Student Name :.....
Enrollment No.:.....

Mid-Term Examination – May 2023

Programme: B.Tech (AI&DS, AI&ML) | **Semester: Fourth Semester**

Paper Code: AIDS212, AIML212 | **Subject: Computational Methods**

Time: 1½Hrs. | **Maximum Marks: 30**

Note:
- Question No. 1 is compulsory.
- Attempt any two questions from the remaining questions.
- All questions carry equal marks.
- Only scientific calculator is allowed.

Q1(a) Find the polynomial f(x) by using interpolation and hence find f(3) for

x:	0	1	2	5
f(x):	2	3	12	147

2.5

(b) Write an algorithm for Bisection method. **2.5**

(c) Evaluate $\sqrt{5}$ using the equation $x^2 - 5 = 0$ by applying the fixed point iteration method. **2.5**

(d) Write major differences between secant method and Regula Falsi method. **2.5**

Q2(a) Solve the following system of equations using Gauss Elimination method with and without partial pivoting. Assume that the numbers in arithmetic calculations are rounded to four significant digits. The exact solution to the system is $x_1 = 1,\ x_2 = 7,\ x_3 = 1$.

$$0.6667x_1 + 0.2857x_2 + 0.2x_3 = 2.867$$
$$0.3333x_1 + 0.1429x_2 - 0.5x_3 = 0.8333$$
$$0.2x_1 - 0.4286x_2 + 0.4x_3 = -2.4$$

6

(b) Determine the largest eigen value and the corresponding eigen vector of the matrix:-

$$A = \begin{bmatrix} 2 & -12 \\ 1 & -5 \end{bmatrix}$$

4

Q3(a) Using Bisection method, find the positive root between 0 and 1, of the equation $x = e^{-x}$ to a tolerance of 0.05%. **6**

(b) Obtain graphically an approximate value of the lowest root of $\cos x . \cosh x = -1$. **4**

Q4(a) Find the inverse of the following matrix using Cholesky method:-

$$A = \begin{bmatrix} 1 & 3 & 6 \\ 3 & 13 & 20 \\ 6 & 20 & 62 \end{bmatrix}$$

6

(b) Determine the quadratic spline S(x) through the points (0, 2), (1, 12), (2, 8), (3, 25) with condition $S_1'(0) = 0$. **4**

Student No: 0416716721

Mid-Term Examination – May 2023

Programme: B.Tech (AI&DS) | **Semester: 4th Semester**

Paper Code: AIDS 202/AIML 202/IOT 202 | **Paper Name: Object Oriented Programming**

Time: 1½Hrs. | **Maximum Marks: 30**

Note:
- Question No. 1 is compulsory.
- Attempt any two questions from the remaining questions.
- Some questions have internal choice also.
- All questions carry equal marks.

	Question 1	Marks
1(a)	Define Checked and UnChecked Exception? Explain with examples?	[2]
1(b)	Explain the difference between a String and a StringBuffer class?	[2]
1(c)	Explain the difference between Compile-time and Run-time Polymorphism in Java?	[2]
1(d)	What is the use of final keyword in java, Explain with suitable examples?	[2]
1(e)	Explain the use of this and super keyword in java with suitable examples?	[2]
	Question 2	
2(a)	What is an inner class in java? Explain advantages and disadvantages of using inner classes?	[3]
2(b)	Differentiate between primitive data types and their respective wrapper classes in java?	[3]
2(c)	What are conditional statements in java programming language, explain with examples?	[4]
	Question 3	
3(a)	What is byte code and explain how java is platform independent language?	[3]
3(b)	What is inheritance and how multiple inheritance in done in java, explain with examples?	[3]
3(b)	What is a constructor and Write a program to create class Student with data members' *name, rollNo* and constructors (default, parameterized and copy) and member function *display* that prints name and rollno.	[4]
	Question 4	
4(a)	What is a package in java? Explain role of access specifiers in java programming language?	[3]
4(b)	What is the purpose of exception handling in java and explain the use of throw and throws?	[3]
4(c)	What is Vector class in java explain with program code?	[4]

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[9]

(Please Write Your Enrolment. No. Immediately)

Student Name: [redacted]

Enrolment No. [redacted]

Mid Term Examination- MAY. 2023

Programme: B. Tech(AI&DS, AI&ML) **Semester IV**

Paper Code: AIDS 206/AIML 206 **Subject: Software Engineering**

Time: 1.5 hours **Max. Marks: 30**

Note:

- **Q. No. 1 is compulsory.**
- **Attempt any two questions from the remaining questions.**
- **All Questions carry equal marks.**
- **Only scientific calculator is allowed.**

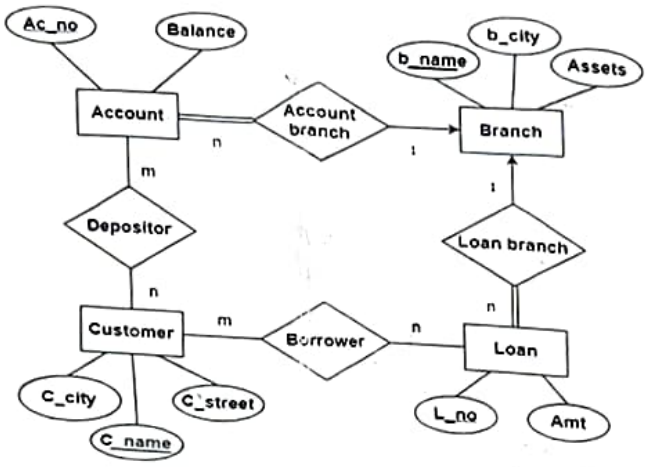
	Question 1. Answer all the following with precise justification:-	Marks	CO	BL
1(a)	Detailed COCOMO model is used to estimate effort & development time based on project slot. (T/F)	[2.5]	1	5
1(b)	State Transition Diagram is used to model the behaviour of a software system to be built. (T/F)	[2.5]	1	5
1(c)	Quality Function Deployment is better than brain storming technique for software requirements elicitation. (T/F)	[2.5]	2	5
1(d)	Data dictionary is an organized listing of all data elements that are pertinent to the system. (T/F)	[2.5]	2	5

	Question 2.	Marks	CO	BL
2(a)	Discuss advantages and disadvantages of prototyping model over evolutionary model for software development.	[5]	1	2
2(b)	Write short notes on any two: (a) Generic Process Model (b) Failure Curve for Software (c) Software Engineering Layers	[5]	1	1

	Question 3.	Marks	CO	BL
3(a)	Discuss any two requirements elicitation techniques with suitable examples.	[5]	2	2
3(b)	Why is Requirements Analysis necessary? Compare CSPEC & PSPEC?	[5]	2	2 4

	Question 4.	Marks	CO	BL
4(a)	Discuss the importance of DFDs? Draw a Level-1 DFD or ER diagram for a University Information System.	[5]	1	2 6
4(b)	Suppose that a project was estimated to be 400 KLOC. Calculate effort & time for each of 3 modes of development.	[5]	2	3

Software Product Type	a	b	c	d
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

3(b)	Solve the following queries in **SQL as well as Relational Algebra**: 1. Retrieve the names, age, course id and course name of students enrolled in different courses. 2. Find the names of students enrolled in Course 'CSE'. (Use nested queries for SQL). 3. Find the department no. wise average age of students having average age greater than 25.	[6]
	Question 4	
4(a)	For the ER Diagram given below, derive the relational schema (Tables along with keys)  	[5]
4(b)	Categorize the difierent types of cursors in PL/SQL with examples. OR Illustrate the key advantages and disadvantages of PostgreSQL?	[5]

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Total No. of Pages: 2

Student Name: .....

Enrollment No: 105[illegible]621 .....

Mid-Term Examination – May 2023

Programme: B.Tech (AIML, AIDS, IIOT)

Semester: Fourth (Jan 2023 - Aug 2023)

Paper Code: AIML/AIDS/IIOT 204

Paper Name: Database Management Systems

Time: 1½Hrs.

Maximum Marks: 30

Note:
- Question No. 1 is compulsory.
- Attempt any two questions from the remaining questions.
- Some questions have internal choice also.
- All questions carry equal marks.

	Question 1	Marks
1(a)	Compare and contrast the features of DBMS with traditional file system.	[3]
1(b)	Frame an instance to explain Referential Integrity.	[3]
1(c)	Compare the 2-tier and 3-tier architecture of DBMS.	[2]
1(d)	Outline the concept of Query Processing and Optimization with the help of a neat diagram.	[2]
	Question 2	
2(a)	Do you agree with the statement "Are specialization and generalization simple inversions of each other". Defend your answer with the help of examples.	[4]
2(b)	Design an ER Diagram for an IT Organization having following details: • Organization is organized into DEPARTMENTS. Each department has a **unique name** and a particular employee who manages the department. The date when one becomes a manager is also recorded. Department may have **several** locations. The department has a budget also. A department controls several PROJECTS having a unique name, number, and a single location. • Organization's EMPLOYEE name (first, middle and last name), ssno., address, salary, sex, birth date, mobile numbers (multiple) and age (derived from birth date) are recorded. An employee is assigned to one department but may work for several projects (not necessarily controlled by his/her dept). Number of hours/weeks an employee works on each project is recorded. Also, there is an immediate supervisor for the employee. Employees can be categorized as salaried or hourly paid. • Employee's DEPENDENT records (dependent name, age, relationship to employee) are also maintained for insurance purposes.	[6]
	Question 3	
3(a)	Consider the following relations. Student(Rollno, Name, Address, Phone, Age, Department_no) Course(Courseid, Course_name) StdCourse(Courseid, Rollno) #Courseid and Rollno act as foreign key Solve the following queries using SQL: 1. Find the student details whose names (start with 'a' and end with 'h') or (have at least one 'p'). 2. Find the student details in decreasing order of age followed by increasing order of rollno. 3. Update the department no. of students to 20 who are enrolled in course 'AIML'. 4. Find the names and address of students enrolled in courses with courseid=3.	[4]

Total No. of Pages: 1

Student Name: Taranveer

Enrollment No: 04117711721

Mid-Term Examination – May 2023

Programme: B.Tech (AI&DS), (AI&ML), (IIoT)

Semester: Third Semester (Sept. 2022 – Jan. 2023)

Paper Code: IOT210

Paper Name: Internet of Things

Time: 1½ Hrs.

Maximum Marks: 30

Note:

- Question No. 1 is compulsory.
- Attempt any two questions from the remaining questions.
- Some questions have internal choice also.
- All questions carry equal marks.
- Only scientific calculator is allowed.

	Question 1	Marks
1(a)	What are the basic functional blocks required for IoT Systems? Justify your answer.	[2.5]
1(b)	Why HTTP protocol is used in IoT applications? Which communication model is the base for HTTP protocol?	[2.5]
1(c)	Examine the operational principles and benefits of ZigBee technology and write its relevance to IoT applications.	[2.5]
1(d)	'SPI Protocol (Serial Peripheral Interface) is a synchronous serial communication interface specification used for short-distance communication'. Is the statement true or false? Give reasons for your answer.	[2.5]
	Question 2	
2(a)	Build an IoT-based temperature monitoring system which records data such as temperature, humidity and display it on a serial monitor. Draw rough sketch of Pin diagram and write corresponding Arduino code. **OR** Build a simple traffic management system using RGB LEDs and Arduino. Draw rough sketch of Pin diagram and write corresponding Arduino code.	[5]
2(b)	Compare the operational principles of UART and I^2C protocols, giving one application of each.	[5]
	Question 3	
3	Draw a well-defined diagram depicting the IoT architecture and provide a brief explanation of the Application Layer protocols, which enable the exchange of data between devices in IoT systems.	[10]
	Question 4	
4	What are the specific properties and characteristics that distinguish the wireless communication protocols namely NFC, Bluetooth and WLAN generally employed in IOT applications? Give one application of each.	[10]

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(Please Write Your Enrolment. No. Immediately)

Student Name: Tamanveer

Enrolment No: 04 11721472 1

Mid Term Examination- May. 2023

Programme:	B.TECH.(AFF.)	
Paper Code:	AIDS/AIML/IIoT-208	Maximum Marks: 30
Subject:	COMPUTER NETWORKS & INTERNET PROTOCOLS	Duration: 01:30 Hrs

Note: Attempt any three Questions including Q.No.1 which is compulsory. Attempt two more questions from remaining.

	Question 1.	Marks 10	CO	BL
1(a)	How do the layers of the Internet model correlate to the layers of the OSI model?	[2]	1	Analyze
1(b)	How does information get passes from one layer to the next in the Internet model?	[2]	2	Understand
1(c)	What are the headers and trailers, and how do they get added and removed?	[2]	2	Analyze
1(d)	Explain Transmission Impairments	[2]	1	Understand
1(e)	Named the protocols those used for Noisy channels.	[2]	2	Understand

	Question 2.	Marks	CO	BL
2(a)	Give the difference between OSI & TCP/IP model in detail.	[5]	1	Understand
2(b)	Explain the frame format of IEEE802.3 & IEEE 802.11.	[5]	1	Remember

	Question 3.	Marks	CO	BL
3(a)	Compare and Contrast the Go-Back-N ARQ protocol with Selective- Repeat ARQ.	[5]	2	Understand
3(b)	Explain Sliding window protocol in detail.	[5]	2	Remember

	Question 4.	Marks	CO	BL
4(a)	What is channel allocation problem? How do we remove this problem? Explain.	[5]	2	Analyze
4(b)	Compare CSMA/CA and CSMA/CD.	[5]	2	Evaluate

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(b) Find the singular points, type of singularities and the corresponding residues of the function $f(z) = \frac{1}{(z^2-1)^2}$. (7)

Q 5.(a) Sketch and graph the given region: $|z| \leq \frac{1}{2}, -\frac{\pi}{8} < Arg(z) < \frac{\pi}{8}$, and its image under the given mapping: $w = z^2$. (7.5)

(b) Prove that the integral $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)}\, dx = \frac{\pi}{3}$. (7.5)

UNIT-III

Q 6. (a) Using Laplace transform solve the ordinary differential equation

$y'''(t) + 2y''(t) - y'(t) - 2y = 0$, with conditions $y(0) = y'(0) = 0$, and $y''(0) = 6$. (8)

(b) Find the inverse Laplace transform of $log(\frac{s+1}{s-1})$. (7)

Q 7.(a) Find the Fourier series to represent the function $f(x) = x^2$ in the interval $(-\pi, \pi)$. (7.5)

(b) Find the Fourier transform of $f(x) = \begin{cases} 1 & for \quad |x| < 1 \\ 0 & for \quad |x| > 1 \end{cases}$

Hence evaluate $\int_0^{\infty} \frac{\sin x}{x}$. (7.5)

UNIT-IV

Q 8. (a) Find the temperature in a laterally insulated bar of length L whose ends are kept at temperature zero, assuming that the initial temprature is

$$f(x) = \begin{cases} x & for \quad 0 < x < \frac{L}{2} \\ L - x & for \quad \frac{L}{2} < x < L \end{cases}$$ (8)

(b) A tightly stretched string with fixed end points $x = 0$ and $x = l$, is initially in a position given by $y = \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from this position, find the displacement $y(x,t)$. (7)

Q 9. (a) **Solve the Laplace equation** $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$, subject to the conditions

$u(0,y) = u(l,y) = u(x,0) = 0$ and $u(x,a) = \sin\frac{n\pi x}{l}$. (8)

(b) Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, with boundary condition $su(x,0) = 3\sin(n\pi x)$, $u(0,t) = 0$ and $u(1,t) = 0$, where $0 < x < 1, t > 0$. (7)

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(Please write your Exam Roll No.) Exam Roll No. 0481721722

END TERM EXAMINATION

SECOND SEMESTER [B.TECH] JULY 2023

Paper Code: BS-112 **Subject: Applied Mathematics-II**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

Q1. (a) Find all the point at which the following mapping is not Conformal $w = \frac{z+\frac{1}{2}}{4z^2+2}$. (2.5)

(b) Split the real and imaginary part of i^i. (2.5)

(c). Find the Laplace transform of t^2e^{-2t}. (2.5)

(d) Using half range sine series of function $f(x) = 1$ for $0 < x < \pi$,

prove that $1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \ldots\ldots = \frac{\pi^2}{8}$ (2.5)

(e) Taylor series expansion of $\frac{1}{z-2}$ in $|z| < 1$ is……. (2.5)

(f) Classify the type of PDE: $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + 5\frac{\partial^2 u}{\partial y^2} = 0$, whether it is parabolic, ellipticor hyperbolic? (2.5)

UNIT-I

Q 2. (a) Find all the values of $(-1 + \sqrt{3}\, i)^{\frac{3}{2}}$. (7)

(b) Verify that the function $u(x,y) = x^3y - xy^3$ is harmonic and find the harmonic conjugate of $u(x,y)$ to express the function $f(z) = u + iv$ as an analytic function. (8)

Q 3. (a) Evaluate the integral $\oint_C \frac{e^{2z}}{(z-1)(z-2)} dz$ along the curve C, where C is a circle $|z| = 3$. (7)

(b) Integrate the function $f(z) = \bar{z}$ along the curve C, where C is the square with vertices $z = 0, 2, 2i, 2 + 2i$ (8)

UNIT-II

Q 4. (a) Find the bilinear transformation or Mobious transformation which maps $1, i, 1$ of the $z-$plane onto $1, i, -1$ of the $w-$plane respectively. Also find the fixed points or invariant points. (8)

P.T.O.