1. Which of the following step is not a part of the requirement engineering process?

A. Feasibility Study
B. Programming Language Requirement Specification
C. Software Requirement Specification
D. Requirement Gathering & Validation

Explanation:

Programming Language Requirement Specification is not a part of the requirement engineering process.
  The four main steps of the requirement engineering process are:

1. Requirement Gathering and Analysis: This step involves identifying stakeholders, gathering and documenting requirements, and analyzing the requirements for completeness, consistency, and feasibility.
2. Requirement Specification: This step involves translating the gathered requirements into a formal specification that defines the system's functionality, performance, and constraints.
3. Requirement Validation: This step involves reviewing and validating the requirements to ensure that they are correct, complete, and consistent.
4. Requirement Management: This step involves managing the requirements throughout the system development lifecycle, including traceability, change control, and version control.

2. Elicitation of requirements is a _____

   (A) SDLC Process
   (B) Cyclic Process
   (C) SRS Process
   (D) Development Process

Explanation:

The correct answer is **(A) SDLC Process** for requirements elicitation
        Elicitation of requirements is a critical part of the **software development life cycle (SDLC)**. It involves the identification, collection, analysis, and refinement of the requirements for a software system. This process ensures that the software development is based on a clear and comprehensive understanding of the customer's needs and requirements. Requirements elicitation typically takes place at the beginning of a project and involves stakeholders from different areas of the organization, including business owners, end-users, and technical experts[1]. It is essential for creating a solid foundation for the subsequent phases of software development.

3. _____ is not an approch to agile software development
A) Scrum
B) Entreme programming
C) Waterfall Model
D) SAFE

Ans: Waterfall Model

Non-agile, a.k.a. the Waterfall or linear, is a traditional method for creating software. Agile is an incremental, iterative approach to software development. Unlike the Waterfall approach that has a rigid structure and demands that you complete your product one phase at a time, agile is a lot more loose and open to changes.

4. .... focuses on the degree to which the implementation follows the design and

the resulting system meets its requirements and performance gools.
(A) Quality of Code (B) Quality of Design
(C) Quality of Conformance (D) Stress testing

Ans: **Quality of Conformance**: The degree to which the design specifications are followed during manufacturing, this focuses on how well the implementation follows the design and how well the resulting system meets its requirements

5.
 .... is a test case design philosophy that uses the control structure described as part of component level design to derive testcases.
(A) Blackbox testing (B) Glass box testing
         (C) Model based testing (D) Regression testing

   Explaination:

The test case design philosophy that utilizes the control structure described as part of **component-level design** to derive test cases is known as **white-box testing** or **glass-box testing**. In white-box testing, specific paths through the software are examined by exercising sets of conditions and loops, ensuring that all independent paths within a module have been exercised at least once. This approach provides insight into the internal logic and structure of the software, allowing for thorough testing based on the design details. Therefore, the correct answer is **(B) Glass box testing**.

6. A Let function f : R -> R be defined by f(x) = 3x - 4. Then f^-l(x) is given by:

(A) (x+4)/3
(B) (x/3)-4
(C) 3x+4
(D) 4x-3

Answer: (A)

Explanation: $f(x) = 3x - 4$ So, $y = 3x - 4$ To find the inverse of a function, we need to find x in terms of y So, $y + 4 = 3x$; $x = (y + 4)/3$

x→f^-1(x) and y→x
Hence, $f^-1(x) = (x + 4)/3$

7. If A = {1, 2, 3} , then which of the following is relation reflexive but not symmetric on A?

(a) {(1, 1), (1, 2)}
(b) {(1, 1), (1, 2), (2, 1), (2, 2)}
(c) {(1, 1), (2, 2), (3, 3)}
(d) {(1, 1), (2, 2,) (2, 3), (3, 3)}
Solution: Option (d)
Explanation:

Reflexive means (a, a) should be in relation .

So, (1, 1) , (2, 2) , (3, 3) should be in a relation

Symmetric means if (a, b) is in relation, then (b, a) should be in relation .

We need relation which is **not symmetric.**

8. Given A = {1,2,3}, B = {7, 8} and R = {(1, 7), (2, 7), (3, 7), (1, 8), (3, 8),

then ....

    A) R-1 = {(7, 1), (7,2), (7, 3), (8, 1), (8, 3)}
    B) R-1 = {(I, 7), (2, 7), (3, 7), (8, 1), (8, 3)}

C) R-1 = {(7, 1), (7, 2), (7, 3), (1, 8), (3, 8)}

D) R-I = {(7, 1), (7, 2), (3, 7), (1, 8), (3, 8)}

Explanation: Inverse Relation Definition

In simple words, if $(x, y) \in R$, then $(y, x) \in R^{-1}$ and vice versa. i.e., If R is from A to B, then R^{-1} is from B to A. Thus, if R is a subset of A x B, then R^{-1} is a subset of B x A.

Inverse Relation

If $(x, y) \in R \Leftrightarrow (y, x) \in R^{-1}$

Relation   Inverse
                Relation

Thus

If $R = \{(x, y) : x \in A, y \in B\}$

Then $R^{-1} = \{(y, x) : y \in B, x \in A\}$

Example:

Relation: $\{(a, 1), (b, 2), (c, 3), (d, 4)\}$

Inverse : $\{(1, a), (2, b), (3, c), (4, d)\}$
Relation

9. Given function f: N -> N as f(l) = 3 and f(n) = 2f(n -1), then f(5) = ...

A) 36

B) 12

C) 60

D) 48

Explanation: Ans: (D)

f(5)=2f(5-1) = 2f(4)=2(2f(3))=2(2(2f(2)))=2(2(2(2(f(1))))=2(2(2(2(3))))=48

10. Match the Column X with their corresponding description in Column Y :

	Column X		Column Y
(i)	Relational Model	(a)	Represents data of entities, attributes, and relationships.
(ii)	Entity-Relationship Model	(b)	Structures data in a tree-like format.
(iii)	Hierarchial Model	(c)	Stores data using tables with rows and columns.
(iv)	NoSQL Database	(d)	Optimzed for handling complex relationships, like social networks.
(v)	Graph Model	(e)	Allows flexible, schema-less data storage.

(A)   (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv), (e)-(v)
(B)   (a)-(ii), (b)-(iii), (c)-(i), (d)-(v), (e)-(iv)
(C)   (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv), (e)-(v)
(D)   (a)-(ii), (b)-(v), (c)-(i), (d)-(iv), (e)-(iii)

Answer: (B)

Explanation:

11. Normalization is the process of organizing data in a relational database to reduce
. ... and improve Data Integrity.
(A) Data Redundancy (B) Data Consistency
(C) Data Accuracy (D) Data Accuracy

Answer: (A)

Explanation:

Normalization is the process of organizing a database to reduce redundancy and improve data integrity.

So (A) is correct option.

12. Which of the following is a example of an "Unsupervised" machine learning technique commonly used in Big Data Analysis?
(A) Linear Regression
(B) Decision Trees
(C) K-means clustering
(D) Support Vector Machines (SVM)

Answer: (C)

Explanation: There are three different approaches to machine learning, depending on the data you have. You can go with supervised learning, semi-supervised learning, or unsupervised learning. **Clustering** is an unsupervised machine learning task. **K-means clustering** is a common example of an exclusive clustering method where data points are assigned into K groups, where K represents the number of clusters based on the distance from each group's centroid.

So, option (C) is correct.

13. In supervised learning for classification what is the role of the labelled dataset?
(A) It server as the test data.
(B) It provides the input features.
(C) It contains both input features and corresponding output labels.
(D) It is used for model validation.

Answer: (C)

It involves training a model on **labeled** examples to learn patterns between input features and output classes. In classification, the target variable is a categorical value. For example, classifying emails as spam or not. The model's goal is to generalize this learning to make accurate predictions on new, unseen data.

Hence Answer C

14. In paging, every address generated by the CPV is divided into 2 parts ....
and ....
(A) Frame bit, Page number
(B) Page number, Page offset
(C) Page offset, Frame bit
(D) Frame offset, Page offset

Answer: (B)

Explanation:

15.

The relation scheme given below is used to store information about the employees of a company, where **empId** is the key and **deptId** indicates the department to which the employee is assigned. Each employee is assigned to exactly one department.

emp(empId, name, gender, salary, deptId)

Consider the following SQL query:

```sql
select deptId, count(*)
from emp
where gender = "female" and salary > (select avg(salary)from emp)
group by deptId;
```

The above query gives, for each department in the company, the number of female employees whose salary is greater than the average salary of

A) employees in the department
B) employees in the company
C) female employees in the department
D) female employees in the company

Ans: It's a nested query but not Co-related query.

Evaluate the innermost query first.

```sql
1. select avg(salary)
2. from emp
```

It is given that `emp` represent employees of a company.

So, Option B is the correct answer.

16. An AI (Artificial Intelligence) agent performs which of the following functions?
(A) Maps the goal-sequences to an action.
(B) Maps th~ percept sequences to an action.
(C) Maps the environment sequences to an action.
(D) Works without direct inference from any external factor like human.

Explanation: An agent is anything that can be viewed as perceiving its **environment** through **sensors** and acting upon that environment through **actuators**.

- The term **percept** refers to the content an agent's sensors are perceiving
- An agent's **percept sequence** is the complete history of everything the agent has ever perceived
- The **agent function** maps any given percept sequence to an action (an abstract mathematical description)
- The agent function for an AI agent will be implemented by an **agent program** (a concrete implementation, running within some physical system)

So, option (B) is correct.

17

Let A and B are two fuzzy sets with membership function :

$\mu_A(x) = \{0.3, 0.4, 0.7, 0.8, 1.0\}$

$\mu_B(x) = \{0.5, 0.6, 0.4, 0.7, 0.9\}$

What will be the value of $\mu_A \cap \mu_B$?

(A) {0.3, 0.4, 0.4, 0.7, 0.9} (B) {0.5, 0.6, 0.7, 0.8, 1.0}

(C) {0.8, 1.0, 0.1, 0.5, 0.9} (D) {O.2, 0.2, 0.3, 0.1, O.1}

Explanation: INTERSECT OPERATION IN FUZZY SET TAKES MIN VALUE BETWEEN TWO

AND UNION OPERATION IN FUZZY SET TAKES MAX VALUE BETWEEN TWO.
ANS: (A)

18. What is the length of single error correcting code for detecting error is 16 bit data?
A) 3
B) 4
C) 5
D) 6

Ans: C

Explanation: For **single error correction**, the **Hamming code** is commonly used. Let's break it down:
1. **Hamming Code Overview**:
   - o Hamming code is an **error-correction code** designed to detect and correct errors that can occur during data transmission or storage.
   - o It was developed by **R.W. Hamming**.
   - o The code adds **redundant bits** to the original data to ensure that no bits are lost during transfer.
2. **Calculating Redundant Bits**:
   - o To calculate the number of redundant bits needed, we use the formula: $[2^r \geq m + r + 1]$ where:
     - ▪ (r) represents the number of redundant bits.
     - ▪ (m) represents the number of data bits.
   - o Given that we have **16 data bits**, let's find the number of redundant bits: $[2^r \geq 16 + r + 1]$ Solving for (r), we get: $[r = 5]$
3. **Parity Bits**:
   - o Parity bits are used for **error detection**.
   - o There are two types of parity bits:
     - ▪ **Even parity bit**: If the total count of 1's in a given set of bits is odd, the parity bit value is set to 1 (making the total count of 1's even). Otherwise, the parity bit value is 0.
     - ▪ **Odd parity bit**: If the total count of 1's in a given set of bits is even, the parity bit value is set to 1 (making the total count of 1's odd). Otherwise, the parity bit value is 0.
4. **General Algorithm of Hamming Code**:
   - o Write the bit positions starting from 1 in binary form (1, 10, 11, 100, etc.).
   - o Mark all bit positions that are a **power of 2** as **parity bits** (1, 2, 4, 8, etc.).
   - o The other bit positions are **data bits**.
   - o Each data bit is included in a unique set of parity bits based on its binary position:
     - ▪ Parity bit 1 covers bits with a 1 in the least significant position (1, 3, 5, 7, 9, 11, etc.).
     - ▪ Parity bit 2 covers bits with a 1 in the second position from the least significant bit (2, 3, 6, 7, 10, 11, etc.).
     - ▪ Parity bit 4 covers bits with a 1 in the third position from the least significant bit (4–7, 12–15, 20–23, etc.).
     - ▪ Parity bit 8 covers bits with a 1 in the fourth position from the least significant bit (8–15, 24–31, 40–47, etc.).

19. In order to transfer a complete block of data from a hard disk to memory, which of the following I/O techniques will be used ?

(A) Programmed I/O
(B) Interrupt driven I/O
(C) Direct memory access
(D) Dedicated transfer mode

Answer: (C)

Explanation: DMA(Direct memory access) is used for transferring bulk data from Main Memory with the highest throughput as the CPU is unable to access the hard disk directly.
DMA helps in the effective utilization of the CPU's time.

Another method used for data transfer in a similar fashion is programmed Input/Output but this method is quite slow.

20. **How many RAM chips of size 256 K x 4 bit are needed to build a memory of 1 M word, with the size of 1 word being 32 bits?**

(A) 16

(B) 32
(C) 64
(D) 8

Answer: (B)

Explanation:
A total of **32 RAM chips** are needed to **build 1 M word of memory.**

Following is the detailed explanation:

1 M Word = 1024x1024x32 bits

Size of RAM chip given = 256 K x 4 bits

= 256x1024x4 bits

Total number of chips required are

= (**1024x1024x32) /** 256x1024x4

= 32 chips.

Thus, **32 RAM chips** are needed to build **1 MB of memory.**

Hence Option(B) is the correct answer.

21. In servlet programming data sent with the .... method is appended to the URL.

(A) POST
(B) GET
(C) SERVICE
(D) APPEND

Answer: (B)

Explanation:
In servlet programming, the method used for sending data from the client (usually a web browser) to the server is crucial. Let's explore the two primary methods:

1. **GET Method**:
   - The **GET method** is used to process HTTP GET requests.
   - When data is sent using the GET method, it is appended to the URL as query parameters.
   - For example, if you submit data with the GET method, the URL might look like this: `http://localhost:8080/HelloServlet/hello?myParam=myValue`.
   - However, be cautious: sensitive information (such as passwords) should not be sent via the GET method because the data is clearly visible in the browser's URL.
   - GET requests have some length restrictions.
   - It is not typically used for data modification.
2. **POST Method**:
   - The **POST method** is used to process HTTP POST requests.
   - Data submitted with the POST method is sent in the message body, making it secure and not visible in the URL.
   - There is no limit on the data that can be sent through the POST method.
   - Ideally, the POST method should be used to send form data to the web server.
   - When handling form submissions, developers often use the `doPost()` method in servlets to process the data.

In summary, if you want to securely send form data to the server, use the POST method. If you need to retrieve data from the server, the GET method is appropriate, but be mindful of its limitations and visibility in the URL.

So, option (B) is correct.

22. Consider the following statements relating to structure in C++ :

 I: Structure is a user defined data type.

 II: A structure is similar to records.

 III : In C++ array of structure cannot be declared.

Choose the correct option:

a) Both I and II are true but III is false
b) II is false III is true
c) Both I and III are true but II is false.
d) All I, II and III are false.

Answer (A) Both I and II are true but III is false

1. Explanation: **Structure is a user-defined data type**: **True**. In C++, a structure is a user-defined composite data type that allows you to group together variables of different data types under a single name. It's similar to a record in other programming languages.
2. **A structure is similar to records**: **True**. Structures in C++ serve a similar purpose as records. They allow you to organize related data fields into a single unit.
3. **In C++, an array of structure cannot be declared**: **False**. You can indeed declare an array of structures in C++. For example:

```
struct Student {
    int roll;
    char name[50];
    float marks;
};

int main() {
    Student students[10]; // Array of 10 Student structures
    // Initialize and use the array elements
    // ...
    return 0;
}
```

Remember that structures are powerful tools for organizing and managing related data in C++.

23. In UNIX, which one of the following system call creates a new process? **1.** 9

A) Create
B) Fork
C) New
D) Process-new
Answer : B) Fork

Explanation
In **UNIX**, the system call that creates a new process is `fork()`. When you invoke `fork()`, it produces a **copy of the current process**, except for the returned value. The new process, known as the **child process**, inherits the parent process's memory, file descriptors, and other attributes. After forking, if the child process wants to execute a different program, it can use the `exec()` family of system calls to replace its image with a new program. Here's a simplified breakdown:

1. `fork()`: Creates a new process by duplicating the parent process's image.
2. `exec()`: Replaces the current process with a new program.

So, option (B)is correct answer

24. Consider the following boolean function-

   $F(W, X, Y, Z) = \Sigma m(1, 3, 4, 6, 9, 11, 12, 14)$
   The simplified function would be :

A) X'Z' + XZ
B) XYZ' + XY'Z + X'YZ
C) X'Z + XZ'
D) X'Y + XY'

   Ans: C) X'Z + XZ'

Then we have: XZ' + X'Z

25. What is the mean (average) of a standard normal distribution (Z-distribution) ?
(A) 0
(B) 1
(C) -1

(D) π

Answer: (A) 0

Explanation:

The **standard normal distribution**, also known as the **Z-distribution**, is a special case of the normal distribution. Here are some key properties:

1. **Mean (Average)**: In the standard normal distribution, the **mean** is **zero**. This means that the central value of the distribution is located at zero.
2. **Standard Deviation**: The standard deviation of the standard normal distribution is **1**. It measures the spread or variability of the data points around the mean.
3. **Skewness and Kurtosis**: The standard normal distribution has **zero skew** (it is symmetric) and a **kurtosis of 3** (which is the kurtosis of a normal distribution).