Guided Exercises / Practical Work 1

Your mind is your prison or your paradise

Exercise 1:

You are part of a team developing a mobile application for blood donation management.

Project Tasks

ID	Task Name	Duration (Days)	Predecessor(s)
T1	Requirements Analysis	5	—
T2	System Design	4	T1
T3	Database Design	3	T2
T4	UI/UX Design	4	T2
T5	Backend Development	8	T3
T6	Frontend Development	7	T4
T7	Integration	4	T5, T6
T8	Testing	5	T7
T9	Deployment	2	T8

Questions

1. Identify the starting and ending tasks of the project.
2. Draw the Gantt chart assuming the project starts on Day 1.
3. Determine the total project duration.
4. Identify the critical path.

Exercise 2:

A company wants to develop an e-learning web platform.

Project Tasks

ID	Task Name	Duration (Days)	Predecessor(s)
T1	Project Planning	3	—
T2	Requirement Specification	4	T1
T3	Architecture Design	5	T2
T4	Content Management Module	6	T3
T5	User Management Module	5	T3
T6	Payment Integration	4	T4, T5
T7	Testing	5	T6
T8	Release	2	T7

Questions

1. Which tasks can be executed in parallel?
2. Construct the Gantt chart.
3. Calculate the start and end day for each task.
4. What is the impact on the project timeline if the Testing phase is delayed by 3 days?

Exercise 3:

Your team is developing an AI chatbot for customer support.

Project Tasks

ID	Task Name	Duration (Days)	Predecessor(s)
T1	Data Collection	5	—
T2	Data Preprocessing	4	T1
T3	Model Training	7	T2
T4	Model Evaluation	3	T3
T5	API Development	5	T4
T6	User Interface	6	T2
T7	Integration	4	T5, T6
T8	Deployment	2	T7

Questions

1. Draw the Gantt chart for the entire project.
2. Identify the critical tasks (tasks on the critical path).
3. Calculate the total duration of the project.
4. Suggest practical strategies to reduce the overall project duration.

Exercise 4 :

A hospital wants to implement a smart management system.

Project Tasks

ID	Task Name	Duration (Days)	Predecessor(s)
T1	Needs Assessment	4	—
T2	System Design	5	T1
T3	Database Implementation	6	T2
T4	Security Module	5	T2
T5	Application Development	8	T3, T4
T6	Testing	5	T5
T7	Staff Training	3	T6
T8	System Launch	2	T7

Questions

1. Construct the Gantt chart.
2. Determine which tasks have dependencies and classify them (finish-to-start, etc.).
3. Identify the critical path and justify your answer.
4. Explain why understanding task dependencies is crucial in project management.

Exercise 5:

You are developing a simple chatbot using Natural Language Processing (NLP). The project consists of the following tasks:

Task	Duration (days)	Dependencies
A Collect conversational data	3	–
B Data cleaning	2	A
C Train NLP model	4	B
D Develop user interface	3	–
E Integrate model + interface	2	C, D
F User testing	2	E

1. Draw the corresponding Gantt chart.

2. What is the total project duration?

3. Identify the **critical path**.

4. If model training (Task C) is delayed by 1 day, what is the impact on the final delivery date? Justify your answer.

Exercise 6:

Development of a medical image classification system (MRI scans) with a team of three members:

- Dev1: Developer 1
- Dev2: Developer 2
- DS: Data Scientist (can work on only one task at a time)

Task	Duration	Assigned to	Dependencies
T1 Image annotation	5 days	Dev1	–
T2 Data augmentation	3 days	DS	T1
T3 CNN implementation	6 days	Dev2	T2
T4 Cross-validation	2 days	DS	T3
T5 Server deployment	2 days	Dev1	T4
T6 Report writing	4 days	Dev2	T4

Constraints

- The Data Scientist cannot work on two tasks simultaneously.
- Developers may work in parallel on independent tasks.

Questions

1. Propose a Gantt chart that respects resource constraints.
2. Are there idle periods for any team member? If yes, suggest a possible task reassignment to optimize resource usage.
3. Calculate the **free float** (free slack) for Task T6 without delaying the project end date.
4. What is the minimum project duration under these constraints?

Exercise 7:

Development of a movie recommendation system over 3 sprints of 2 weeks each (10 working days per sprint). Each sprint includes:

- Sprint planning: 0.5 day
- Development work: 8 days
- Sprint review: 0.5 day
- Retrospective: 0.5 day

Sprint content:

- **Sprint 1:** Data collection + preprocessing pipeline
- **Sprint 2:** Train two models (collaborative filtering + content-based)
- **Sprint 3:** Model comparison + deployment on cloud platform

Questions

1. Construct a Gantt chart representing the 3 sprints, including **milestones** at the end of each sprint.
2. The client requests a live demonstration after Sprint 2. Add this task to your Gantt chart (assume 1 day preparation + 0.5 day demo).
3. A critical bug is discovered at the end of Sprint 3 requiring 2 days of emergency fixing before deployment. Show the impact on the final delivery date and propose a mitigation strategy that minimizes delay.
4. Discuss how Gantt charts complement (or conflict with) agile methodologies like Scrum in AI project management.