UNIVERSITY OF GHANA

BSc. INFORMATION TECHNOLOGY, FIRST SEMESTER EXAMINATIONS
2022/2023

DEPARTMENT OF DISTANCE EDUCATION

DCIT 201: PROGRAMMING 1 (3 CREDITS)

INSTRUCTION

> Answer ALL Questions. **Answer both sections A & B in the answer booklet.**

TIME ALLOWED

> *TWO (2) HOURS*

SECTION A:

For each of the following statements (Questions 1-10) regarding object-oriented programming using Java, indicate whether you think it is **true** or **false**.

1. Many similar objects can be created from a single class.

2. A method can only have one return type, or void.

3. The state of an object is defined by a combination of its setter and getter methods.

4. The signature of a method is defined as its return type and the number of parameters it takes.

5. The scope of a variable defines the section of source code from where the variable can be accessed.

6. Constructors are called automatically when a variable is declared.

7. An ArrayList implements the Collection interface.

8. Methods can only call other methods of the same class if those other methods are declared as private.

9. The body of a while loop may be executed zero, one or many times.

10. A class can have more than one direct superclass.

11. What is the return type of a method that does not return any value?
   a) int   b)float   c) void   d) double

12. What will be the output of the following Java program?
```
class main_class
{
            public static void main(String args[])
            {
                  int x = 9;
            if (x == 9)
            {
                  int x = 8;
                  System.out.println(x);
            }
      }
}
```
a) 9   b) 8   c) Compilation error   d) Runtime error

13. A Java class representing a bank account maintains the name as a String and the balance as a double. Which of the following is NOT a valid constructor for the class:
```
a)      public Account(String n){
            name = n;
            balance = 0;
      }
b)      public Account(String n, double b){
            name = n;
            balance = b;
      }
c)      public Account(){
            name = "";
            balance = 0.0;
      }
d)      public void Account(String n, double b){
            name = n;
            balance = b;
      }
e)      public Account(double b){
            name = "Bob";
            balance = b;
      }
f)      public Account(int b, String n){
            name = n;
            balance = b;
      }
```

14. Given the code snippet below, what is the value of value[i]?
```
int values[ ] = {1,2,3,4,5,6,7,8,9,10};
for(int i=0;i< Y; ++i)
System.out.println(values[i]);
```
a) 10   b) 11   c) 15   d) None of the above

15. What will be the output of the following Java code?

```
class output
{
        public static void main(String args[])
        {
                String s1 = "Hello i love java";
                String s2 = new String(s1);
                System.out.println((s1 == s2) + " " + s1.equals(s2));
        }
}
```
a) true true   b) false false   c) true false   d) false true

16. In the following Java code, which code fragment should be inserted at line 3 so that the output will be: "123abc 123abc"?
```
StringBuilder sb1 = new StringBuilder("123");
String s1 = "123";
// insert code here
System.out.println(sb1 + " " + s1);
```
a) sb1.append("abc"); s1.append("abc"); b) sb1.append("abc"); s1.concat("abc");
c) sb1.concat("abc"); s1.append("abc"); d) sb1.append("abc"); s1 = s1.concat("abc");

17. How many of the following 4 method declarations are legal Java:
```
private int sum(int x, int y) {
        return x + y;
}

public void difference (int x , int y) {
        return x - y;
}

public double multiply(double m, double n) {
        m * n;
}

public void divide(int x, int y) {
        int d = x / y;
}
```
a) 0   b) 1   c) 2   d) 3   e) 4

18. Which of the following for loop declaration is NOT valid?
a) `for(int i = 99; i >= 0; i / 9)` b) `for(int i = 7; i <= 77; i += 7)`
c) `for(int i = 20; i >= 2; - -i)` d) `for(int i = 2; i <= 20; i = 2* i)`

19. What would be output by the following code fragment:
```
int age = 10;
String output = "Age is " + age; output = output + 1;
System.out.println(output);
```
a) Age is 10   b) Age is 11   c) Age is 101
d) 11   e) 101   f) A syntax error

20. Which of these is correct way of inheriting class A by class B?
a) `class B + class A {}`   b) `class B inherits class A {}`
c) `class B extends A {}`   d) `class B extends class A {}`

21. A Java class representing a book maintains the ISBN number as a String field called isbn. Which of the following method definitions correctly returns the String referenced by this field:

```
a)      public void getIsbn(){
            return isbn;
        }
b)      public getIsbn{
            return isbn;
        }
c)      public getIsbn(String s){
            isbn = s;
        }
d)      public String getIsbn(String s){
            String isbn = s;
            return isbn;
        }
e)      public String getIsbn(){
            return isbn;
        }
f)      public isbn getIsbn(){
            return isbn;
        }
```

22. What would be the output of the following code snippet if variable a=10?

```
if(a<=0){
    if(a==0){
      System.out.println("1 ");
    }else {
       System.out.println("2 ");
    }
}
System.out.println("3 ");
```

a) 1 2   b) 2 3   c) 1 3   d) 3

23. What are the values of a and b following execution of the following code fragment:

```
int a = 3; int b = 9;
while ( b >= 3 ) {
      a = a + b;
      b = b - 3;
}
```

a) a is 3, b is 9   b) a is 12, b is 0   c) a is 18, b is 0
d) a is 18, b is 3   e) a is 21, b is 3   f) a is 21, b is 0

24. What is the value of total at the end of the loop:

```
int total = 0;
for ( int i = 0 ; i < 3; i++ ) {
      for ( int j = 3; j < 5; j++ ){
            total = total + j;
      }
}
```

a) 0   b) 3   c) 7   d) 21   e) 24   f) 36

25. Which of the following loops will execute the body of loop even when condition controlling the loop is initially false?
a) do-while   b) while   c) for   d) none of the mentioned

26. A string literal in Python must be enclosed in _____.
a) parentheses   b) single-quotes.
c) double-quotes.   d) either single-quotes or double-quotes.

27. This symbol marks the beginning of a comment in Python.
a)   b) *   c) **   d) #

28. In Python, which statement is used to handle exceptions.
a) run/handle   b) try/except   c) try/handle   d) attempt/except

29. In Python the _____ method is automatically called when an object is created.
a) __init__   b) init   c) __str__   d) __object__

30. What will be the output of the following Python code?
```python
x = ['ab', 'cd']
for i in x:
    i.upper()
print(x)
```
a) ['ab', 'cd']   b) ['AB', 'CD']   c) [None, None]   d) none

31. What will be the output of the following Python code?
```python
x = ['ab', 'cd']
for i in x:
    x.append(i.upper())
print(x)
```
a) ['AB', 'CD']   b) ['ab', 'cd', 'AB', 'CD']
c) ['ab', 'cd']   d) none

32. What will be the output of the following Python code?
```python
i = 1
while True:
    if i%007 == 0:
        break
    print(i)
    i += 1
```
a) 1 2 3 4 5 6   b) 1 2 3 4 5 6 7   c) error   d) none

33. What will be the output of the following Python code?
```python
i = 1
while True:
    if i%2 == 0:
        break
    print(i)
    i += 2
```
a) 1   b) 1 2   c) 1 2 3 4 5 6 ...   d) 1 3 5 7 9 11 ...

34. What will be the output of the following Python code?
```python
class Test:
    def __init__(self,a="Hello World"):
        self.a=a

    def display(self):
        print(self.a)

obj= Test()
obj.display()
```
a) The program has an error because constructor can't have default arguments
b) Nothing is displayed

c) "Hello World" is displayed

d) The program has an error display function doesn't have parameters

35. What will be the output of the following Python code?
```
class Test:
    def __init__(self):
        self.x = 0
class Derived_Test(Test):
    def __init__(self):
        self.y = 1
def main():
    b = Derived_Test()
    print(b.x,b.y)
main()
```
a) 0 1

b) 0 0

c) Error because class B inherits A but variable x isn't inherited

d) Error because when object is created, argument must be passed like Derived_Test(1)

36. Suppose B is a subclass of A, to invoke the __init__ method in A from B, what is the line of code you should write?

a) A.__init__(self)   b) B.__init__(self)

c) A.__init__(B)   d) B.__init__(A)

37. What will be the output of the following Python code?
```
class Test:
    def __init__(self):
        self.x = 0
class Derived_Test(Test):
    def __init__(self):
        Test.__init__(self)
        self.y = 1
def main():
    b = Derived_Test()
    print(b.x,b.y)
main()
```
a) Error because class B inherits A but variable x isn't inherited

b) 0 0

c) 0 1

d) Error, the syntax of the invoking method is wrong

38. When will the else part of try-except-else be executed in a Python program?

a) always   b) when an exception occurs

c) when no exception occurs d) when an exception occurs in to except block

39. When is the finally block executed?

a) when there is no exception   b) when there is an exception

c) only if some condition specified is satisfied d) always

40. What will be the output of the following Python code?
```
def foo():
    try:
        return 1
    finally:
        return 2
```

```
k = foo()
print(k)
```
a) 1   b) 2   c) 3
d) error, there is more than one return statement in a single try-finally block

41. What will be the output of the following Python code?
```
def getMonth(m):
    if m<1 or m>12:
        raise ValueError("Invalid")
    print(m)
getMonth(6)
```
a) ValueError   b) Invalid   c) 6   d) ValueError("Invalid")

42. Which of the following blocks will be executed whether an exception is thrown or not?
a) except   b) else   c) finally   d) assert

43. What is the output when we execute `list("hello")` in Python?
a) ['h', 'e', 'l', 'l', 'o']   b) ['hello']
c) ['llo']   d) ['olleh']

44. Which of the following statements create a dictionary in Python?
a) `d = {}`   b) `d = {"john":40, "peter":45}`
c) `d = {40:"john", 45:"peter"}`   d) All of the mentioned

45. Suppose `t = (1, 2, 4, 3)`, which of the following Python code is incorrect?
a) `print(t[3])`   b) `t[3] = 45`   c) `print(max(t))`   d) `print(len(t))`

46. Which of these about a set in Python is not true?
a. Mutable data typ
b. Allows duplicate values
c. Data type with unordered values
d. Immutable data type

47. If `a={5,6,7,8}`, which of the following Python statements is false?
a) `print(len(a))`   b) `print(min(a))`
c) `a.remove(5)`   d) `a[2]=45`

48. What will be the output of the following Python code?
```
>>> a={i: i*i for i in range(6)}
>>> a
```
a) An exception is thrown   b) {0: 0, 1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6:36}
c) {0: 0, 1: 1, 4: 4, 9: 9, 16: 16, 25: 25}   d) {0: 0, 1: 1, 2: 4, 3: 9, 4: 16, 5: 25}

49. Which keyword is used for function?
a) func   b) Def   c) def   d) function

50. This is an operator that raises a number to a power in Python.
a) %   b) *   c) **   d) /

SECTION B: ANSWER BOTH QUESTIONS

B1. Create a Python class called Bank that has the following attributes:
- name (a string)
- location (a string)
- accounts (a list)

The class should have the following methods:
- addAccount(account): This method should add the specified account to the bank.
- removeAccount(account): This method should remove the specified account from the bank.
- getTotalBalance(): This method should calculate and return the total balance of all accounts in the bank.

In the main file, create one Bank object, set its attributes, add some accounts to the bank, remove some accounts from the bank, and print out the total balance of all accounts in the bank.

[25 Marks]

B2. Create a Java class called Song that has the following attributes:
- title (a string)
- artist (a string)
- duration (a double)

The class should have the following methods:
- getTitle(): This method should return the title of the song.
- setTitle(String title): This method should set the title of the song.
- getArtist(): This method should return the artist of the song.
- setArtist(String artist): This method should set the artist of the song.
- getDuration(): This method should return the duration of the song.
- setDuration(double duration): This method should set the duration of the song.
- play(): This method should print "Playing <title> by <artist>" to the console.
-

Create a Playlist class that has the following attributes:
- name (a string)
- songs (an ArrayList of Song objects)

The class should have the following methods:
- addSong(Song song): This method should add the specified song to the playlist.
- removeSong(Song song): This method should remove the specified song from the playlist.
- getTotalDuration(): This method should calculate and return the total duration of all the songs in the playlist.

[25 Marks]