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****Please answer questions: 1, 3, 6, 10, 11, plus two questions {answer seven and skip seven question}.*

1) Answer the following:

1) Each method *main()* can have only one thread; T/F?

2) An activity diagram models the …….…… that an object performs and the order in which it performs them.
a) attributes b) actions c) states d) state transitions

3) We use in Java the keyword..... to cause a variable or method to become a class wide variable or method.

4) A *runnable* thread can enter the……..……..state for a specified interval of time.

5) Methods declared in an interface can abstract or concrete; T/F?

6) Java: A method or variable is considered to have a package access if no access modifier is specified for that method or variable; T/F?

7) In Java, types are divided into two categories..... types and ……...…….types.

8) In Java, constructor can be overloaded; and to overload constructors, simply provide multiple constructor declarations with different signatures and it is allowed in Java; T/F?

9) A generic class must contain at least one generic method; T/F?

10) Write down five (or more, at least 5) primitive types in Java.

11) Which of these is to calculate (and return) the area of the circle in class Circle: {*select one, the most correct one*}

a) public void area( ) {
b) public static area(int radius) {
c) public double area(int radius) {
d) public int area( ) {
e) public double area( ) {
f) public area( ) {
g) public area(int radius) {

12) Multithreading: Operating systems employ a technique called…….....to prevent *starvation*.

13) One of the following five choices lists phases of a typical software life cycle in correct sequential order:

--design, analysis, implementation, testing
--design, analysis, testing, implementation
--analysis, design, testing, implementation
--analysis, design, implementation, testing
--analysis, design, requirements, testing

14) A runnable thread enters the terminated state when (either of these situations): 1) …… or 2) ……

15) Thread synchronization is necessary only for shared…….data {, i.e., data that may change during its lifetime}.
(a) mutable (b) immutable (c) both a and b

16) In multithreading in general (and when thread priority is used): A steady influx of higher-priority threads could indefinitely postpone the execution of lower-priority threads; and this issue is called (when indefinite postponement) ……...

17) Indefinite postponement (indefinite waiting) can occur in two cases:……..

2) (a) Explain requirements (2 – 3 lines).: .....

(b) The result of the requirement gathering process is the ..... which specifies (1 -2 lines) .....

3) Write the definition (the first line only) of implementation of a generic method called *myQavg()* that takes three parameters and return type is double{one lines only {**optional; this question is optional question*}

(b) Write a code fragment consisting of a single statement showing how to use the Integer wrapper class to convert a string containing digits to an integer and store it in a variable of type int.

(c) Write the method area() which is a member in the class Circle (inside the class Circle) in 2 lines only (complete method). This is not a complete program; this is not a complete class. {*****2 lines max*}

(d) Convert this code to the regular if statement (*conditional statement*): `double tax2 = price<100 ? 0.09 : 0.12;`

(e) convert this to enhanced if:

```
int quantity;
if ( h3 < 2500 ) then quantity3 = 150 else quantity3 = 250;
```

4) Use the wrapper classes for integer, double and character to create three arrays (7 elements each); call them integerArray1, doubleArray2, and characterArray3 the first array is initialized with 1, 2, …, 5; the second 1.1, 2.2, …, 5.5; the third: 'A', 'B', …'E' {three lines only}

5) (a) Write the code to define/declare an interface called *DashBoard3Buttons* that includes only one method {3 lines max}.

(b) At any time, a thread is said to be in one of several thread states (6 states), write down these states.

6) Answer two of the following three questions (skip one; answer two): (a) Write a *generic* method in Java that takes/accepts one parameter which is an array of *any type* and the method prints its elements

(b) Write the class definition of a generic class called *MyVehicle* (one line only, write the first line only;

(c) Write down the class definition of generic class called *MyGenericClass* only write the first line; and then write one line (in the driver class) to instantiate one object of MyGenericClass (*this is optional question*).

7) Write Java program that includes only one method (besides main) that outputs the average of two, three, or four numbers (method with variable number of arguments). The program asks the user to input 4 numbers (n1 .. n4), then the main calls a method to print the average of n1 and n2, then the average of n1,n2,n3, and so on; see the following sample output: ***note: refer to Variable-length argument list in section 7.13.*

```
n1 = 10.0   n2 = 20.0   n3 = 30.0   n4 = 40.0
Average of n1 and n2 is 15.0
Average of n1, n2 and n3 is 20.0
Average of n1, n2, n3 and n4 is 25.0
```

8) Write Java application for the following (*using arrays and multithreading with Runnable/Executor*): We need two arrays; each array is type integer and length 12 elements (make a separate array class). We need four threads as follows: 2 threads (call them t1 and t2) are filling numbers in the first array as follows {t1: 10, 12, 14, 16, …..; and t2: 50, 60, 70,..}; and 2 threads (t3, t4,) are filling the second array {t3: 5, 15, 25, ….. t4: : 100, 101, 102, . …}. At the end print the two arrays (from the driver class). Implement this program and provide sample run/output.

9) Write one Java program (*Runnable/Executor multithreaded*) to create three threads that will update array Y as follows. Given three arrays A, B, and Y of 25 integer elements each, and arrays A and B are filled with data, the three threads will fill array Y with the addition of the corresponding elements of A and B, that is: `Y[i] = A[i] + B[i]`. Use multithreading with synchronization correctly; fill A[] with value: 1, 2, 3, .., and fill B[] with: 9, 12, 15, 18, …etc. (implementation optional and recommended).

10) Using multithreaded and Runnable/Executor, write a program that uses threads to print the values from x to y with increment z. The multithreaded class called *MyTh*, so this code (in the driver class):

{ `MyTh t1 = new MyTh(5,45,10);` } >> thread t1 prints/outputs the values from 5 to 45 with increment 10; so the output is: 5, 15, 25, 35, 45. Two classes only (the threads class *MyTh* and the driver class); in the driver class instantiate three objects with different initial values, increments, final values. Provide two sample runs.

11) UML: Answer the following:

(a) UML: the UML diagram……..is to model the interactions between a system's clients and its use cases. The goal is to show the kinds of interactions users have with a system without providing the details—these are provided in other UML diagrams.

(b) The UML represents instance variables as an attribute name, followed by a colon and the type; T/F?

(c) In UML, ……..attributes are preceded by a plus (+) sign..

(d) Describe the meaning of the following operation listing that appears in a UML Class diagram for an object-oriented design of a calculator: add(x : Integer, y : Integer) : Integer

12) (a) When you share ……..… data across threads, declare the corresponding data fields……..….to indicate that the values of the variables will not change after they're initialized.

(a) mutable, final (b) mutable, static (c) immutable, static
(d) immutable, final (e) final, mutable (f) static, mutable

(b) Declaring instance variables with access modifier …… is known as data hiding or information hiding.

(c) Class diagram: The top compartment contains ……..……centered horizontally in boldface type; while the middle compartment contains the……... ,which correspond to instance variables in Java.

(d) A thread moves form the ……..… state to a *timed-waiting* state by wait or sleep {*fill in the blank*}

13) The Design phase is ……{*explain briefly in 3 – 5 lines*} ……

14) Write about Agile vs waterfall vs incremental models {similarities and difference; this is a research question}:
a)what it is b) similarities c) differences d) example.

*{**** note: you can take two more weeks for this question and submit this question 14 days after the due date}*

	Agile	vs Waterfall	vs Incremental models
what is			
similarities			
differences			
example			

Due: 11:59pm Friday 4/26. *{Note: from total 14 questions, answer seven questions and skip seven. The seven question you answer include: 1, 3, 6, 10, 11}.*

----------*end*----------