Indian Institute of Technology Kharagpur
Course: MA41021/MA60001 Programing Languages
Autumn Semester 2020-21
Time : 45 minutes
Class Test - 3

Declaration:

- **Each question carries 2 marks.**

- **NO query will be entertained during the examination.**

- **There may be multiple options correct for a problem. Full marks is given only when all the correct options are identified.**

- **Once a problem is passed, it will not appear in your screen again and hence if a problem appears in your screen then identify the correct option and then go for the next problem.**

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1. Consider the grammar $G = (NT, T, P, E)$ with $NT = \{E, I\}$, $T = \{a, b, c, +, *, (,)\}$ and the productions are given by

$$E \rightarrow I \mid E + E \mid E * E \mid (E)$$
$$I \rightarrow a \mid b \mid c$$

Then the number of derivation trees corresponding to the string $a + b * c$ is

   (a) 1
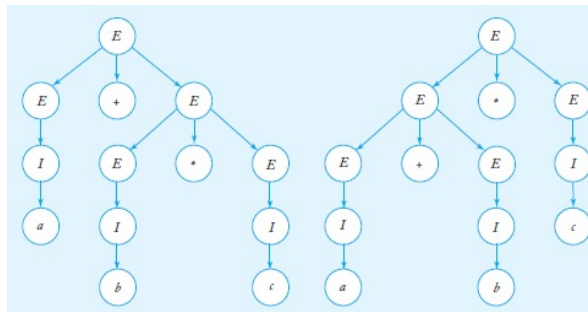   (b) > 1

   ANS. b)

2. Which of the following are true?

Figure 1: Hint: Question 1

(a) Any rooted tree whose nodes are labelled as terminal and not-terminal symbols of a grammar represents a derivation tree for some string in the corresponding language

(b) The interior nodes of a derivation tree corresponding to a context free grammar can only be non-terminal symbols of the grammar

(c) None of the above

ANS b)

3. A machine in which both compiler and interpreter are used for implementation of a programming language, which of the following are true?

(a) First a compiler is used to translate a high level language into another language which is then interpreted or runtime support

(b) First an interpreter is used to interpret a high level language into another language which is then translated by a compiler

(c) None of the above

ANS a)

4. In a hierarchy of machines, functionalities of one machine is extended to higher-level machines if they are not present in the higher-level machines by

(a) A compiler

(b) An interpreter

(c) The operating system

(d) None of the above

ANS c)

5. Consider the following example of a structure type:

struct {int $x[2]$; } temp[] = {{0}, {1}};

Then which of the following are true:

(a) the statement is incorrect since struct should be defined using tag and the array temp should be defined using that tag

(b) the statement is incorrect due to the initialization of array temp

(c) the statement is correct

(d) none of the above

ANS. C)

6. The statement "The function malloc() returns the number of bytes it has allocated if it successfully allocates the memory" is

(a) True

(b) False

ANS b)

7. Consider the following program:

```
main( )
{
char *ptr;
*ptr = (char)malloc(10);
strcpy(ptr, "Hello");
printf("%s", ptr);
free(ptr);
}
```

Then how many errors are there in the program?

(a) 0

(b) 1

(c) 2

(d) 3

ANS ~~b)~~ c) Hint:

```
main( )
{
char *ptr;
ptr = (char *)malloc(10);
strcpy(ptr, "Hello");
printf("%s", ptr);
free(ptr);
}
```

(NOTE. the header file are not considered as usual since in all the classes, exams we meant program by this only)

8. Consider the following program:

```
int x;
main( )
{
int y;
int *z = (int *) malloc (sizeof(int));
}
```

Then

(a) $*z$ is stored in stack

(b) $*z$ is stored in heap

ANS b)

9. "$29 << 2$" is

(a) 7

(b) 45

(c) 116

10. Consider the following program:

main( )

{

int x, y, z;

$x + y = z$;

}

Then the error in the program is

(a) Syntax

(b) Semantic

ANS: b)