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M.Sc. (Informatics) 2nd Semester, 2014

Paper: IT-24(Programming Languages)

→ Progroming language

Time allowed: **03 Hrs** Maximum Marks: **75**

(Q1 is Compulsory. Attempt any 4 Questions from Q2 to Q6)

Q1 (3+3+3+3+3)

A) Which code initializes the two-dimensional array matrix so that matrix[3][2] is a valid element? Select the two correct answers.

(a) int[][] matrix = {{ 0, 0, 0 },{ 0, 0, 0 }};
(b) int matrix[][] = new int[4][];
for (int i = 0; i < matrix.length; i++) matrix[i] = new int[3];
(c) int matrix[][] = {
0, 0, 0, 0,
0, 0, 0, 0,
0, 0, 0, 0,
0, 0, 0, 0
};
(d) int matrix[3][2];
(e) int[] matrix[] = { {0, 0, 0}, {0, 0, 0}, {0, 0, 0}, {0, 0, 0} };

B) Which statement, when inserted at (1), will raise a runtime exception?

```
class A {}
class B extends A {}
class C extends A {}
public class Q3ae4 {
public static void main(String[] args) {
A x = new A();
B y = new B();
C z = new C();
// (1) INSERT CODE HERE.}}
```

Select the one correct answer.
(a) x = y;
(b) z = x;
(c) y = (B) x;
(d) z = (C) y;
(e) y = (A) y;

C) Given the following directory structure:

```
/proj
|--- lib
|    |--- supercharge.jar
|
|--- src
|--- top
|--- sub
|--- A.java
```

Assume that the current directory is /proj/src, and that the class A declared in the file A.java uses reference types from the JAR file supercharge.jar.
Which commands will succeed without compile-time errors?
Select the two correct answers.
(a) javac -cp ../lib top/sub/A.java
(b) javac -cp ../lib/supercharge top/sub/A.java
(c) javac -cp ../lib/supercharge.jar top/sub/A.java
(d) javac -cp /proj/lib/supercharge.jar top/sub/A.java
(e) javac -cp /proj/lib top/sub/A.java

D) Which expressions will evaluate to true if preceded by the following code?

```
String a = "hello";
String b = new String(a);
String c = a;
char[] d = { 'h', 'e', 'l', 'l', 'o' };
```

Select the two correct answers.
(a) (a == "Hello")
(b) (a == b)
(c) (a == c)
(d) a.equals(b)
(e) a.equals(d)

E) What will be written to the standard output when the following program is executed?

```
public class Qcb90 {
int a;
int b;
public void f(){
a = 0;
b = 0;
int[] c = { 0 };
g(b, c);
System.out.println(a + " " + b + " " + c[0] + " ");}
public void g(int b, int[] c) {
a = 1;
b = 1;
c[0] = 1;}
public static void main(String[] args) {
Qcb90 obj = new Qcb90();
obj.f(); }}
```

Select the one correct answer.
(a) 0 0 0
(b) 0 0 1
(c) 0 1 0
(d) 1 0 0
(e) 1 0 1

Q2 (2+2+2+5+2+2)

A. What is Java Byte code? Explain the series of steps involved in compiling and running any Java Program?

B. Write the differences between Java Servlets and Applets?

C. Which of the following expressions evaluate to true? Select the two correct answers.
(a) (false | true)
(b) (null != null)
(c) (4 <= 4)
(d) (!true)
(e) (true & false)

D. Briefly explain three Object oriented programming principals? How these three principals work together? Give example.

E. Why JAVA is called as Strongly Typed Language?

F. Which of the following expressions are valid? Select the three correct answers.
(a) (- 1 -)
(b) (+ + 1)
(c) (+-+-+-1)
(d) (--1)
(e) (1 ** 1)
(f) (- -1)

Q3 (3+3+3+4+2)

A. What is Garbage Collection? Name some programming languages which don't support automatic garbage collection?

B. Explain Static methods in Java? What are the various restrictions imposed on static methods?

C. How Java supports Variable-arity methods internally? How it is different from C language? Which method declarations are valid declarations of variable-arity methods?
(a) void compute(int... is) { }
(b) void compute(int is...) { }
(c) void compute(int... is, int i, String... ss) { }
(d) void compute(String... ds) { }

(e) void compute(String... ss, int len) { }

D. What is Method overloading? Give an example of overloaded constructors. Following two methods are overloaded or not:

```
void fn(){
        System.out.println("in f()");
}
final static void fn(){
        System.out.println("in final static fn(int i)");
}
```

E. Differentiate between this and super keywords?

Q4 (3+3+3+3+3)

A. What is Dynamic Method Dispatch? Write its usage with example?

B. What are Abstract classes? Write some properties of Abstract classes?

C. Complete the following Access protection table with YES or NO:

	Private	No Modifier	Protected	Public
Same Class	Yes	Yes	Yes	Yes
Same Package Sub class	no	Yes	Yes	"
Same Package Non-sub class	no	Yes	Yes	"
Different Package Sub class	no	no	Yes	"
Different Package Non-Sub class	no	no	no	"

D. What are Interfaces?
- Does an interface inherit another interface?
- Is Nested interfaces supported in Java?
- A class which partially implements interface can be instantiated or not?

E. Which letters will be printed when the following program is run?

```
public class MyClass {
    public static void main(String[] args) {
        B b = new C();
        A a = b;
        if (a instanceof A) System.out.println("A");
        if (a instanceof B) System.out.println("B");
        if (a instanceof C) System.out.println("C");
        if (a instanceof D) System.out.println("D");
    }
}
```

B b
A a
a = b

Q5 (2+4+3+4+2)

A. Differentiate between throw and throws keywords with example?

B. What are Threads? How threads can be created in JAVA? What are benefits and challenges of using threads in applications?

C. Draw the Thread State transition diagram?

D. What is race condition in multi-threaded applications? Under what conditions deadlocks are generated in applications? Explain with example.

E. Given the following program, which statements are true?

```
public class Exceptions {
public static void main(String[] args) {
try {
if (args.length == 0) return;
System.out.println(args[0]);
} finally {
System.out.println("The end");}}}
```

Select the two correct answers.
(a) If run with no arguments, the program will produce no output.
(b) If run with no arguments, the program will print "The end".
(c) The program will throw an ArrayIndexOutOfBoundsException.
(d) If run with one argument, the program will simply print the given argument.

(e) If run with one argument, the program will print the given argument followed by "The End".

Q6 (2+2+3+3+3+2)

A. JDK7 introduces Automatic Resource Management (ARM). What is this ARM? Give example.

B. JAVA Strings are called as Immutable? What does it mean?

C. Name the type of I/O streams supported in JAVA. Name I/O class of each stream. Which type of I/O stream should be used for web based applications?

D. Elaborate the significance of following line of code in JAVA:

```
BufferedReader br = new
                BufferedReader(new InputStreamReader(System.in));
```

E. Write difference between Overloading and Overriding?
Given the following code, which statement is true?

```
public interface HeavenlyBody { String describe(); }
class Star implements HeavenlyBody {
String starName;
public String describe() { return "star " + starName; }}

class Planet {
String name;
Star orbiting;
public String describe() {
return "planet " + name + " orbiting " + orbiting.describe();}}
```

Select the one correct answer:
(a) The code will fail to compile.
(b) The code defines a Planet has-a Star relationship.
(c) The code will fail to compile if the name starName is replaced with the name body Name throughout the declaration of the Star class.
(d) The code will fail to compile if the name starName is replaced with the name name throughout the declaration of the Star class.
(e) An instance of Planet is a valid instance of a HeavenlyBody.

F. Which of these array declaration statements are not legal?
Select the two correct answers.
(a) int[] i[] = { { 1, 2 }, { 1 }, {}, { 1, 2, 3 } };
(b) int i[] = new int[2] {1, 2};
(c) int i[][] = new int[][] { {1, 2, 3}, {4, 5, 6} };
(d) int i[][] = { { 1, 2 }, new int[2] };
(e) int i[4] = { 1, 2, 3, 4 };