Object Oriented Analysis and Design: Assignment 1

Total Marks : 20

June 10, 2022

Question 1

Consider the following statements.

I. The user interface of a software must not be counter intuitive.

II. The cost of a software must be competitive with cost of other similar software product.

Which of the given options is correct?

Marks: 2 **MCQ**

a) Statements I and II both refer to functional requirements.

b) Statement I refers to functional requirement and Statement II refers to non-functional requirements.

c) Statement I refers to non-functional requirement and Statement II refers to functional requirements.

d) Statements I and II both refer to non-functional requirements.

Answer: (d)
Explanation: Functional requirements are those which refer to the correct working of the software. Non-functional requirements are those which refer to other aspects of a software like usability, portability, scalability, reliability etc. Hence, option (d) is correct.

Question 2

Consider the following statements. Which of them is NOT related to the challenge of management of software development process?

Marks: 2 **MCQ**

a) Developers are not experts of the problem domain in which the software has to be developed.

b) The number of lines of code of a software project is more than 100000.

c) Developers in a software development team work at different geographical locations.

d) Many developers leave jobs during development of the software system.

Answer: (a)
Explanation: The first one is a complexity coming from the problem domain.
The other three give rise to complexity due to software process management.
Hence, option (a) is the desired answer.

Question 3

Which of the following is NOT an example of common patterns of a software system?

Marks: 2 **MCQ**

a) Templates in C++

b) Libraries for data structures

c) Decomposing a problem into almost independent subproblems.

d) Math library in C

Answer: (c)
Explanation: Templates, data structure libraries, and math library are heavily used codes in a software system. They form common and important code patterns.
Decomposing a problem into subproblems, on the other hand, talks about another attribute of a complex software system.
Hence, option (c) is the desired answer.

Question 4

Consider the following statements.

I. In all automobiles, be it a car or a lorry or a tram, we can apply brake and press accelerator.

II. A car has an engine, a few seats, one steering, some wheels etc.

Which of the given options is correct?

Marks: 2 **MCQ**

a) Statements I and II both refer to abstraction.

b) Statement I refers to abstraction but statement II refers to decomposition.

c) Statement I refers to decomposition but statement II refers to abstraction.

d) Statements I and II both refer to decomposition.

Answer: (b)
Explanation:
Statement I implies that lorry, car, trams are special type of aitomobiles. So, this is abstraction.
Statement II implies that a car has many different components. This is decomposition.
Hence, option (b) is correct.

Question 5

Different types of shapes are listed (sorted alphabetically) below. Build them into a natural hierarchy.

1) Isosceles
2) Hexagon
3) Kite
4) Parallelogram
5) Pentagon
6) Polygon
7) Quadrilateral
8) Rectangle
9) Equilateral
10) Triangle
11) Trapezoid

What is at the root of the hierarchy?

Marks: 2 **MCQ**

a) Rectangle

b) Triangle

c) Trapezoid

d) Polygon

Answer: (d)
Explanation: The hierarchy is as follows:

Polygon
- Triangle
  - Isosceles
  - Equilateral
- Quadrilateral
  - Parallelogram
    - Rectangle
  - Trapezoid
  - Kite
- Pentagon
- Hexagon

So, the root of the hierarchy is Polygon Hence, option (d) is correct.

Question 6

Different types of shapes are listed (sorted alphabetically) below. Build them into a natural hierarchy.

1) Isosceles
2) Hexagon
3) Kite
4) Parallelogram
5) Pentagon
6) Polygon
7) Quadrilateral
8) Rectangle
9) Equilateral
10) Triangle
11) Trapezoid

Identify the set of leaf nodes in the given hierarchy.

Marks: 2 **MCQ**

a) {1, 2, 3, 5, 8, 9, 11}

b) {1, 2, 3, 4, 8, 9, 11}

c) {1, 2, 4, 5, 8, 9, 11}

d) {1, 2, 3, 5, 8, 9, 10}

Answer: (a)
Explanation: The hierarchy is as follows:

Polygon
- Triangle
  - Isosceles
  - Equilateral
- Quadrilateral
  - Parallelogram
    - Rectangle
  - Trapezoid
  - Kite
- Pentagon
- Hexagon

So, the leaves of the hierarchy are: Isosceles, Equilateral, Rectangle, Trapezoid, Kite, Pentagon, Hexagon.
Hence, option (a) is correct.

Question 7

Different types of shapes are listed (sorted alphabetically) below. Build them into a natural hierarchy.

1) Isosceles
2) Hexagon
3) Kite
4) Parallelogram
5) Pentagon
6) Polygon
7) Quadrilateral
8) Rectangle
9) Equilateral
10) Triangle
11) Trapezoid

Identify the correct hierarchy among the given components from the following options.

Marks: 2 **MCQ**

a) rectangle → triangle → polygon

b) triangle → isosceles → polygon

c) rectangle → parallelogram → quadrilateral

d) polygon → pentagon → hexagon

Answer: (c)
Explanation: The hierarchy is as follows:

Polygon
- Triangle
  - Isosceles
  - Equilateral
- Quadrilateral
  - Parallelogram
    - Rectangle
  - Trapezoid
  - Kite
- Pentagon
- Hexagon

Hence, option (c) is correct.

Question 8

Which of the following (X, Y) pairs denote a decomposition (X HAS-A Y)?

Marks: 2 **MSQ**

a) Star, Sun

b) University, Department

c) Employee, Manager

d) Molecule, Atom

Answer: (b), (d)
Explanation: A University consists of many departments.
A molecule consists of one or more atoms.
Sun is an example of a star.
Some employees are managers.
Hence, (b), (d) are correct options.

Question 9

Which of the following (X, Y) pairs denote abstraction (X IS-A Y)?

Marks: 2 **MSQ**

a) Manager, Employee

b) Bird, Mammal

c) Polygon, Shape

d) Wheel, Car

Answer: (a), (c)
Explanation: A manager is also an employee.
Birds are not mammals.
A polygon is a shape.
A car has wheels but wheels are not cars.
Hence, (a), (c) are correct options.

Question 10

Which of the following statements is NOT TRUE in the context of object oriented design?

Marks: 2 **MCQ**

a) Object oriented design models software systems as collections of cooperating objects.

b) The computing model for object oriented design is von Neumann.

c) Object oriented decomposition decomposes according to the key abstractions in the problem domain.

d) In Object oriented design services are invoked by sending messages.

Answer: (b)
Explanation: The computing model for Object Oriented Design is client server. All other options are correct. See slides for module 5 of week 1.
Hence, option (b) is the correct option.