

Department of Computer Science and Information Technology

Name				Id	
Course	CSCI380 Software Engineering				
Date	20 April	Time	11:00 -12:15	Duration	75 minutes
Pages	6	Calculators	Allowed	Documents	Not Allowed

Question I: [15 points] Choose the correct answers

Part MCQ (10 points = 5x2)

- What is the primary purpose of requirements engineering in software development?
 - To design the user interface of the software
 - To implement coding standards and best practices
 - To gather, analyze, specify, and validate software requirements
 - To conduct software testing and quality assurance
- Which software requirement describes what the system should do without specifying how it should be implemented?
 - Functional requirement
 - Non-functional requirement
 - Design requirement
 - Performance requirement
- What is the primary goal of software testing?
 - To ensure zero defects in the software
 - To find and fix defects in the software
 - To design the user interface of the software
 - To document the software requirements
- What is the primary goal of project management?
 - Completing tasks within budget
 - Maximizing project scope
 - Delivering projects on time and within budget while meeting quality objectives
 - Minimizing stakeholder involvement
- What is the purpose of a use case description in software engineering?
 - To provide a detailed description of the interactions between actors and the system
 - To specify the implementation details of a use case
 - To define the user interface elements of a system
 - To represent the flow of control within a system

Part True/False (5 points = 5x1)

- Software engineering only involves writing code and does not encompass other activities such as requirements gathering, testing, and maintenance.
True - False
- Software maintenance is not an important phase in the software development life cycle and can be skipped.
True - False
- Project managers in software engineering are responsible for allocating resources, managing project timelines, and ensuring that project deliverables meet quality standards and stakeholder requirements.
True - False
- Project management in software engineering involves planning, organizing, directing, and controlling resources to achieve specific project goals within constraints such as time, cost, and scope.
True - False
- Use case diagrams primarily focus on the internal workings of the system, detailing the algorithms and data structures used.
True - False

Question 2: Project Management [30 points]

Consider the following assumption: a project is broken into the tasks shown in the following table along with the dependencies, duration and needs in terms of staff for each task.

Task	Duration (Weeks)	Dependency	Staff
A	4		2
B	3	A	1
C	6	B	3
D	5	C	2
E	3	C	4
F	4	E	2
G	3	D, F	1
H	2	G	2

Part A – Gantt (15):

- 1. (10 pts)** Build the Gantt chart to calculate the duration to finish the project,
- 2. (5 pts)** Calculate the minimum number of staff that should be employed in this project.

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26 ...
A	2	2	2	2																						
B					1	1	1																			
C								3	3	3	3	3	3													
D														2	2	2	2	2								
E														4	4	4										
F																	2	2	2	2						
G																					1	1	1			
H																								2	2	
# of Staff	4	4	4	4	1	1	1	3	3	3	3	3	3	6	6	6	4	4	2	2	1	1	1	2	2	

- 1. On the graph**
- 2. The minimum number of staff is (2 + 4 = 6) where tasks D & E intersects.**

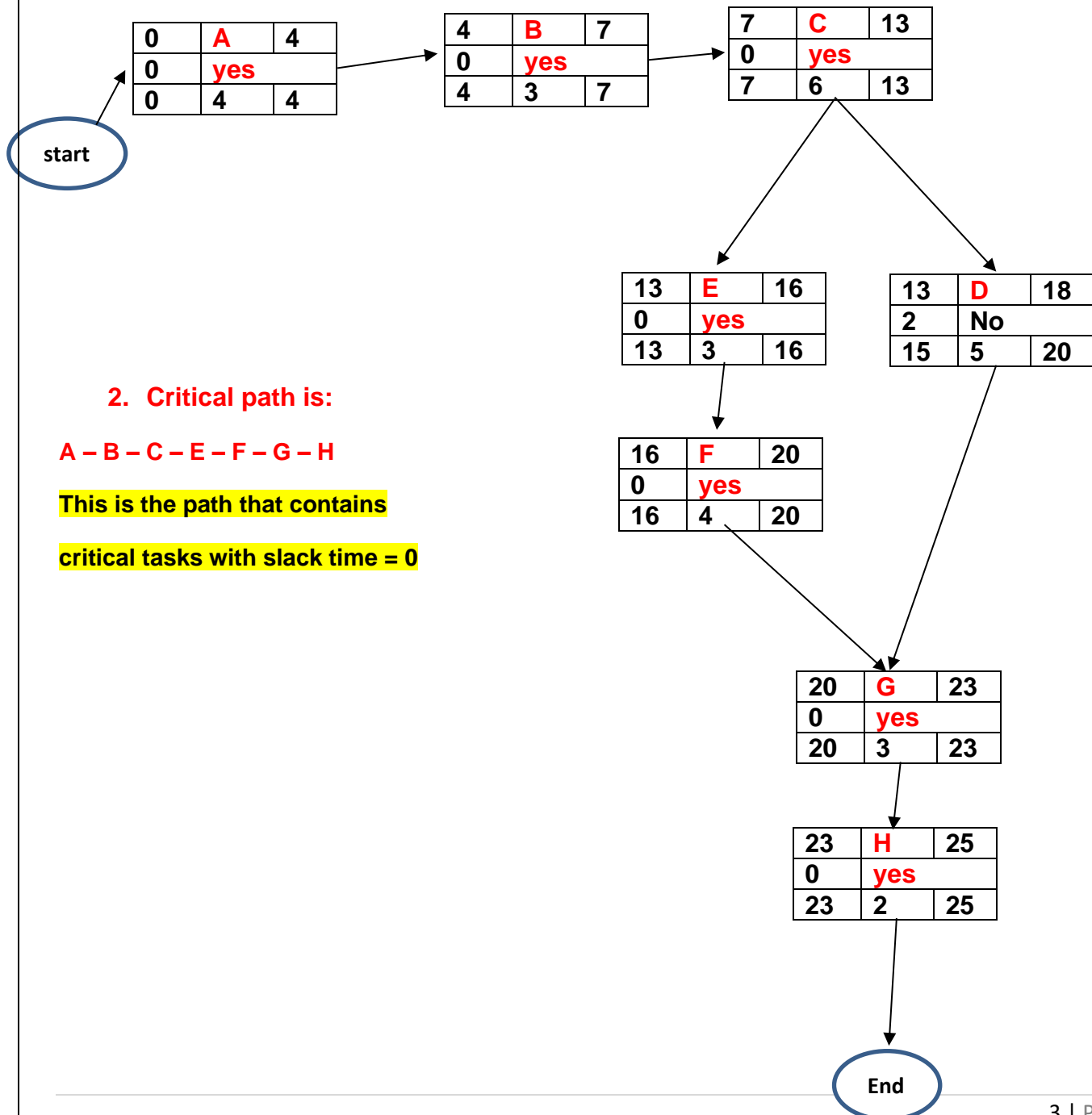
Part B – PERT (15 points):

- 1. (10 pts)** Give the PERT graph/chart for the above project, consider that each node should have the following information:

Note that you can use circles and arrows instead of the boxes.

Early Start	Task Number	Early Finish
Slack Time	Critical? Yes or NO	
Late Start	Duration	Late Finish

- 2. (5 pts)** Using the above Pert diagram, find the critical path. Justify.

1. Solution

Question 3: Feasibility Analysis [15 points]

Your friend is studying the feasibility for opening a new company. He/She provides you with the below table indicating the **costs and the benefits for the system on 4 years**, with a **discount factor of 13%**. Find the **Net Present Value**

- When does the system pay back for its cost? (Use cost benefit analysis.)
- Calculate the Present Value (PV) for each year and fill the table.

Year	0	1	2	3	4
Discount factor 13%	1	0.88	0.78	0.69	0.61
Development costs	(\$60,000.00)				
Operation Costs	-	(\$40,000.00)	(\$45,000.00)	(\$85,000.00)	(\$75,000.00)
Present value Costs	(\$60,000.00)	(\$35,398.23)	(\$35,241.60)	(\$58,909.26)	(\$45,998.90)
Total Present Value of lifetime costs	(\$60,000.00)	(\$95,398.23)	(\$130,639.83)	(\$189,549.09)	(\$235,548.00)
Annual benefits	\$0.00	\$95,000.00	\$100,000.00	\$175,000.00	\$170,000.00
Present value benefits	\$0.00	\$84,070.80	\$78,314.67	\$121,283.78	\$104,264.18
Total Present value of lifetime benefits	\$0.00	\$84,070.80	\$162,385.47	\$283,669.25	\$387,933.43
Total Present value of lifetime	(\$60,000.00)	(\$11,327.43)	\$31,745.64	\$94,120.16	\$152,385.43

The system will start pay back itself between year 1 and 2

Question 4: Use Case Analysis [40 points]

"Online Auction System" is a website that allows users to sell/buy multiple products online by bidding for an item. The system contains the following requirements:

A user can:

- a. Register / Login to the system.
The login process requires a two-factor authentication. The user should enter the code shared on each login.
- b. Edit his profile by either changing his username or the password.

A seller, is a user that can:

- a. Post a product to be viewed and sold.
- b. View the bidding information.
- c. Close the auction, in which he announces the winner and ships the product to the buyer if the buyer confirmed buying the product.

A buyer/bidder, is a user that can:

- a. Search for a certain product to buy, the user then can choose to browse the product details.
- b. Place a bidding to buy the product.
- c. Cancel the bidding at any time.
- d. Confirm receiving the product from the seller once the auction is closed and he is selected as a winner.

An administrator is a user that can:

- a. Manage users, by either deleting a user, or viewing the history of other users!
- b. Manage bidding processes in which he may check for any scams.

Questions:

Draw the use-case model diagram:

1. Show the interaction between actors and each of the use-cases in the system!
2. Show the dependencies among use cases (initiates, includes, extends, or depends on).

