PART A. [40 marks]

In the following questions choose one correct answers.

d 1. System development lifecycle (SDLC) provides structures, methods, controls and checklist. Which of the following is the structure in SDLC?

a. Data structure
b. Logical structure
c. Mathematical structure
d. Team structure

C 2. Which of the following does not belong to a system development lifecycle (SDLC)?

a. Deployment phase
b. Project initiation phase
c. Support phase
d. Implementation phase

C 3. Which is NOT a criterion that is used to determine how to define tasks for a work breakdown structure.

a. How to know when the task is complete.
b. How to estimate the effort required.
c. A logical way to determine its predecessor.
d. It should take one to five days.

b 4. "Customer decides to buy a shirt" is an example of what?

a. An external event
b. Activity prior to an event
c. A temporal event
d. Activity after an event.

C 5. Which of the following is not an UML?

a. Use case diagram
b. Class diagram
c. Entity relationship diagram
d. Activity diagram

b 6. When DFD fragment 3 is decomposed with 4 processes, the 4 processes are numbered as processes _____, respectively.

a. 1, 2, 3, and 4
b. 3.1, 3.2, 3.3, and 3.4
c. I, II, III, and IV
d. f3.1, f3.2, f3.3, and f3.4

C 7. One way to show multiple, independent alternative paths within an activity diagram is with a _____.

a. synchronization bar
b. swimlane
c. decision diamond
d. activity oval

b 8. A decision support system (DSS) is used by

a. Workers
b. Senior Managers
c. Middle Managers
d. Executives

d 9. Which of the following best describes the reason why projects fail?

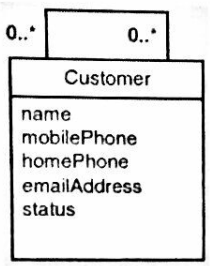
a. Technological problems
b. System is too complex
c. Wrong development methodology
d. Undefined project management practices

d 10. Workflows can be documented using _____.
   a. swimlanes
   b. use case diagrams
   c. class diagrams
   d. activity diagrams

d 11. An important step in using the CRUD technique is to _____.
   a. identify the system controls
   b. identify the external agents
   c. identify the business events
   d. identify the data entities

C 12. The number of associations that occur among specific things in a domain class diagram is called _____.
   a. a relationship
   b. an attribution
   c. multiplicity
   d. cardinality

a 13. The association shown on the following image is a(n) _____ association.



   a. Unary
   b. Binary
   c. n-ary
   d. Undefined

C 14. Which of the following relationships would be the most appropriate way to describe a relationship between an employee and his/her manager?
   a. Composition relationship
   b. Aggregation relationship
   c. Generalization/Specialization relationship
   d. Association relationship

a 15. An approach to the SDLC where the phases overlap is often referred to as the _____ approach.
   a. modified waterfall
   b. waterfall
   c. modified predictive
   d. spiral

In the following questions choose multiple correct answers.

ad 1. Which two of the followings are function requirements?
   a. Generate a list of customers
   b. Efficient and Reliable
   c. User-interface should be clear
   d. Send monthly report

abe 2. Which three of the following components describe locations and communication through networks?
   a. Location diagram
   b. Activity-location matrix
   c. Activity diagram
   d. Black hole
   e. Activity-data matrix
   f. Use case diagram

abe 3. Which three of the following models are adaptive models in SDLC? (choose three)
   a. Spiral model
   b. Phased development model
   c. Modified waterfall model
   d. Waterfall model
   e. Prototyping model
   f. Parallel Model

ae 4. The "+" in FURPS+ includes which of the following types of requirements? (choose two)
   a. Supportability requirements
   b. Performance constraints
   c. Reliability constraints
   d. Nonfunctional requirements
   e. Design constraints
   f. User interface requirements

ad 5. Two primary techniques to identify use cases are _____ and _____. (choose two)
   a. user goal technique
   b. CRUD technique
   c. system response technique
   d. event decomposition technique
   e. business function technique
   f. user procedure technique

PART B. [15 marks]

B1. (5 marks)

(1) List three methods to describe processes in DFDs. (3 marks)

Structured English

Decision Table

Decision Tree

(2) If the decision logic is complex, which method(s) would you choose? (2 marks)

Decision Table

Decision Tree

B2. (5 marks) What are the basic steps to create DFDs (Data Flow Diagrams)?

Create Use Case
Draw a context diagram
Draw Diagram 0
Draw lower-level diagrams
Check the diagrams

B3. (5 marks) List three types of events and brief descriptions for each.

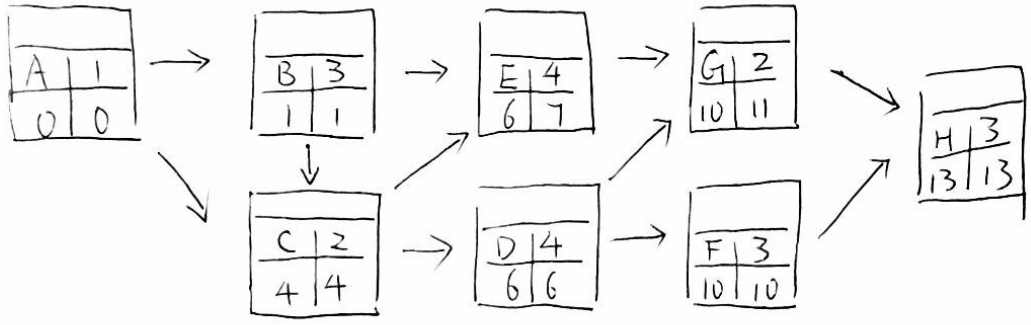
External Event: Occurs outside of the system
Temporal Event: Occurs as a result of reaching a point of time
State (Internal) Event: Occurs when something happens inside the system that triggers some process

PART C. [45 marks]

C1. (15 marks) Given the following project activities and duration information of each task. Assume that the tasks will start as soon as possible.

Task Name	ID	Immediate Predecessors	Duration (in days)
Collect requirements	A		1
Create reports	B	A	3
Analyze requirements	C	A, B	2
Design processes	D	C	4
Design data	E	B, C	4
Design GUI	F	D	3
Program	G	D, E	2
Test and install	H	G, F	3

(1) Use a PERT/CPM chart to schedule the tasks. (9 marks)



(2) What is the total duration of the project? (2 marks)

16 days

(3) What is the critical path? Please specify the Task IDs on the critical path sequentially. (4 marks)

A B C D F H

C2. (15 marks) The one-time cost for developing an Information system is 10000. The costs for maintaining the system are 900, 1000, 1000, 1100, and 1100 a year. The benefits of the system from year 1 to year 5 are 5000, 5100, 5200, 5300, and 5400. Suppose the discount interest rate is 10%. (During the calculation, round the numbers to two decimal places in each step)

(1) Calculate the net present value of each year. (6 marks)

	Year 1	Year 2	Year 3	Year 4	Year 5
Net Benefit/cost = Benefit − cost	4100	4100	4200	4200	4300
Discount Factor = $\frac{1}{(1+\text{InterestRate})^n}$	0.91	0.83	0.75	0.68	0.62
NPV = (Net Benefit/cost) * Discount Factor	3731	3403	3150	2856	2666

(2) When is the break-even point? (6 marks)

Cumulative NPV:
Year 0 −10000
Year 1 −10000 + 3731 = −6269
Year 2 −6269 + 3403 = −2866
Year 3 −2866 + 3150 = 284

365 * 2866/3150 ≈ 332

The break-even point is at 2 years and 332 days.

(3) Calculate return on investment with discount. (3 marks)

$$\frac{\text{Sum of NPV}}{\text{development cost}} = 158.06\%$$

C3. (15 marks) Construct an ERD for a car insurance company whose customers own one or more cars each. Each car has associated with it zero or more recorded accidents. For each customer we also want to model the neighborhood the customer lives in (affects insurance rates). Please add any additional attributes that might be necessary in this diagram.