohibition on the employment of woman labor passing maternity? 3
- c) Mention the amount, right to, and liability for payment of maternity benefit to such labor. 5

6. a) Mention the persons legally bound to perform a contract. 4
- b) What are the remedies for the breach of contract? 4
- c) State the rules regarding compensation for loss or damage caused by the breach of contract. 6

- (Q) a) What is intellectual property? Write down the contribution of intellectual property to the sustainable development of the country. 5
- b) What are the exclusive rights enjoyed by the copyright holder? How can the transfer of copyright be made to the successor of the copyright holder? 5

- c) Write down the restrictions to the registration of similar or deceptively similar trademarks under the Trade Marks Act, 2009. 4

- (Q) a) Elaborate on the concept of infringement of the patent. What are the remedies in case of such infringement? Where to file a case of infringement of patent? 6
- b) Mention the conditions of the patent. When a patent can be revoked? 4
- c) Define the inventor's certificate. State the validity duration of a patent 4