2014 Academic Challenge

COMPUTER SCIENCE TEST - REGIONAL

This Test Consists of 30 Questions

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GENERAL DIRECTIONS

Please read the following instructions carefully. This is a timed test; any instructions from the test supervisor should be followed promptly.

The test supervisor will give instructions for filling in any necessary information on the answer sheet. Most Academic Challenge sites will ask you to indicate your answer to each question by marking an oval that corresponds to the correct answer for that question. Only one oval should be marked to answer each question. Multiple ovals will automatically be graded an incorrect answers.

Be sure ovals are marked as ● , not ⊙ , ◍ , ◑ , etc.

If you wish to change an answer, erase your first mark completely before marking your new choice.

You are advised to use your time effectively and to work as rapidly as you can without losing accuracy. Do not waste your time on questions that seem too difficult for you. Go on to the other questions, and then come back to the difficult ones later if time remains.

*** TIME: 40 MINUTES ***

DO NOT OPEN TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO!

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1. Which of the following is a type of error that a compiler first attempts to detect?

   a. division by zero

   b. runtime

   c. syntax

   d. logic

   e. infinite loops

2. Which of the follow is not a common mobile operating system?

   a. iOS

   b. RIM OS

   c. Android

   d. Windows Phone

   e. MVS

3. What provides a user interface, manages a computer's resources, and schedules application programs for execution?

   a. Utility programs

   b. Operating systems

   c. General purpose applications

   d. Source code

   e. Storage area networks

4. Which of the following is not true in regards to solid-state drives (SSDs)?

   a. SSDs are faster and more durable than traditional hard drives.
   b. SSDs require less power than traditional hard drives.
   c. SSDs are usually more expensive than a traditional hard drive with the same capacity.
   d. SSDs usually have more moving parts than a traditional hard drive.
   e. SSDs are designed to be connected inside a microcomputer system in the same way as a traditional hard disk.

5. What is the decimal number 189 converted to binary?

   a. 189

   b. 10101011

   c. BD

   d. 10111101

   e. None of the above.

6. What is the hexadecimal number D9 converted to decimal?

   a. 11001001

   b. 217

   c. 209

   d. 199

   e. None of the above.

7. Match the following types of gates with the appropriate images provided.

    1. inverter
    2. AND
    3. OR
    4. XOR
    5. NAND

    i.   ii.   iii.   iv.   v.

    a. 1-i   2-iv   3-iii   4-v   5-ii
    b. 1-iii   2-v   3-iv   4-ii   5-i
    c. 1-iv   2-iii   3-ii   4-iv   5-i
    d. 1-i   2-v   3-ii   4-iv   5-iii
    e. None of the above.

8. What is the Boolean expression that matches the given truth table?

A	B	C	OUTPUT
F	F	F	F
F	F	T	F
F	T	F	F
F	T	T	T
T	F	F	F
T	F	T	F
T	T	F	T
T	T	T	T

    a. AB or (A'BC)
    b. AC
    c. A'BC xor AB
    d. AC or BC
    e. Both a and c

9. Which of the following is not true regarding object constructors and destructors?

    a. Destructors may be passed arguments.
    b. Constructors only execute when an object is instantiated.
    c. A destructor need not necessarily be provided by the programmer.
    d. Constructors may be passed arguments.
    e. Destructors only execute when an object loses scope.

10. Which of the following is not a principle of object oriented programming?

    a. abstraction   b. initialization   c. inheritance   d. encapsulation   e. polymorphism

11. Which of the following is not true regarding overloaded operators?

    a. They allow programmers to provide code that implements the operator properly for an object.
    b. The = is already overloaded for all objects.
    c. They must return values of the same type as the class itself.
    d. They may, but do not necessarily need to be friends of a class.
    e. Both the pre and post increment ++ may be overloaded for the same object.

12. Which of the following is not true regarding the tree to the right?

    a. This is a binary search tree.
    b. This tree is balanced.
    c. This tree has 4 leaves.
    d. The head of the tree is H.
    e. The tree has a maximum depth of 7.
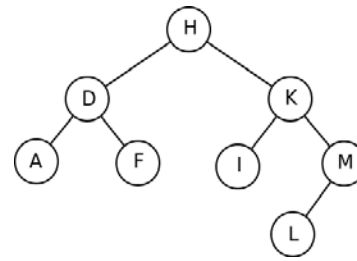
13. For a sorted array of items, what is the worst number of comparisons required to determine if an item is contained in the list if the list has 100 items using a binary search?

    a. 1   b. 7   c. 50   d. 100   e. None of the above.

14. Which of the following structures may have the placement of a value within a structure depend upon the value of the element itself?

    a. Queue, Stack, Linked List
    b. Array, Linked List, Hash, Queue
    c. Queue, Hash, Stack
    d. Array, Priority Queue, Binary Search Tree, Linked List
    e. Stack, Queue, Binary Search Tree

Use the following code for Questions 15, 16, and 17.

```
1     char one[10] = "HELLO JOE";
2     char two[10] = "EOJ OLLEH";
3     int i;
4
5     for (int i=0; i<10; i++)
6        if (i%2)
7              cout << one[i];
8        else
9              cout << two[i];
10    cout << i;
```

15. What is the name of the operator on line 6?

    a. if   b. division   c. assignment   d. modulus   e. None of the above.

16. What is printed by the code from lines 5 thru 9?

    a. HELLO JOE   b. EOJ OLLEH   c. EEJLO LOH   d. HOL OLJEE   e. HHEELLOO

17. What is printed by the code from line 10?

   a. 0   b. 1   c. 9   d. 10   e. Cannot be determined.

18. Which of the following is not an assignment operator?

   a. ==   b. +=   c. %=   d. =   e. All are assignment operators.

Use the following code for Questions 19 & 20.

```
1       int myarray[8];
2
3       for (int i = 0; i < 8; i++)
4          cin>>myarray[i];
5       for (int i = 7; i > 0; i--)
6          cout<<myarray[i];
```

19. Given user input of 1 2 3 4 5 6 7 8 , what will be output to stdout?

   a. `8765432`   b. `1234567`   c. `87654321`   d. `7654321`   e. `12345678`

20. If the `i` was initialized to 8 on line 5, what would be output to stdout assuming the same input as the previous question?

   a. 8765432
   b. 87654321
   c. The output would be undefined.
   d. 1234567
   e. 12345678

Use the following code for Questions 21 & 22.

```
1       int k;
2       cin>>k;
3
4       while (k < 10)
5          k = 2 * k;
6       cout << k << endl;
```

21. Which user input will result in the largest number being printed?

   a. 9   b. 4   c. 3   d. 8   e. 10

22. What type of statement is on line 4?

   a. Declaration
   b. Repetition
   c. Algebraic
   d. Assignment
   e. None of the above

Use the following code for Questions 23, 24, & 25.

```
1    int x = 0;
2    int y = 0;
3    int z = 0;
4
5    cin >> z;
6    while (z != 99) {
7       x++;
8       y += z;
9       cin >> z;
10   }
11   if (x > 0) {
12      y = y / x;
13   }
14   cout << y << endl;
```

23. What will be output to stdout for the following user input? 8 16 66 99

   a. 0   b. 45   c. 63   d. 30   e. 47

24. What will be output to stdout for the following user input? 99

   a. 0   b. 45   c. 63   d. 30   e. 47

25. What will be output to stdout for the following user input? 8 11 99

   a. 8   b. 9   c. 9.5   d. 10   e. 99

Use the following code for Questions 26, 27, & 28.

```
1    int * xx;
2    int x = 19;
3    int y = 21;
4
5    xx = &x;
6    x += 3;
7    y += *xx;
8    xx = &y;
9    y = *xx;
```

26. What is the value of `x` after the code executes?

   a. 21   b. 19   c. 43   d. 38   e. 22

27. What is the value of `y` after the code executes?

   a. 21   b. 19   c. 43   d. 38   e. 22

28. What is the type of `xx`?

   a. int   b. float   c. pointer to an int   d. int array   e. None of the above.

Use the following code for Questions 29 & 30.

```
1    void display(const int list[], int size) {
2       for(int i=0; i<size; i+=2)
3          cout << list[i];
4    }
5    int main()
6    {
7       int myarray[8];
8       for(int i=0; i<8; i++)
9          cin >> myarray[i];
10      display(myarray, 8);
11      return 0;
12   }
```

29. Given user input of `1 2 3 4 5 6 7 8`, what will be output to stdout?

   a. 1357   b. 12345678   c. 7531   d. 8642   e. 2468

30. How are the arguments of function `display` passed?

   a. by reference   b. by value   c. as global constants   d. no arguments are passed   e. by reference and by value