CS508-Modern Programming Languages

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1. **Arrays in JavaScript are _____ based**

   A. One index
   B. Zero index Correct (Page no 143)
   C. Location
   D. Length

2. **The super class of all exception classes in java is:**

   A. Exception Correct
   B. Error
   C. Throwable
   D. System

3. **_____ Operator in Prolog is used for List construction and also for List Dismantling.**

   A. | (Vertical Slash) Correct (Page no 85)
   B. ! (Sign of Exclamation)
   C. : (Colon)
   D. . (Full Stop)

4. **Each Thread in Java has its own set of _____ and _____**

   A. Code, Data Correct
   B. Register, Code
   C. Stack, Register
   D. Stack, Data

5. **Java has _____ categories of data types.**

   A. Three
   B. Four
   C. Two Correct (Page no 93)
   D. Five

   Note:

   Java has two "categories" of types: **primitive types and reference types**.

6. **In C#, the condition written with 'if statement' is a/an _____ expression**

   A. Arithmetic Correct
   B. Boolean
   C. Numeric
   D. Variable

7. **Pascal language was popular in college and universities to teach:**

   A. Structured Programming Correct (Page no 28)
   B. Object Oriented Programming
   C. Business Programming
   D. Scripting language

8. **_____ has a pre-test version, but no post-test version of logically controlled loop**

   A. Java
   B. C++
   C. C
   D. Ada Correct (Page no 184)

9. COBOL uses _____ to show nested records.

A. level number Correct (Page no 168)
B. Recursive definition
C. Pointer
D. Arrays

Note:

COBOL uses level numbers to show nested records; others use recursive definitions

10. In_____, the 'break' statement may have an optional parameter or argument.

A. C/C++
B. Java
C. PHP Correct
D. C#

Note:

In C/C++, the break statement is commonly used to exit from a loop or switch statement. It may have an optional parameter or argument, which is used to specify the number of enclosing loops or switch statements to exit from. This is called a labeled break statement, as it is preceded by a label that identifies the loop or switch statement to break from.

In Java, PHP, and C#, the break statement does not allow an optional parameter or argument.

11. The "is" operator in C# is used for runtime _____.

A. Type Conversion
B. Type Checking Correct (Page no 126)
C. Type Casting
D. Type Declaration

12. Which of the following enhances reliability of a programming language?

A. Readability Correct
B. Writability
C. Exception Handling
D. Operator Overloading

13. C/C++ has both pre-test and post-test version of _____

A. Counter controlled loop
B. Logically Controlled loops.
C. For loop
D. While loop Correct (Page no 168)

Note:

C and C++ also have both, but the control expression for the post-test version is treated just like in the pretest case (while - do and do - while)

14. In Ada, the distance between values is implemented as a power of _____ in the ordinary fixed-point type.

A. 16
B. 2
C. 10 Correct (Page no 50)
D. 8

15. 'Discriminate types' in Ada are similar to C _____.

A. Pointer
B. union Correct (Page no 52)
C. Reference
D. Class

16. In LISP, there is no concept of _____.

A. Functions
B. Sequential statements Correct
C. Strings
D. Symbols

17. The scientific computing was supported by _____ computers,

A. IBM 6090 and 1520
B. IBM 6080 and 1301
C. IBM 7090 and 1620 Correct (Page no 27)
D. IBM 7080 and 1401

18. A unary operator has _____ operand/s.

A. Zero
B. One Correct (Page no 173)
C. Two
D. Three

Note:

A unary operator has one operand

A binary operator has two operands

A ternary operator has three operands

19. In which of the following programming language, type checking of parameters is not required?

A. Java
B. Ads
C. Pascal
D. FORTRAN 77 Correct

20. Which of the following special word is used in Module-2 as a closing word for all control structures?

A. END Correct (Page no 179)
B. CLOSE
C. THEN
D. ENDIF

21. The basic tool for writing programs in PROLOG is:

A. Inheritance
B. Polymorphism
C. Object-Orientation
D. Recursion Correct (Page no 85)

22. The data type of variable in PHP language is determined at:

A. Runtime Correct (Page no 131)
B. Compile-time
C. Debug-time
D. Parse-time

23. In Prolog, a list is _____ if every element in the list is smaller than the next element in the list.

A. Fixed
B. Joined
C. Sorted Correct (Page no 86)
D. Bounded

24. A static method in a Java class:

A. can access non-static field of class Correct
B. cannot access non-static field of class
C. cannot be declared
D. can call non-static methods of other classes

25. JavaScript statement are terminated by returns or _____.

A. colon
B. semi-colon Correct (Page no 142)
C. question mark
D. full stop

26. In the context of programming language, if type-binding is dynamic then _____

A. type matching
B. type checking Correct (Page no 163)
C. type security
D. type sequence

27. In LISP, _____ function is same as _____ function.

A. cds,cons
B. car,first Correct (Page no 67)
C. car,rest
D. member, symbol

28. FORTRAN, PL1 and BASIC language provide _____ of variables.

A. Explicit declaration
B. implicit declaration Correct (Page no 161)
C. runtime declaration
D. static declaration

29. The syntax of PHP "foreach" loop is similar to _____ loop.

A. C++ foreach
B. C# foreach Correct
C. java foreach
D. C++ for

30. The concept of package in JAVA is similar to _____.

A. Global class in C++ Correct (Page no 130)
B. Assembly in C#
C. Global class in C#
D. Assembly in C++

31. In JavaScript navigator is a _____ object.

A. Built-in Correct
B. Browser
C. Document
D. User defined

32. _____ has a steep learning curve and suffers from lack of standardization.

A. C++
B. SNOBOL
C. PROLOG Correct (Page no 91)
D. JAVA

33. Which of the following method is used to implement Runnable interface in JAVA?

A. Stop()
B. run() **Correct (Page no 107)**
C. runThread()
D. stopThread()

34. In PHP 'switch' structure, the _____ starts or implements an implicit loop.

A. Break statement Correct
B. For loop
C. Continue statement
D. Return Statement

35. In PHP, foreach statement work only on _____

A. Integers
B. Conditionals
C. Arrays Correct (Page no 136)
D. Pointers

36. PROLOG stands for _____ in logic.

A. Protecting
B. Projecting
C. Processing
D. Programming Correct (Page no 77)

37. The size of integers in PHP is _____.

A. Fixed on all operating system
B. Assigned by programmer
C. Platform dependent Correct (Page no 131)
D. 128 bits

38. The purpose of symbol -p list object in LISP is to:

A. Assign properties to a symbol
B. Remove "p" property of a symbol
C. Arrange properties in alphabetical order
D. See all properties of a symbol Correct (Page no 73)

39. How many elements are in the following PROLOG list?
[[a, list, of, lists], and, numbers, [1,2,3]]

A. 9
B. 6
C. 4 Correct (Page no 84)
D. 2

40. In LISP, lists can be constructed (created and extended) with the help of _____ basic functions.

A. One
B. Four
C. Three Correct (Page no 66)
D. Five

Note:

Lists can be constructed (created and extended) with the help of three basic functions. These are **cons, list and append.**

41. In _____, we have to address the client-side compatibility issues.

A. Python
B. JavaScript Correct (ChatGPT + Google + Blogsite)
C. ASP
D. PHP

42. ALGOL 60 and most of its descendants use the _____ for parameter passing.

A. Run-time Stack Correct (Page no 188)
B. ROM
C. Secondary
D. Memory Heap

43. Which of the following operator is used for string concatenation in PHP?

A. | (vertical bar)
B. . (dot) Correct (Google + w3school)
C. $ (Dollar)
D. @ (at the rate)

44. In the context of Type Compatibility, sub ranges of integer types are NOT compatible with _____ types.

A. float
B. char
C. double
D. integer Correct (Page no 163)

45. In C programming language, array is passed by _____.

A. Value Correct (ChatGPT)
B. Reference
C. Pointer
D. Access method

46. A/an _____ is a special word that cannot be used as a user defined name.

A. Dynamic word
B. Reserved word Correct (Page no 160)
C. Flag word
D. Dummy word

47. Which of the following programming language allows functions to be defined inside functions?

A. C#
B. C
C. JAVA
D. PHP Correct (Page no 138)

48. _____ is usually a logical grouping of heterogeneous elements in a typical programming language.

A. Array
B. Pointer
C. Record Correct (Page no 168)
D. Reference

49. All variables in SNOBOL are _____.

A. Explicit Heap Dynamic variables
B. Implicit Heap Dynamic Variables Correct (Page no 162)
C. Stack Dynamic variables
D. Static variables

50. The resultant value of variable 'x' n JavaScript statement var x = "5" - "2"; will be _____.

A. 5-2
B. 52
C. "5"-"2"
D. 3 Correct (100% Sure)

51. Delegates in C# are used for _____.

A. Web Application
B. Event Driven Application Correct (Page no 128)
C. Parallel Programming
D. Multi-Threading

3 Marks Questions

Question no 1:

The facts are given below:

age(john,2).

drinks(tony,water).

Answer the following prolog queries in yes and no.

?-drinks(fred,water)

Answer:

The Prolog query ?-drinks(fred,water) can be answered as "no" based on the given facts.

This is because there is no fact in the knowledge base that states that Fred drinks water. The only drink-related fact is that Tony drinks water. Therefore, the query cannot be proven true and will result in a "no" answer.

Question no 2:

Indicate whether the following are syntactically correct Prolog Rules:

1. a :- b, c, d :- e f.

2. happy(X):- hasmoney(X) & has_friends(X).

3. fun(fish):- blue(betty), bike(yamaha).

Answer:

Only the second rule is syntactically correct Prolog rule:

1) a :- b, c, d :- e f. - This rule is not syntactically correct. It appears to have multiple heads, a and d :- e f, which is not allowed in Prolog. Also, there is a missing comma between e and f in the body of the rule.

2) happy(X):- hasmoney(X) & has_friends(X). - This rule is syntactically correct. It defines a rule happy that takes a parameter X, and it has two conditions in its body separated by the logical conjunction &.

3) fun(fish):- blue(betty), bike(yamaha). - This rule is not syntactically correct. It appears to define a rule fun that takes a constant fish as its parameter, but the body of the rule has two goals that are not properly separated by a logical conjunction or disjunction operator.

Question no 3:

The following table contains some built-in data types available in C#. You are required to provide their ranges (i.e., possible values).

Data Type	Ranges (Possible values)
byte	
short	
int	

Answer:

Data Type	Ranges (Possible values)
byte	0 to 255
short	-32768 to 32767
int	-2147483648 to 2147483647

Question no 4:

List down at least three bitwise operators available in JavaScript

Answer:

& represents the bitwise AND operator, | represents the bitwise OR operator, and ^ represents the bitwise XOR (exclusive OR) operator in JavaScript.

Question no 5:

The following code snippet is used to declare and initialize two integer type arrays in a typical java program. you are required to write output of the code.

```
1. int [] A = {1,2,3,4};
2. int [] B = {5,6};

3. A [0] = 4;
4. A= B;
5. B [1] = 7;

6. System.out.println (A [0]);
7. System.out.println (B [1]);
8. System.out.println (A [1]);
```

Note: No need to write code again, just write the output as shown below;

6._____

7._____

8._____

Answer:

6) **5**

7) **7**

8) **6**

Question no 6:

There are some reserved words (i.e, keywords) to represent inheritance in any programming language, like colon ":" is used to represent inheritance in C++.

The following code snippets represent a typical inheritance hierarchy in Java, you are required to write appropriate keywords with respect to class and interface at missing places. Dotted lines represent the missing code.

1. **public class ClassB ..... ClassA { }**

Answer:

In Java, the keyword extends is used to represent inheritance between classes. Here's the **corrected code snippet:**

```
public class ClassB extends ClassA {
}
```

Question no 7:

1) Point out the design considerations for parameter passing

2) What do you mean by limited access to variables?

Answer:

1. **Design Considerations for Parameter Passing:**

- Choose between pass-by-value and pass-by-reference based on memory and efficiency considerations.
- Decide whether parameters should be mutable or immutable to prevent unintended changes.
- Consider passing large data structures by reference for efficiency, but be cautious of side effects.
- Optimize performance by selecting the appropriate parameter passing mechanism.
- Handle error cases related to parameter passing.
- Ensure consistency with the language's overall design and philosophy.

2. **Limited Access to Variables:**

Limited access to variables refers to controlling their visibility within specific scopes:

- **Public:** Accessible from anywhere in the program.
- **Private:** Accessible only within the same class or module.
- **Protected:** Accessible within the class, subclasses, or modules in the same inheritance hierarchy.
- **Package-Private (Default):** Accessible within the same package or module, not from outside.

Question no 8:

1) PHP provides different comparison operators to test that whether one value is less than, greater than or equal to another value. For example, if there are two variables $x and $y, then you can write the following expression that tests whether $x is greater than $y or not

$x > $y

Now, write the expressions to test the following conditions

Answer:

1. Check if $x is less than $y

   $x < $y

2. Check if $x is less than $y

   $x >= $y

3. Check if $x is less than or equal to $y

   $x <= $y

4. Check if $x is equal to $y:

   $x == $y

5. Check if $x is not equal to $y:

   $x != $y

Question no 9:

Suppose you have to select heads from the following lists of members. Use Prolog's list head and tail concept to do this.

1. [Ali,| [Saad, Sana, Haadi]]

2. [Suleman, Arshad, | [Akbar, Aliya, Sara]]

3. [Aneela, Ainie, Fahad, Jibran | []]

Answer:

In Prolog, the list head and tail concept can be used to select the first element (head) from a list. Here's how you can use it for the given lists of members:

1. [Ali,| [Saad, Sana, Haadi]]
    - Selected Head: Ali
2. [Suleman, Arshad, | [Akbar, Aliya, Sara]]
    - Selected Head: Suleman
3. [Aneela, Ainie, Fahad, Jibran | []]
    - Selected Head: Aneela

Using Prolog's list head and tail notation, you can easily extract the first element from each list.

Question no 10:

LISP provides selector functions to perform selection on the elements of lists. Write the resultant output of the following LISP statement:

1. >(rest '(a s) (d f))

2. >(setq L '(A B C))

3. >(cdr L)

Answer:

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In LISP, the selector function **'cdr'** is used to retrieve the rest of a list after the first element. Here's the resultant output of the provided LISP statements:

1. >(rest '(a s) (d f))
   (d f)

2. >(setq L '(A B C))
   (A B C)

3. >(cdr L)
   (B C)

The **cdr** function retrieves the rest of the list after the first element.

Question no 11:

Other than loops, there are several Control Flow statements in C#. You are required to list down at least three of them.

Answer:

If Statement:

It's used for conditional branching, allowing the program to execute different code blocks based on whether a certain condition is true or false.

Switch Statement:

This statement is used for multi-way branching. It allows the program to select one of many code blocks to execute based on the value of an expression.

Try-Catch Statement:

This is used for exception handling. Code within the "try" block is executed, and if an exception occurs, it's caught by the "catch" block where you can handle or process the exception.

5 Marks Questions

Question no 1:

What is meant by Operator overloading? Describe potential problems related to operator overloading. Also suggest a solution.

Answer:

The Use of an operator for more than one purpose is called operator overloading.

Operator overloading is a feature in programming languages that allows operators such as +, -, *, /, and others to have different meanings depending on the operands. For example, in Python, the + operator can be used to concatenate strings as well as to add numbers.

Potential problems related to operator overloading include:

1. Confusion: Operator overloading can lead to confusion and unexpected behavior if the overloaded operators are not used in a clear and consistent manner.

2. Misuse: If the overloaded operator is not used properly or is used in a way that was not intended by the programmer, it can cause errors or unexpected results.

3. Ambiguity: If multiple overloaded operators are available for a given operation, it may not be clear which one is being used.

A solution to these problems is to use operator overloading judiciously and only when it makes sense for the programming task at hand. Overloading operators should be done in a consistent and clear manner, and it should be well documented to avoid confusion. Additionally, testing should be done to ensure that the overloaded operators are functioning as intended

Question no 2:

There are various class modifier in C#. Five of them are listed below; briefly explain them.

Class Modifier	Explanations
Internal	
internal protected	
Private	
Abstract	
Sealed	

Answer:

Class Modifier	Explanations
Internal	The internal keyword specifies that the class or class member can be accessed only within the same assembly (or module).
internal protected	The internal protected keyword is a combination of the internal and protected keywords. It specifies that the class or class member can be accessed only within the same assembly (or module) or by a derived class in another assembly.
Private	The private keyword specifies that the class or class member can be accessed only within the same class.
Abstract	The abstract keyword specifies that the class or class member cannot be instantiated directly. Instead, it must be derived by another class and implemented in the derived class.
Sealed	The sealed keyword specifies that the class or class member cannot be inherited or overridden by a derived class.

Question no 3:

You are required to write Rules for the following statement in PROLOG,

"It says that two symbols, X and Y, are brother if X is a man and Y is a man and their father is same."

Answer:

```
brother(X,Y):-
man(X),
man(Y),
father(Z,Y),
father(Z,X).
```

Question no 4:

Write a recursive predicate that should replace repeated elements in a list with a single copy using Prolog programming language.

Answer:

Here's a concise example of a recursive predicate in Prolog that removes duplicate elements from a list:

```
remove_duplicates([], []).  % Base case: empty list has no duplicates
remove_duplicates([X|Xs], Ys) :-
    member(X, Xs),    % If X is a member of the tail of the list
    !,                % Cut operator to stop backtracking
    remove_duplicates(Xs, Ys). % Ignore X and recursively process the tail

remove_duplicates([X|Xs], [X|Ys]) :-
    remove_duplicates(Xs, Ys). % Add X to the output list and recursively process the tail
```

The predicate takes two arguments: the input list and the output list. The base case is when the input list is empty, in which case the output list is also empty.

The first recursive rule checks if the head of the input list **"X"** is a member of the tail of the list **"Xs".** If it is, the rule cuts to prevent backtracking and ignores **"X".** It then recursively processes the tail **"Xs**" to remove any other duplicates.

The second recursive rule is used when the head of the input list "X" is not a member of the tail of the list **"Xs".** In this case, it adds **"X"** to the output list and recursively processes the tail **"Xs".**

Here's an example usage of the predicate:

```
?- remove_duplicates([a, b, c, a, b, d, d], X).
X = [a, b, c, d].
```

In this example, the predicate removes the duplicate elements "a", "b", and "d" from the input list, leaving only one copy of each element in the output list.

Question no 5:

Write a recursive predicate that should replace represented elements in a list with a single copy using Prolog programming language.

Answer:

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----------END OF LECTURE 24----------

Example 3: Eliminate consecutive duplicates of list elements.

If a list contains repeated elements they should be replaced with a single copy of the element. The order of the elements should not be changed.

Example:

```
?- compress([a,a,a,a,b,c,c,a,a,d,e,e,e,e],X).
X = [a,b,c,a,d,e]
```

Here is the code for this function:

```
compress([],[]).                    % there is nothing to be compressed in
compress([X],[X]).                  % an empty list or a list with only one
                                    % element

compress([X,X|Xs],Zs) :-            % if the first element is repeated, copy
        compress([X|Xs],Zs).        % it once in the new list

compress([X,Y|Ys],[X|Zs]) :-        % inspect the rest of the list and
        X \= Y,compress([Y|Ys],Zs). % repeat the process recursively
```

Question no 6:

Write a function in LISP that computes the power of x to y (i.e. x^y). Also call this function with parameters 3, 4 (i.e. x = 3 and y = 4) and show the resultant output.

Answer:

Here's a function in LISP that computes the power of x to y (i.e., x^y):

```
(defun power (x y)
 (if (= y 0)
    1
    (* x (power x (- y 1)))))
```

To call this function with parameters 3 and 4 (x = 3 and y = 4) and show the resultant output:

```
(format t "3^4 = ~a" (power 3 4))
```

When you run this code, you should see the output**: 3^4 = 81** indicating that 3 raised to the **power of 4 is equal to 81.**

Question no 7:

Consider the following JavaScript code:

```
var students = ["Ali", "Aakash", "Taha", "Faiq"];
```

Based on the above code, what will be the output of following JavaScript statements?

1. **document. write (students [2]);**

Answer:

Output:

Taha

Explanation:

This is because the array index in JavaScript is zero-based, so **students [2]** accesses the third element of the array, which is "**Taha**".

Question no 8:

Some of the possible binding requirements are given here. You are required to choose correct time of these bindings from given list and write in Binding Time column.

1. **Language design time**
2. **Language implementation time**
3. **Compile time**

Answer:

Handouts Page no 160 (Just Mention the sequence)

Binding Time	Correct Time
Language design time	1
Language implementation time	2
Compile time	3

Reference:

Possible binding times

1. Language design time - e.g. bind operator symbols to operations
2. Language implementation time - e.g. bind fl. pt. type to a representation
3. Compile time - e.g. bind a variable to a type in C or Java
4. Load time- e.g.
5. Runtime - e.g. bind a non-static local variable to a memory cell

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