

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of Computer Science and Engineering

BE CSE - G2 & SEM 6

CONTINUOUS ASSESSMENT TEST 1 Date: 20.1.2025

19Z601 – Machine Learning

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer **ALL** questions. Each Question carries 25 Marks.
2. In each question, subdivision **a** contains 5 questions and the weightage of each question is one mark, subdivision **b(i)** and **b(ii)** carries 5 marks each and subdivision **c** carries 10 marks each.
3. Subdivisions (a) and (b) will be with no choice and Subdivision (c) may be with choice but not in more than 1 question.

4. Course Outcome Table

Qn. 1	CO1
-------	-----

Qn.2	CO2
------	-----

1.a	(5x1mark=5marks)	BTL
i)	<p>You are given a dataset containing customer information, including their age, income, purchase history, and geographic location. The goal is to segment customers into distinct groups based on their purchasing behaviour to tailor marketing strategies.</p> <p>Which type of machine learning technique is most suitable for this task?</p> <p>A) Supervised Learning B) Unsupervised Learning C) Reinforcement Learning D) Semi-Supervised Learning</p>	L2
ii)	<p>How does one-hot encoding handle categorical variables with multiple unique values, and what is a potential drawback of using this technique?</p> <p>A) It replaces each category with its frequency and can lead to biased models. B) It assigns a unique integer to each category, which may imply an unintended ordinal relationship. C) It creates a binary column for each category, which can increase dimensionality significantly. D) It combines similar categories into a single column, which may lose information.</p>	L2

	iii) Consider the following statements about types of missing values in a dataset:	L1																				
	<p>1. MCAR (Missing Completely at Random) means that the missing data is unrelated to both observed and unobserved data.</p> <p>2. MNAR (Missing Not at Random) can lead to biased analysis if not handled appropriately, as the missing data is related to unobserved values.</p> <p>Which of the following is correct?</p> <p>A) Both statements are true. B) Both statements are false. C) Only statement 1 is true. D) Only statement 2 is true.</p>																					
iv)	The number of wickets taken in last seven games by a cricket player is specified as data points (vector) [2,3,1,4, 5, _____, 2]. Fill the missing data point with mode data imputation.	L3																				
v)	The first principal component accounts for the _____ variance in the data, while subsequent components account for the remaining variance in descending order.	L2																				
b.	(2 x 5 marks = 10 marks)																					
i)	Consider the training dataset of 4 instances. It contains the details of the performance of students and their likelihood of getting a job offer or not in their final semester. Apply the Find-S Algorithm.	L3																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CGPA</th> <th>Interactivity</th> <th>Practical Knowledge</th> <th>Job Offer</th> </tr> </thead> <tbody> <tr> <td>>=9</td> <td>Yes</td> <td>Excellent</td> <td>Yes</td> </tr> <tr> <td>>=9</td> <td>Yes</td> <td>Good</td> <td>Yes</td> </tr> <tr> <td>>=8</td> <td>No</td> <td>Good</td> <td>No</td> </tr> <tr> <td>>=9</td> <td>Yes</td> <td>Good</td> <td>Yes</td> </tr> </tbody> </table>	CGPA	Interactivity	Practical Knowledge	Job Offer	>=9	Yes	Excellent	Yes	>=9	Yes	Good	Yes	>=8	No	Good	No	>=9	Yes	Good	Yes	
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>=8	No	Good	No																			
>=9	Yes	Good	Yes																			
ii)	<p>You are given a dataset containing the sepal width of Iris flower in centimeters:</p> <p>Sepal Width (cm): [3.5, 3, 3.2, 3.6]</p> <p>Use the following data scaling techniques and provide the scaled values for the above dataset.</p> <p>(i) Min-Max Normalization (ii) Z-score Normalization</p>	L3																				
c.	(1 x 10 marks = 10 marks)																					
	Using the Candidate Elimination Method, determine the version space	L4																				

(S and G boundaries) after processing the given dataset. Assume that "EnjoySport" is the target concept.

Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	EnjoySport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

Analyze the changes in the version space (S and G boundaries) after processing the dataset. Identify any inconsistencies in the data or concepts that might lead to conflicts within the version space

2.a		(5x1mark=5marks)	BTL
i)	Which of the following statements about linear regression models is TRUE?		L2
	A) Linear regression can only be applied if the relationship between variables is non-linear. B) The slope coefficient in a simple linear regression represents the average change in the dependent variable for a one-unit increase in the independent variable. C) In multiple linear regression, adding more independent variables always improves the model's accuracy. D) Linear regression models do not assume any relationship between the independent and dependent variables.		
ii)	Which of the following is an example of cultural bias in datasets?		L3
	A) Missing values in the dataset. B) Overrepresentation of one demographic group leading to skewed predictions. C) Using a dataset that includes diverse geographic and cultural populations. D) Applying feature scaling to normalize data.		
iii)	The following are the assumptions of linear regression : Assumption 1 : Linearity Assumption 2: Heteroscedasticity Which of the following is correct? A) Both Assumptions are true. B) Both Assumptions are false. C) Only Assumption1 is true. D) Only Assumption2 is true.		L2

iv)	Loss/Error of a Machine Learning (ML) model is decomposed into _____	L1												
v)	High variance and low bias in a machine learning model can lead to _____ fitting of model.	L1												
b.	(2 x 5 marks = 10 marks)													
i)	Mathematically derive the estimates of the unknown parameters in a linear regression model using the Ordinary Least Squares (OLS) method.	L5												
ii)	Let us assume a binomial logistic regression problem where the classes are pass and fail. The student dataset has entrance mark based on the historic data of those who are selected or not selected. Based on the logistic regression, the values of the learnt parameters are $a_0 = 1$ and $a_1 = 8$. Assuming marks of $x = 60$, compute the resultant class.	L3												
c.	(1 x 10 marks = 10 marks)													
i)	You are given a dataset containing information about the number of hours students spend studying and their corresponding scores on a test. Your task is to perform simple linear regression to predict test scores based on the number of hours studied using the following dataset.	L4												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">No.of Hours Studies</th> <th style="text-align: center;">Test Scores</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">75</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">82</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">93</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">89</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">98</td> </tr> </tbody> </table> <p>Analyze whether a linear model is the most suitable for this data. Suggest scenarios where the relationship might require a non-linear approach, and justify your reasoning.</p>	No.of Hours Studies	Test Scores	2	75	3	82	4	93	5	89	6	98	
No.of Hours Studies	Test Scores													
2	75													
3	82													
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Time: 1 Hour 30 minutes.

INSTRUCTIONS:

1. Answer ALL questions. Each Question carries 25 Marks.
2. In each question, subdivision a carries total of 5 marks (one mark for each question), subdivisions b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Course Outcome Table :

Qn. 1	CO 1
Qn. 2	CO 2

(5 x 1 mark = 5 marks)

1. a. Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.
- i. Select the **false** statements from the following.
- A. Context-free grammar specifies syntax rules ✓
 - B. Type checking is done before parsing ✗
 - C. High-level language programs can be translated to different Intermediate Representations. ✗
 - D. Symbol table can be implementation by using array and hash table but not tree ✗
- A) B & D only B) A & D only C) B & C only D) A & C only [L2]
- ii. Identify the system program that integrates a program's individually compiled modules into an executable form. [L2]
- A) Interpreter B) Assembler C) Compiler D) Linking Loader
- iii. Which of the following is/are NOT a valid token-type(s): [L3]
- A. Type of a variable
 - B. scope of a variable
 - C. operator
 - D. loop
- A) D only B) B & D only C) B only D) A & D only
- Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.
- iv. The lexical analyzer takes Stream of characters as input and produces a list of Stream of tokens as output. [L1]
- v. Register assignment is done in Intermediate code generation phase of the compiler. [L1]

(2 x 5 marks = 10 marks)

- b.
- i. Briefly discuss any 5 compiler construction tools used to implement various phases of a compiler. [L2]
- ii. How would you apply the concept of a pass in compiler design to combine multiple phases into a single pass, and what potential advantages or disadvantages might arise from this approach? [L2]

c. Consider the following code snippet

```
main()
{
    int i,j;
    float x[10];
    for(i=0,j=3; i<10; i++, j=j+2)
    {
        x[i]=j
    }
}
```

$L \rightarrow DEC; for(INT\ ;\ CON\ ;\ INC)\{ AS\ ;\ }$

Illustrate the output of various phases of compilation process for the above code snippet. Also illustrate the error handling process (if any) and construct the symbol/literal table. [L5]

(1 x 10 marks = 10 marks)

2. a.

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

i. The number of tokens in the following C code is

```
switch(inputvalue)
{
    case 1:a=b+c;break;
    default:a=a++;break;
}
```

A) 24 B) 25 C) 26 D) 27

[L2]

ii. The process of searching for matched tokens is typically described using _____

A) Finite automata B) Regular expressions
C) Context free grammar D) Both A and B

[L2]

iii. S1: Lexical analysis can be used infer the type of each variable.

S2: Regular expressions can be used to ensure that all variables are of lower case only.

A) S1 is True and S2 is False B) S1 is False and S2 is False
C) S1 is True and S2 is True D) S1 is False and S2 is True

[L2]

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

iv. Consider the expression: $(a + + b) + c$. The mode of error recovery which skips ahead to the next character and then continues is known as _____.

[L2]

v. If lexeme is very long then _____ buffering scheme cannot be used.

[L1]

b.

(2 x 5 marks = 10 marks)

i. A word is defined by a sequence of upper and lower case letters in the input. Write lex code to print the longest word in a paragraph and number of characters in that word. [L5]

ii. Give a leftmost derivation, a rightmost derivation for the following string 110100. Argue if the grammar is ambiguous or unambiguous. [L4]

$S \rightarrow 1\ S\ 0\ | 01$

(1 x 10 marks = 10 marks)

c. Construct ϵ - NFA using Thompson's construction algorithm for the regular expression 10^*01^* and convert it into DFA. Write the subset construction algorithm. [L5]

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of CSE

BE CSE G1 & G2

CONTINUOUS ASSESSMENT TEST 1 Date: 21.01.2025

19Z603 - Distributed Computing

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer **ALL** questions. Each Question carries 25 Marks.
2. In each question, subdivision a contains 5 questions and the weightage of each question is one mark, subdivision b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Subdivisions (a) and (b) will be with no choice and Subdivision (c) may be with choice but not in more than 1 question.
4. Course Outcome Table :

Qn. 1	CO 1
-------	------

Qn.2	CO 2
------	------

(5 x 1 mark = 5 marks)

1. a

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

L2

- i. A file server provides stateless service if
- A) The files that it provides are not stored physically on that server.
 - B) The files that it provides are stored physically on that server.
 - C) The server keeps track of information about open files on client machines
 - D) The server does not keep track of information about open files on client machines.

ii. i. All processors are synchronized in distributed system.

ii. A distributed system is defined as a collection of autonomous computers linked by a network with software designed to produce an integrated computing facility.

L2

- A) I is True and II is True
C) I is False and II is True

- B) I is True and II is False
D) I is False and II is False

iii. The transparency that enables multiple instances of resources to be used, is called

L1

- A) Performance transparency
C) Concurrency transparency

- B) Scaling transparency
D) Replication transparency

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

iv. Distributed systems should be used, when-----is required.

L1

v. The transfer of message data between two computers require encoding and decoding of the message data. This operation is known as _____ *Marshalling*

L2

(2 x 5 marks = 10 marks)

b.

- i. What is stub? How are they generated? Infer the need behind the development of the RPC architecture that makes the job of distributed application programmers simpler. L3
- ii. Suggest suitable server creation semantics for each of the following types of applications. Justify your answers with suitable inferences.

- (a) A service is needed only once in a while, and the session for which a client interacts with the server of this service involves the exchange of a single call and a single reply message between the client and server processes. *Instant per call*
- (b) A service is needed only once in a while, and the session for which a client interacts with the server of this service normally involves the exchange of several call and reply messages between the client and server processes. *Multiple per session*
- (c) A server can service the requests of multiple clients. *Peristent sessions*

L4

c.

Consider that railway reservation system is implemented using distributed environment. List out the possible types of transparencies need to be incorporated in the system. Justify your answers. L5

2. a

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

i. Select the condition for non faulty clock

L1

- A) $1+\epsilon \leq dc/dt \leq 0$ B) $1-\epsilon \leq dc/dt \leq 1+\epsilon$ C) $1-\epsilon \geq dc/dt \leq 1+\epsilon$ D) $1+\epsilon \leq dc/dt \geq 0$

ii. Identify the type of routine

L2

```
debit(amount)
{
    if(balance >= amount)
    {
        balance = balance - amount;
        return ("success",balance);
    }
    else return ("Failure",balance);
}
```

- A) An idempotent routine
B) A non-idempotent routine
~~C) An idempotent routine using request identifiers~~
D) A non- idempotent routine using request identifiers

iii. Suggest a call semantics that should be used for making a request to a compilation server to compile a file

L2

- ~~A)~~ Exactly- once call semantics B) At-least-once call semantics
C) May -be call semantics D) Last-one call semantics

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. In the token passing approach, _____ process regenerates the lost token. L1
- v. The ring election algorithm requires n^{-1} messages for election initiation and _____ messages on an average for recovery action. L2
 n^{-1}

b.

(2 x 5 marks = 10 marks)

- i. What are logical clocks? Describe in detail the approaches for implementation of logical clocks with examples. L3

- ii. Discuss the purpose of election algorithm in a distributed system? Formulate the use of bully algorithm with a neat diagram and explain what will happen when two or more processes simultaneously discover that the coordinator has crashed. L4

c.

(1 x 10 marks = 10 marks) L5

Consider a distributed system that has three types of resources R1, R2 and R3 with 2,2,2 units each. Processes P1, P2, P3 and P4 are competing for resources as follows.

- i) P1 holding 1 unit of R1 and is requesting 1 unit for R2.
- ii) P2 holding 2 units of R2 and is requesting 1 unit of each R1 and R3.
- iii) P3 holding 1 unit of R1 and is requesting 1 unit of R2.
- iv) P4 holding 2 units of R3 and is requesting 1 unit of R1.

Determine whether the system is deadlocked. Describe methods to detect deadlocks and to recover from it.

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004
Department of Computer Science and Engineering
BE CSE & SEMESTER VI
CONTINUOUS ASSESSMENT TEST I Date: 21.01.2025
19Z604 – Embedded Systems

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer ALL questions. Each Question carries 25 Marks.
2. In each question, subdivision a carries total of 5 marks (one mark for each question), subdivisions b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Course Outcome Table:

Qn. 1	CG 1	Qn. 2	CO 2
-------	------	-------	------

I. A

- i) S1: Embedded microcontroller is an OS for embedded system.
S2: The MCU must have an oscillator and reset circuits.
 - a) S1: True & S2: True
 - b) S1: False & S2: True
 - c) S1: True & S2: False
 - d) S1: False & S2: False
- ii) Hard Real Time System belongs to
 - a) Relaxed rigid system
 - b) Sleep mode
 - c) Specific deadline
 - d) Soft computing
- iii) Emulator
 - a) Software embedded in a microcontroller
 - b) Is only a linker
 - c) Emulates an operating system
 - d) Emulates the microcontroller peripherals
dual/multicore
- iv) In an embedded system ----- processors may be needed to execute an algorithm fast within a strict deadline.
- v) ‘Sleep’ and ‘idle’ modes are offered in microcontrollers for *power management*

B

- i) Explain “Programming for embedded devices offer unique challenges not found in PC/workstation based applications” – Justify this statement by your detailed answer.
- ii) The number of four wheelers entered inside the college car parking is to be counted and the gate must be closed automatically when the count reaches 100. Show the essential hardware blocks required to build the embedded system for this application and justify each block.

C

Assess the seven phases of embedded system design life cycle by considering one suitable example.

2. A

- i) S1: Row Address Strobe and Column Address Strobe are associated with DRAM.
S2: To maintain the information stored in it, no power is needed for flash memory.
 - a) S1: False & S2: True
 - b) S1: True & S2: True
 - c) S1: True & S2: False
 - d) S1: False & S2: False
- ii) The speed of semiconductor memory is in the range of
 - a) Micro Seconds
 - b) Milli Seconds
 - c) Nano Seconds
 - d) Pico Seconds
- iii) Which one of the following is not an OTP memory?
 - a) Boot Code
 - b) Encryption Keys
 - c) eFuse
 - d) Floppy Disk
- iv) The processor fetches instructions from ----- and gives the processed results back to it.
- v) ----- memory is often used in mobile devices due to its low power consumption.

B

- i) Compare the characteristics of following memory devices: DRAM, NVRAM, EPROM, EEPROM and FLASH.
- ii) Examine the direct memory access technique using an example.

C

Illustrate the common source of memory problems that may be encountered in the circuit boards.

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004
Department of Computer Science and Engineering

BE CSE & 6th Semester

CONTINUOUS ASSESSMENT TEST 1 Date: 22.01.2025

19Z009 – INTERNET OF THINGS

Time: 1 Hour 30 minutes.

Maximum

Marks: 50

INSTRUCTIONS:

- INSTRUCTIONS:**

 1. Answer **ALL** questions. Each Question carries 25 Marks.
 2. In each question, subdivision **a** carries total of 5 marks (one mark for each question), subdivisions **b(i)** and **b(ii)** carries 5 marks each and subdivision **c** carries 10 marks each.
 - 3.
 4. Course Outcome Table

Qn. 1	CO1	Qn. 2	CO2
-------	-----	-------	-----

Qn. 1 CO1 Qn. 2 CO2

1. a

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

- i. If things offer RESTful APIs over HTTP, they get a ___ and become seamlessly integrated to the World Wide Web [L2]

 - A. Port Numbers
 - B. URL
 - C. IP address
 - D. SSID

ii. In which of the following evolutions of web, the content started to get socially based and user generated

- A. Web 1.0
 - B. Web 2.0
 - C. Web 3.0
 - D. Web 4.0

iii. MQTT transmits to and from a broker using which format? [L2]

- A. Hexadecimal
 - B. ASCII
 - C. Binary
 - D. Text

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

iv. In a Zigbee network, a single device that controls the network is called _____

v. _____ Mhz frequency spectrum is used by LoRA radio in US

[L1]

(2 x 5 marks = 10 marks)

b.

i. Illustrate using a real world application, how the key components of IoT architecture build a digital value chain. How do they interact to enable seamless communication and data processing between IoT devices, the cloud, and end-users? Provide examples for each component. [L5]

ii. What is MQTT? JUSTIFY why is it considered a lightweight protocol suitable for IoT applications? [L4]

c. A manufacturing company wants to implement IoT to monitor its production lines and predict equipment failures. To achieve this, they need middleware to connect various IoT devices, manage data, and integrate with their existing systems like ERP. [L6]

The company faces the following challenges:

- a. Devices use different communication protocols.
- b. A large amount of data is generated daily.
- c. They need to ensure the system is secure.

As the middleware architect:

How would you design the middleware to handle devices using different communication protocols?

What approach would you take to manage and process the large amounts of data generated?

What key security features would you include in the middleware?

Provide simple and practical solutions to address these challenges.

a . Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

i. What is the maximum data rate supported by zigbee ?

[L1]

- A. 250 Kbps
- B. 250 mbps
- C. 20 Kbps
- D. 25 Kbps

ii. Which of the following QoS levels of MQTT ensured that messages are delivered at least once ?

[L2]

QoS 0 B. QoS 1 C. QoS 2 D. Both QoS 1 &2

iii. Which of the following topologies offer self-healing property?

[L2]

A. Star B. mesh C. Tree D. All of them

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning the question number and subdivision number.

iv. _____ is the name of the zigbee object that is connected to Endpoint 0. [L1]

v. _____ is the expected lifetime of a class A LoRA end device .

[L1]

b.

(2 x 5 marks = 10 marks)

i. Why is Zigbee a popular choice for IoT and smart home applications? What is the purpose of Zigbee application profiles, and how do they enable interoperability.

[L4]

ii. Describe the architecture of a LoRaWAN network.

[L2]

c.

(1 x 10 marks = 10 marks)

i) Imagine that Coimbatore city implements LoRa-based IoT devices in urban farms to monitor soil moisture, temperature, and crop health, ensuring efficient resource use and higher yields. [L6]

How does LoRa's long-range capability support urban farming initiatives spread across various parts of the city?

How can LoRa-based agricultural data be used to optimize irrigation systems and reduce water wastage?

Discuss the potential for integrating LoRa-enabled urban farming data with other smart city systems, such as weather monitoring and water management.

(or)

ii. A company, SmartHome Solutions, is developing a Zigbee-based home automation system. The system includes the following devices: [L6]

1. Smart Light Bulbs: Capable of dimming, color adjustment, and on/off control.
2. Motion Sensors: Detect motion to trigger lighting and security alerts.
3. Smart Thermostats: Allow remote temperature adjustments and energy-saving scheduling.
4. Smart Door Locks: Provide secure remote locking/unlocking and status monitoring.
5. The goal of the system is to provide a seamless and interoperable home automation experience. The company plans to use Zigbee application profiles to ensure compatibility with existing Zigbee devices and compliance with industry standards. Answer the following questions for the given use case scenario:

Identify the Zigbee application profile SmartHome Needs should use for this project and justify why it is suitable for a home automation application.

For each device listed in the case study:

Identify two relevant Zigbee clusters for each device. Explain how these clusters support the functionality of the respective device.

Explain the role of the Zigbee Coordinator in ensuring seamless communication between devices in the Zigbee network.

Describe the importance of using standardized application profiles and clusters in achieving interoperability with third-party devices.

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of Computer Science and Engineering

B.E CSE, 6

CONTINUOUS ASSESSMENT TEST 1 Date: 22/01/2025

19Z027 - XML and Web Services

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer **ALL** questions. Each Question carries 25 Marks.
2. In each question, subdivision a contains 5 questions and the weightage of each question is one mark, subdivision b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Subdivisions (a) and (b) will be with no choice and Subdivision (c) may be with choice but not in more than 1 question.
4. Course Outcome Table :

Qn. 1	CO 1
Qn. 2	CO 2

1. a

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

- A _____ corresponds to a fragment of the actual information being represented by the XML document.
 - A) Element Node
 - B) Text Node
 - C) Comment Node
 - D) Attribute Node[L1]
- ii. When an XML document references a DTD or schema _____ can read the DTD/Schema and check that the XML document follows the structure defined by the DTD/Schema.
 - A) Analyzer
 - B) Parser
 - C) Validating Parser
 - D) Semantic Analyzer[L2]
- iii. Identify the TRUE statement.
 - A) DTD cannot contain character data
 - B) DTD permits embedded structured self-documentation
 - C) Element and Attribute Declarations are not entirely context sensitive
 - D) Markups are allowed in the comments of DTD

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. Say True or False
XML is case sensitive True [L1]
- v. An XML document can reference a _____ that defines the proper structure of the XML document. [L2]

b.

(2 x 5 marks = 10 marks)

- i. Create a valid XML document for recipe display. [L3]

Recipe1
 |
 | Recipe2
 |
 | Name7
 | Style7
 | Ingredient
 | Recipe1
 | Recipe2

`<xsd:schema xmlns:xsd = "http://www.w3.org/2001/XMLSchema" >`
`<xsd:element name = "Employee">`
`<xsd:complexType>`
`<xsd:sequence>`
`ii. Create an external DTD schema for creating student details.`
`<xsd:element name = "Person" maxOccurs = "unbounded" />`
`<xsd:complexType>`
`iii. Discuss about XML schema with appropriate examples highlighting the need for it in processing XML document.`

[L4]
(1 x 10 marks = 10 marks)

2. a

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

- i. A browser loads the _____ file, executes the corresponding transformation and presents the result. [L1]

A) XSL B) XSLT C) DTD D) XML Schema

- ii. When an XSLT processor applies a style sheet to a target document, it finds a _____ rule that is appropriate for the document root and executes the corresponding template body. [L2]

A) template B) vertical C) horizontal D) critical

- iii. _____ was originally designed as a generalized style sheet intended to fit into the same niche as CSS. [L1]

A) XSLT B) XML Schema C) XSL D) DTD

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. An XML document may contain a _____ that links to an external XSLT. [L1]

- v. The value for a variable is assigned through an _____ in a select attribute. [L2]

(2 x 5 marks = 10 marks)

b.

- i. Design an XML document and XSLT that displays the names and Aadhar number of persons belonging to a particular college. [L3]

- ii. Write the XSLT syntax to design the following table:

Roll No.	Name	CGPA
2023Z201	Asha	9.5
2023Z202	Ayesha	9.5

[L4]

(1 x 10 marks = 10 marks)

c.

Explain how the data is retrieved using XQuery. Design an XQuery for retrieving the name of the citizens who possess valid PAN card in a city whose monthly income is >Rs.50,000/- [L4]

for-each output = select
select = output
Select value of

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of Computer Science and Engineering

BE CSE - G2 & SEM 6

CONTINUOUS ASSESSMENT TEST 2 Date: 24.2.2025

19Z601 – Machine Learning

Maximum Marks: 50

Time: 1 Hour 30 minutes.

INSTRUCTIONS:

1. Answer ALL questions. Each Question carries 25 Marks.
2. In each question, subdivision a contains 5 questions and the weightage of each question is one mark, subdivision b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Subdivisions (a) and (b) will be with no choice and Subdivision (c) may be with choice but not in more than 1 question.
4. Course Outcome Table :

Qn. 1	CO3
-------	-----

Qn.2	CO4
------	-----

		(5x1mark=5marks)	BTL
1.a	i)	<p>Which of the following statements about Decision tree is TRUE?</p> <p>S1: Statement 1: Decision tree is a non-parametric, supervised learning algorithm.</p> <p>S2: Statement 2: Entropy represents the randomness in data and information gain is obtained by removing randomness in data.</p> <p>A. S1 and S2 are correct B. Only S1 is correct C. Only S2 is correct D. Both S1 and S2 is wrong</p>	L2
	ii)	<p>Neurons in the next layer that receive input from the current neuron are downstream neurons. In other words, Downstream (j) = the set of units whose immediate inputs include the output of unit j.</p> <p>For the Neural Network specified below , find the downstream neurons of X1, X2, H1, H2.</p>	L3

iii)	Which type of decision tree uses utilizes Gini impurity to identify the ideal attribute to split on. A) ID3 B) C4.5 C) CART D) None of the Above	L1
iv)	Perceptron rule is suitable for <u>linearly</u> separable data.	L2
v)	The weight update rule in Perceptron training rule method is mathematically specified as <u>$w_i = w_i + \Delta w_i$</u> <u>$\Delta w_i = y(t-o)x_i$</u>	L2
b.		(2 x 5 marks = 10 marks)
i)	Using a perceptron model, design a two input perceptron that implements the Boolean functions OR, NAND, NOR, and XOR. a) Graphically represent on a 2D plane. b) Determine if each function is linearly separable. c) For linearly separable functions, derive appropriate weights and bias values for a perceptron that implements them. d) Explain why XOR cannot be implemented using a single-layer perceptron.	L3
ii)	Derive the backpropagation rule using stochastic gradient descent algorithm by considering the output unit case alone. (Squashing activation function can be used).	L4
c.		(1 x 10 marks = 10 marks)
	Construct a Decision Tree using the ID3 algorithm to classify whether a child will enjoy sport based on the given attributes. Calculate the Information Gain for each attribute at the root node and choose the best splitting attribute. Draw the resulting Decision Tree.	L4

Day	Weather	Temperature	Humidity	Wind	Play?
1	Sunny	Hot	High	Weak	No
2	Cloudy	Hot	High	Weak	Yes
3	Sunny	Mild	Normal	Strong	Yes
4	Cloudy	Mild	High	Strong	Yes
5	Rainy	Mild	High	Strong	No
6	Rainy	Cool	Normal	Strong	No
7	Rainy	Mild	High	Weak	Yes
8	Sunny	Hot	High	Strong	No
9	Cloudy	Hot	Normal	Weak	Yes
10	Rainy	Mild	High	Strong	No

What are the interpretations from the final decision tree obtained ?

$$\log(\frac{1}{3}) = -1.584$$

$$\log(\frac{2}{3}) = -0.584$$

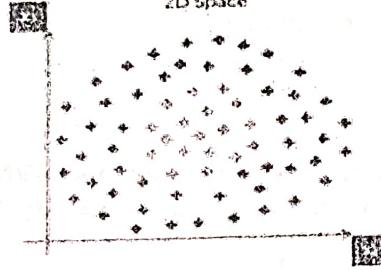
$$\log(\frac{1}{2}) = -2$$

$$\log(\frac{3}{2}) = -0.415$$

$$\log(\frac{2}{2}) =$$

$$\frac{1}{2}$$

$$3.5 \quad 0.75 \quad 0.75$$

2.a	<p style="text-align: right;">(5x1mark=5marks)</p> <p>i) Which are the statements true with respect to Support Vector Machine (SVM)? S1: Statement 1 : SVM uses the kernel trick that takes as low dimensional space as input and transforms to higher dimensional space. S2 : Support vectors are datapoints near to the hyperplane (decision boundary) A) Both S1 and S2 are true B) Only S1 is true C) Only S2 is true D) Both S1 and S2 are not true</p> <p>ii) The Naïve Bayes algorithm mathematically specified as $P(B A) = P(A B)P(B)/P(A)$</p> <p>iii) For the data points presented in the graph below, what kind of kernel function is applicable to project it into higher dimensional space ?</p>  <p>A) Radial Basis Function B) Polynomial Function C) Sigmoid Function D) Linear Kernel function</p> <p>iv) The Naïve part of Naïve Bayes algorithm is -----</p> <p>v) The hyperplane of SVM is represented mathematically as -----</p>	<p>BTL</p> <p>L2</p> <p>L3</p> <p>L2</p> <p>L1</p> <p>L1</p> <p>L3</p>												
b.	<p style="text-align: right;">(2 x 5 marks = 10 marks)</p> <p>i) Apply the Naïve Bayes with Laplace smoothing algorithm to the following email example , predict this email is Spam or Ham : You Buy Valium!</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 5px;">Email</th> <th style="text-align: left; padding: 5px;">Label</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Buy Valium!</td> <td style="padding: 5px;">Spam</td> </tr> <tr> <td style="padding: 5px;">You good?</td> <td style="padding: 5px;">Ham</td> </tr> <tr> <td style="padding: 5px;">Valium help you.</td> <td style="padding: 5px;">Spam</td> </tr> <tr> <td style="padding: 5px;">Good Valium help.</td> <td style="padding: 5px;">Spam</td> </tr> <tr> <td style="padding: 5px;">I need Valium for my health condition.</td> <td style="padding: 5px;">Ham</td> </tr> </tbody> </table>	Email	Label	Buy Valium!	Spam	You good?	Ham	Valium help you.	Spam	Good Valium help.	Spam	I need Valium for my health condition.	Ham	
Email	Label													
Buy Valium!	Spam													
You good?	Ham													
Valium help you.	Spam													
Good Valium help.	Spam													
I need Valium for my health condition.	Ham													

ii)	<p>A hospital wants to classify whether a patient has a disease (Yes or No) based on medical test results using Support Vector Machine (SVM) and Naïve Bayes (NB).</p> <p>Compare SVM and Naïve Bayes in terms of:</p> <ul style="list-style-type: none"> • Assumptions • Handling of numerical medical data • Performance on small vs. large datasets • Computational complexity • Sensitivity to missing or noisy data • Architectures (Mathematical Intuition) 	L5
c.	<p style="text-align: right;">(1 x 10 marks = 10 marks)</p> <p>i) Compute the suitable SVM that accurately discriminates the following two classes.</p> <p>Positively labeled points</p> $\begin{pmatrix} 3 \\ 1 \end{pmatrix}, \begin{pmatrix} 3 \\ -1 \end{pmatrix}, \begin{pmatrix} 6 \\ 1 \end{pmatrix}, \begin{pmatrix} 6 \\ -1 \end{pmatrix}$ <p>Negatively labeled points</p> $\begin{pmatrix} 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ -1 \end{pmatrix}, \begin{pmatrix} -1 \\ 0 \end{pmatrix}$ <p>Identify the support vectors, show the SVM architecture, slope and the decision hyperplane. Show all necessary diagrams.</p> <p>Consider the point $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$. Predict the label.</p> <p>What are the interpretations from the obtained final hyperplane ?</p>	L4

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of CSE

BE(CSE) – VI semester

CONTINUOUS ASSESSMENT TEST 2 Date: 24/02/2025

19Z602 - Compiler Design

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer ALL questions. Each Question carries 25 Marks.
2. In each question, subdivision a carries total of 5 marks (one mark for each question), subdivisions b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Course Outcome Table :

Qn. 1	CO 3
-------	------

Qn.2	CO 4
------	------

1. a.

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

- i. Assume that the SLR parser for a grammar G has n1 states and the LALR parser for G has n2 states. Analyze the relationship between n1 and n2. Context-free grammar specifies syntax rules

- A) n1 is necessarily less than n2 B) n1 is necessarily equal to n2
 C) n1 is necessarily greater than n2 D) There is no relationship between n1 and n2 [L2]

- ii. S1: Canonical LR parser is LR (1) parser with single look ahead terminal.

S2: All-LR(K) parsers with K > 1 can be transformed into LR(1) parsers.

- A) S1 is True and S2 is False B) S1 is False and S2 is False
 C) S1 is True and S2 is True D) S1 is False and S2 is True

[L2]

- iii. _____ in YACC has state transitions of the generated parser

- A) y.tab.c B) y.tab.h C) y.output D) yacc.tmp [L1]

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. Consider the following grammar, FIRST (D) is _____

$$S \rightarrow aBDh$$

$$\{g, f\}$$

$$B \rightarrow cC$$

$$C \rightarrow bC / \epsilon$$

$$D \rightarrow EF$$

$$E \rightarrow g / \epsilon$$

$$F \rightarrow f / \epsilon$$

- iv. If a state does not know whether it will make a shift operation or reduction for a terminal is called _____ shift-reduce conflict [L2]

[L1]

b.

- i. Construct a Predictive parser for the grammar

(2 x 5 marks = 10 marks)

$$S \rightarrow aABb$$

$$A \rightarrow c / \epsilon$$

$$B \rightarrow d / \epsilon$$

Is the parser LL(1). Show the actions of the parser for the input string acdb

[L4]

ii. Construct a Recursive decent parser for the following grammar

$$\begin{aligned} S &\rightarrow a \mid \uparrow \mid (T) \\ T &\rightarrow T, S \mid S \end{aligned}$$

[L4]

c. Construct the a Canonical LR parser table for the grammar given below

$$\begin{aligned} S &\rightarrow Aa \mid Bb \mid ac \\ A &\rightarrow a \\ B &\rightarrow b \end{aligned}$$

Show the actions of the parser for the input string "abc"

[L5]

(1 x 10 marks = 10 marks)

2. a.

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

i. Which of the statement is true about Syntax Directed Definitions (SDD)?

A) CFG along with Semantic rules gives SDD

B) Syntax Directed Definitions along with Semantic rules gives CFG

C) Syntax Directed Definitions along with CFG gives Semantic rules

D) Intermediate code along with Semantic rules

[L1]

ii. Which of the following is not true for postfix notation of intermediate codes?

A) Compact storage B) Good for optimisation

C) Ineffective target code generation D) Easy to generate postfix code

[L2]

iii. "Some code optimizations is carried out on intermediate code" – reason out

A) Program analysis is more accurate on intermediate code than on machine code

B) Information from dataflow analysis cannot otherwise be used for optimization

C) Enhances the portability of the compiler to other target processors

[L2]

D) Information from the front end cannot otherwise be used for optimization

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

iv. Postfix form of $x=a < b ? a : b$ is _____ if else _____ $x \ a \ b \ < \ a \ b \ ? \ : \ =$

[L2]

v. The following grammar is _____ -attributed

$$S \rightarrow T \ a \{ S.type = T.val \}$$

$$T \rightarrow c \{ T.val = c \}$$

parent child \rightarrow synthesised - S

[L1]

(2 x 5 marks = 10 marks)

b.

i. Write the postfix and Abstract Syntax Tree of the following code fragment

if ($a < 100$ and $a > 0$)

$z = p + q * 10;$

else if ($a > 100$)

$z = p * q - 10;$

[L4]

ii. What are the implementations of Three address code? Explain all by considering the expression $x = a + b * c / e + b * c$

[L4]

(1 x 10 marks = 10 marks)

c. Write the syntax directed definition for assignment statements. Write the three address code for the following assignment statement $P = a * b + b * 20.5$ where a, b and P are floating point numbers.

[L5]

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of CSE

BE CSE G1 & G2

CONTINUOUS ASSESSMENT TEST 2 Date: 25.02.2025

19Z603 - Distributed Computing

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer ALL questions. Each Question carries 25 Marks.
2. In each question, subdivision a contains 5 questions and the weightage of each question is one mark, subdivision b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Subdivisions (a) and (b) will be with no choice and Subdivision (c) may be with choice but not in more than 1 question.
4. Course Outcome Table :

Qn. 1	CO 3
-------	------

Qn.2	CO 4
------	------

(5 x 1 mark = 5 marks)

1. a

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

L1

i. What is the primary reason for process migration in distributed systems?

- a) To reduce network traffic
- b) To improve system performance and resource utilization
- c) To increase the number of processes
- d) To prevent process failure

ii. Which of the following is commonly used in load estimation policies to determine the load on a server?

L2

- a) Number of active users only
- b) CPU usage, memory utilization, and network bandwidth
- c) The geographical location of the server
- d) The total number of servers in the system

iii. Which of the following is a challenge associated with process transfer policies in load sharing?

L2

- a) Ensuring uniformity in task execution across all servers
- b) Ensuring that each server performs the same number of tasks
- c) Managing the migration overhead and ensuring minimal disruption to running processes
- d) Simplifying the decision-making process for task allocation

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. ^{most repeat method} _____ assumes that the remaining service time is equal to the time used so far. L1
v. ^{Intermediate} _____ is the priority assignment policy, Wherein the number of local processes is greater or equal to the number of remote processes, local processes are given higher priority than remote processes. L2

(2 x 5 marks = 10 marks)

b.

- i. When examining load balancing algorithms, it's important to understand how they are categorized based on their functionality, implementation methods, and performance characteristics. Explore the different types of load balancing algorithms and their classifications. L3

- ii. What are the reasons behind the necessity of process migration? Analyze the following critical activities involved in the process migration:

- a. Transferring the process's address space
b. Freezing and restarting the process

L4

c.

(1 x 10 marks = 10 marks)

- Imagine you need to design a centralized load sharing algorithm for global job scheduling in a distributed system to ensure its effectiveness and scalability. Evaluate the issues associated with implementing this load sharing approach. L5

2. a

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

- i. In the private cloud deployment model, which of the following is true? L2

- a) The infrastructure is shared by multiple organizations and is publicly available
b) The organization owns and manages the infrastructure, providing services only to its employees
c) It offers shared infrastructure on a pay-per-use basis
d) It is fully managed by a third-party service provider for multiple tenants

L2

- ii. What is a key advantage of the community cloud deployment model? L2

- a) It is designed for use by a specific group of organizations that share common interests, such as security or regulatory compliance
b) It allows the general public to access the cloud infrastructure
c) It offers a mix of public and private cloud resources for scalability
d) It reduces the cost of managing private infrastructure by relying solely on third-party providers

- iii. Which of the following is a potential security concern in cloud computing?
- a. Data redundancy
 - b. Vendor lock-in
 - c. Elasticity
 - d. Unauthorized access

L1

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. The resources or services are temporarily leased for the time required and then released.
This practice is also known as ----- *cloud bursting* L1
- v. The delivery model that is adopted by Red Hat OpenShift on IBM Cloud is ----- PaaS L2

b. (2 x 5 marks = 10 marks)

- i. Explain about the deployment model that have the advantage of keeping the core business operations in-house by relying on the existing IT infrastructure and reducing the burden of maintaining it once the cloud has been set up. *Private cloud* L3

- ii. TechStart is a growing startup focused on developing a mobile app that helps users track their fitness goals. The company plans to launch the app in a few months and needs a cloud solution to support both development and hosting. Which cloud delivery model would be most suitable for TechStart to scale its infrastructure quickly, handle varying workloads, and manage its databases effectively? Justify your answer. *SaaS* L4

c. (1 x 10 marks = 10 marks)

- Illustrate the architecture of cloud computing environment with neat diagram. Elaborate the cloud reference model and justify that it provides runtime environment for applications and data processing platforms. L5

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of Computer Science Engineering

BE – SEMESTER VI

CONTINUOUS ASSESSMENT TEST 2 Date: 25/02/2025

19Z604 – EMBEDDED SYSTEMS

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer **ALL** questions. Each Question carries 25 Marks.
2. In each question, subdivision a contains 5 questions and the weightage of each question is one mark, subdivision b(i) and b(ii) carries 5 marks each and subdivision c carries 10 marks each.
3. Subdivisions (a) and (b) will be with no choice and Subdivision (c) may be with choice but not in more than 1 question.
4. Course Outcome Table :

Qn. 1	CO3
Qn.2	CO4

(5 x 1 mark = 5 marks)

1. a

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number. [BTL1]

- i. The transfer of data using parallel lines is,
A) Faster and More Expensive B) Faster and Less Expensive
C) Slower and More Expensive D) Slower and Less Expensive
- ii. In RS 232, the logic levels 1 and 0 are represented by _____ respectively. [BTL2]
A) -3V to +3V, +3V to +25V B) -3V to -15V, +3V to +15V
C) +3V to +25V, -3V to -25V D) -3V to -25V, +3V to +25V
- iii. The I²C bus is [BTL1]
A) Unidirectional B) Bidirectional C) Control bus D) Chip select signal

Write the answer for the following. Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. _____ serial communication method transfers a single byte at a time. [BTL1]
- v. SPI is a synchronous, _____ main-subnode-based interface. [BTL1]

(2 x 5 marks = 10 marks)

b.

- i. The serial data communication has to be performed between the microcontroller and PC for an application. Design the hardware and examine. [BTL6]
- ii. How does data transfer take place between main and sub-node devices using SPI protocol? Analyze with necessary diagrams. [BTL5]



(1 x 10 marks = 10 marks)

- c. Illustrate the procedure followed to communicate between the master and slave devices including data frame format using I²C protocol with an example. [BTL4]

2. a

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

- i. When a task is created, it is in a _____ state. [BTL1]
A) Blocked B) Idle C) Dormant D) Blocked to Ready
- ii. A function that works properly even if it is called by more than one task is called _____. [BTL1]
A) Recursive B) Reentrant C) Mailbox D) Pipes
- iii. Time between receipt of interrupt signal and starting the code that handle the interrupt is called _____. [BTL1]
A) Dispatch latency B) Interrupt latency C) interrupt recovery time D) interrupt response time

Write the answer for the following. Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. The state of the CPU registers when a task is to be preempted is called the _____. [BTL1]
- v. In _____ scheduling, every task is given an opportunity to execute. [BTL1]

b.

(2 x 5 marks = 10 marks)

- i. Compare the characteristics of RTOS software architectures. [BTL4]
- ii. How does scheduler switch the task between various states in RTOS environment? Analyze using one example. [BTL4]

(1 x 10 marks = 10 marks)

- c. Assess the effect of shared data problem in RTOS environment using one suitable example with pseudo code and suggest a solution to overcome it. [BTL5]



PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of Computer Science and Engineering

BE CSE & 6th Semester

CONTINUOUS ASSESSMENT TEST 2 Date: 26.02.2025

19Z009 – INTERNET OF THINGS

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

- INSTRUCTIONS:**

 1. Answer **ALL** questions. Each Question carries 25 Marks.
 2. In each question, subdivision a carries total of 5 marks (one mark for each question), subdivisions **b(i)** and **b(ii)** carries 5 marks each and subdivision **c** carries 10 marks each.
 - 3.
 4. Course Outcome Table

CO1	CO2
CO3	CO4

Qn. 1	CO3	Qn.2	CO4
-------	-----	------	-----

1. a

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

i. What is the function used to set the output voltage on pin 13 to 5V in Arduino? [L2]

- A. digitalWrite(13, HIGH); B. digitalRead(13, LOW);

C digitalWrite(13, LOW); D. digitalRead(13, HIGH);

ii. What is the smallest measurable voltage in Arduino Uno ?

- A. 3.8 mV B. 4.8 mV
 C. 0.38 mV D. 0.48 mV

iii. Which of the following is an example of a vector sensor?

- A. Thermocouple
 - B. Accelerometer
 - C. Pressure sensor
 - D. PIR sensor

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

iv. _____ is the size of flash memory in Arduino Uno

32 KB

[L1]

v. If the one of the input pins reads a voltage of 1000 mV from a TMP 36 sensor, then -----is the temperature value in degree Celsius measured. [L1]

1nmol 50°C

b.

(2 x 5 marks = 10 marks)

i. Write a program to fade an LED connected to pin 9 of the Arduino Uno. The LED should gradually increase in brightness from 0 to 255 and then decrease back to 0. Hint – Use PWM. [L4]

ii. Write a program that detects motion using a PIR sensor connected to pin 2. When motion is detected, turn ON an LED connected to pin 13. Turn OFF the LED when no motion is detected. [L4]

c.

(1 x 10 marks = 10 marks)

You are designing a home automation system where the temperature inside a house is monitored using a DHT22 temperature and humidity sensor connected to an Arduino Uno. The temperature data is sent to ThingSpeak, and you can control a fan or heater based on temperature thresholds. How would you set up the system to monitor the indoor temperature using the DHT22 sensor and send the data to ThingSpeak?

Write an Arduino sketch with clear annotations, to implement an automatic adjustment feature that turns the fan on if the temperature rises above 30°C and turns the heater on if it falls below 18°C? [L6]

a. Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

i. Which of the following hardware technologies enables real-time data processing at the edge of the network?

A) GPUs (Graphics Processing Units) B) Microcontrollers (MCUs)

C) CPU s. D) SoCs [L1]

ii. Which of the following is a key feature of AI accelerators used in edge computing devices like Google Coral? [L2]

- A) High-speed data storage
- B) Ability to perform local AI inference tasks with minimal power consumption
- C) Enhances cloud connectivity
- D) Reduces data packet size during transmission.

iii. What role does Field-Programmable Gate Arrays (FPGAs) play in edge intelligence hardware?

- A) They process machine learning algorithms in a flexible, customizable way for real-time inference
- B) They store and manage massive data sets
- C) They provide cloud-based computation power for data-intensive tasks
- D) They facilitate communication between edge devices

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning the question number and subdivision number.

v. The software framework developed by Google to enable machine learning at the edge with minimal resource usage is called _____ [L2]

v. A converged gateway integrated compute , storage and ----- in one device. [L2]

b. (2 x 5 marks = 10 marks)

i. Discuss how distributed /edge based IoT data analytics overcomes the limitations of cloud based analytics. [L4]

ii. What are the main challenges when implementing machine learning models on microcontrollers, and how does TensorFlow Lite for Microcontrollers address these challenges? [L4]

c. (1 x 10 marks = 10 marks)

A smart home company has developed an energy management system that controls the usage of electricity in the home based on various factors such as temperature, time of day, and the presence of people in the house. The system uses microcontrollers connected to sensors that measure temperature, motion, and power consumption. The goal is to optimize energy use by predicting peak electricity demand and adjusting settings accordingly. [L6]

How can Tiny ML be used to predict power consumption trends and optimize the system's operation in real-time?

What are the benefits of using TensorFlow Lite for Microcontrollers in this energy management system, particularly in terms of power efficiency and low latency?

How would you optimize a machine learning model to run efficiently on the microcontrollers used in the smart home system?

(or)

ii. A health tech company is developing a wearable device for monitoring patients' vital signs (heart rate, temperature, and oxygen levels) in real-time. The device uses a microcontroller and sensors to gather the data, and the goal is to analyze the data to detect potential health risks, without the need for constant connection to the cloud. [L6]

How would Tiny ML enable real-time health monitoring on this wearable device?

What role does TensorFlow Lite for Microcontrollers play in enabling the device to run machine learning models locally on the wearable device?

What challenges might arise from deploying machine learning models on resource-constrained devices like wearables, and how can these challenges be overcome?

How would the system handle the detection of health anomalies, and what steps could be taken to alert the patient or healthcare provider without compromising the battery life of the device?

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

Department of Computer Science and Engineering

B.E CSE, 7th Semester

CONTINUOUS ASSESSMENT TEST 2 Date: 26.02.2025

19Z027-XML and Web Services

Time: 1 Hour 30 minutes.

Maximum Marks: 50

INSTRUCTIONS:

1. Answer **ALL** questions. Each Question carries 25 Marks.
2. In each question, subdivision **a** contains 5 questions and the weightage of each question is one mark, subdivision **b(i)** and **b(ii)** carries 5 marks each and subdivision **c** carries 10 marks each.
3. Subdivisions (a) and (b) will be with no choice and Subdivision (c) may be with choice but not in more than 1 question.
4. Course Outcome Table:

Qn. 1	CO3
Qn.2	CO4

1. a

(5 x 1 mark = 5 marks)

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

- i. _____ uses Interoperable Object References for endpoint naming. [L1]
 - A) CORBA
 - B) COM
 - C) DCOM
 - D) ORPC
- ii. _____ rules describe how web services interact over time. [L2]
 - A) Information
 - B) Sequencing
 - C) Service Providers
 - D) Associations
- iii. Identify the protocol used in e-mail. [L1]
 - A) SMTP
 - B) POP
 - C) FTP
 - D) IIOP

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

- iv. A _____ is encapsulated code, which means that the implementation of each component is hidden from outside the component. [L2]
- v. All Web Services are described using a standard XML notation called its _____. [L1]

(2 x 5 marks = 10 marks)

[L3]

b.

i. Propose a model for integrating web services.

[L4]

ii. Design a web service technology stack and explain various components of it.

(1 x 10 marks = 10 marks)

c. Propose a framework for securing web Services by formulating a collaborative security standard among prevailing WS-* security standards [L5]

(5 x 1 mark = 5 marks)

2. a

Write the alphabet of your choice answer in the CA test answer book mentioning question number and subdivision number.

[L1]

i. Identify the TRUE statement

A) SOAP is built with open technologies and open specification

B) SOAP is not a text-based protocol

C) SOAP is a tightly coupled protocol

D) SOAP does not work quite well in messaging as well as RPC architectures

ii. The _____ method sends its parameters in the URL and is typically used to request Web pages from a Web Server. [L2]

A) GET

B) PUT

C) POST

D) DELETE

iii. _____ is a mature protocol that was developed to support the connectionless, stateless world of web pages. [L1]

A) HTTP

B) SOAP

C) WSDL

D) POP

Write the answer for the following Fill in the blanks questions in the CA test answer book mentioning question number and subdivision number.

iv. The _____ is an XML-based messaging and remote procedure call (RPC) specification that enables the exchange of information among distributed systems. [L2]

v. _____ relies on globally unique identifier (GUIDs), which are URNs that uniquely identify the resources in each registry. [L1]

b.

(2 x 5 marks = 10 marks)

i. Analyze the four core types of information in a UDDI registry with a neat diagram. [L3]

ii. List the various steps involved in publishing and finding WSDL descriptions in a UDDI Registry. [L4]

c.

(1 x 10 marks = 10 marks)

Elaborate on Simple Object Access Protocol with neat illustrations. Also propose a new web service protocol that could overcome the drawback of SOAP. [L5]