Grade 12 A/L ICT

Lesson 7: System Analysis and Design

- 7.1 Systems Concept and Classification of Systems
- 7.2 Types of Information Systems
- 7.3 System Development Models and Methodologies
- 7.4 Structured Systems Analysis and Design Method (SSADM)
- 7.5 Preliminary Investigation and Feasibility Study
- 7.6 Requirement Analysis and Analysis Tools: DFD, LDS and BSO
- 7.7 Logical and Physical Design of the Proposed System
- 7.8 Developing and Testing the System
- 7.9 Deploying the System: Changeover, Training and Maintenance
- 7.10 Off-the-Shelf Packages, Gap Analysis and Business Process Reengineering

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Grade 12 A/L ICT · Lesson 7

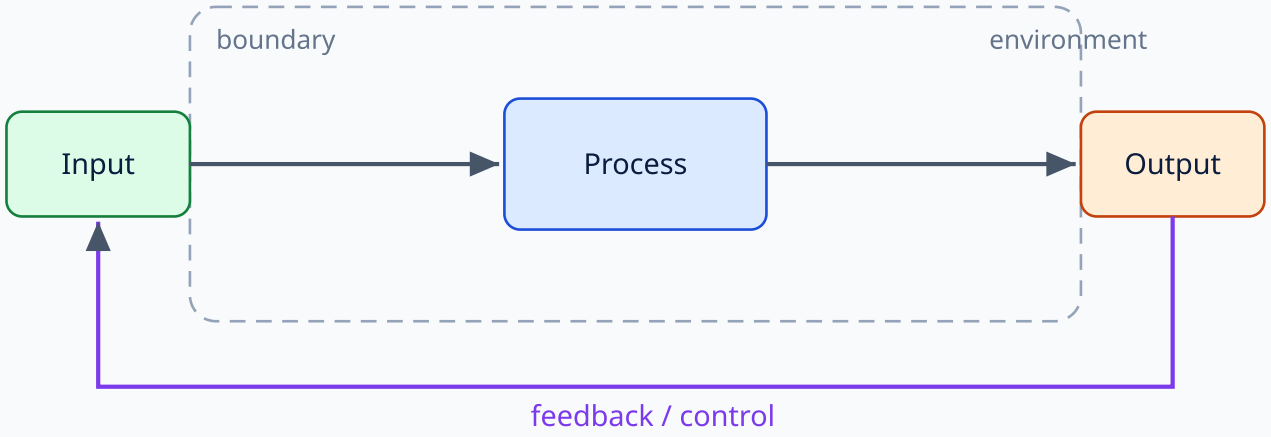
7.1 Systems Concept and Classification of Systems

Syllabus 7.1. A **system** is a set of related parts working together towards a common goal. You learn the **characteristics** of a system (input, process, output, boundary, environment, feedback, control) and **classify** systems as open/closed, natural/manmade and living/physical with examples.

1. What is a system?

A system takes **inputs**, **processes** them and produces **outputs** to meet a **goal**. A school, the human body and a supermarket billing system are all systems.

A system: input → process → output, with feedback and a boundary



Input–process–output with feedback and boundary

2. Characteristics

Boundary
Separates the system from its environment.

Environment
Everything outside that affects the system.

Feedback
Output information returned to adjust input or process.

Control
Compares output with goals and corrects the system.

3. Classification

Type	Meaning	Example
Open	Interacts with its environment	A business, the human body
Closed	No (or very little) exchange with environment	A sealed chemical reaction

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Natural	Formed by nature	Solar system, river
Manmade	Designed by people	Railway, banking system
Living	Has life processes	A plant, an ecosystem
Physical	Made of non-living tangible parts	A computer, a car

🧱 **Worked example: Classify a school canteen billing system.**
It is **open** (takes orders and money from outside), **manmade** and **physical**. Input = orders; process = price lookup and totals; output = bill; feedback = daily sales report used to change stock.

💡 Think of a thermostat: it measures room temperature (feedback) and switches the AC (control).

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Digital twins in 2026 model a real factory or city as a live system with sensor feedback.

Key Words

System – Related parts working together to reach a goal.

Input – Data or resources entering a system.

Process – Changing inputs into outputs.

Output – Result produced by a system.

Boundary – Line separating a system from its environment.

Environment – Things outside a system that affect it.

Feedback – Output information sent back to adjust the system.

Control – Checking output against goals and correcting.

Open system – System that interacts with its environment.

Closed system – System with no exchange with its environment.

Manmade system – System designed and built by people.

Subsystem – A smaller system inside a larger system.

Sample Q&A

1. Define a system.

Answer: A set of related components that work together to achieve a common goal.

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2. List four characteristics of a system.

> **Answer:** Input, process, output, boundary (also environment, feedback, control).

3. What is feedback?

> **Answer:** Information about output returned to adjust inputs or processing.

4. Open vs closed system?

> **Answer:** Open systems exchange with the environment; closed systems do not.

5. Give a natural and a manmade system.

> **Answer:** Natural: solar system. Manmade: banking system.

6. What is a subsystem?

> **Answer:** A part of a system that is itself a system, e.g. the payroll in a business.

MCQ

1. A system is best defined as

A. any single computer part
B. a building with no people
C. related parts working towards a common goal
D. a list of random data
E. only a computer program

2. Which separates a system from its environment?

A. output
B. input
C. feedback
D. process
E. boundary

3. A business that buys from suppliers and sells to customers is

A. an open system
B. not a system
C. a living system only
D. a closed system
E. a natural system only

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4. Returning output information to adjust input is

A. storage
B. boundary
C. environment
D. feedback
E. encoding

5. The solar system is an example of a

A. manmade system
B. software system
C. natural system
D. transaction system
E. information system

6. A car is mainly a

A. natural system
B. physical system
C. living system
D. closed social system
E. abstract number

7. Control in a system

A. compares output with goals and corrects
B. removes all inputs
C. only stores files
D. prints the output only
E. deletes the boundary

8. A plant is classified as a

A. closed computer
B. manmade system
C. living system
D. physical machine
E. data file

9. Which term means: “Related parts working together to reach a goal”?

A. Control
B. Process
C. Manmade system
D. Environment
E. System

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10. Which term means: “Data or resources entering a system”?

A. Open system
B. Input
C. Output
D. Feedback
E. Subsystem

11. Which term means: “Changing inputs into outputs”?

A. Boundary
B. System
C. Closed system
D. Control
E. Process

12. Which term means: “Result produced by a system”?

A. Manmade system
B. Input
C. Open system
D. Output
E. Environment

13. Which term means: “Line separating a system from its environment”?

A. Feedback
B. Process
C. Closed system
D. Boundary
E. Subsystem

14. Which term means: “Things outside a system that affect it”?

A. Environment
B. Control
C. Output
D. System
E. Manmade system

15. Which term means: “Output information sent back to adjust the system”?

A. Feedback
B. Open system
C. Input
D. Subsystem
E. Boundary

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16. Which term means: “Checking output against goals and correcting”?

A. Closed system
B. System
C. Process
D. Environment
E. Control

17. Which term means: “System that interacts with its environment”?

A. Output
B. Open system
C. Feedback
D. Manmade system
E. Input

18. Which term means: “System with no exchange with its environment”?

A. Boundary
B. Control
C. Closed system
D. Subsystem
E. Process

19. Which term means: “System designed and built by people”?

A. Output
B. Manmade system
C. Open system
D. System
E. Environment

20. Which term means: “A smaller system inside a larger system”?

A. Boundary
B. Closed system
C. Input
D. Subsystem
E. Feedback

Structured Questions

1. Define a system and give two examples. *(3 marks)*

> Related parts working to a common goal; e.g. school; banking system.

2. Draw and label an IPO model with feedback. *(3 marks)*

> Input → process → output; feedback arrow from output to input; boundary around process.

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3. Distinguish open and closed systems with examples. *(2 marks)*

> Open exchanges with environment (business); closed does not (sealed reaction).

4. Explain the role of control and feedback. *(3 marks)*

> Feedback reports output; control compares with goals; adjusts inputs or process.

5. Classify a school canteen billing system. *(5 marks)*

> Open; manmade; physical; inputs orders; output bills.

Summary

- A system has parts working to a goal.
- Input, process, output, boundary, environment.
- Feedback and control keep it on track.
- Open or closed; natural or manmade.
- Living or physical systems.

MCQ answer key – 7.1

1. **C** – Goal-directed parts.
2. **E** – Boundary.
3. **A** – Interacts with environment.
4. **D** – Feedback.
5. **C** – Natural.
6. **B** – Physical.
7. **A** – Compare and correct.
8. **C** – Living.
9. **E** – System – Related parts working together to reach a goal.
10. **B** – Input – Data or resources entering a system.
11. **E** – Process – Changing inputs into outputs.
12. **D** – Output – Result produced by a system.
13. **D** – Boundary – Line separating a system from its environment.
14. **A** – Environment – Things outside a system that affect it.
15. **A** – Feedback – Output information sent back to adjust the system.
16. **E** – Control – Checking output against goals and correcting.
17. **B** – Open system – System that interacts with its environment.
18. **C** – Closed system – System with no exchange with its environment.
19. **B** – Manmade system – System designed and built by people.
20. **D** – Subsystem – A smaller system inside a larger system.

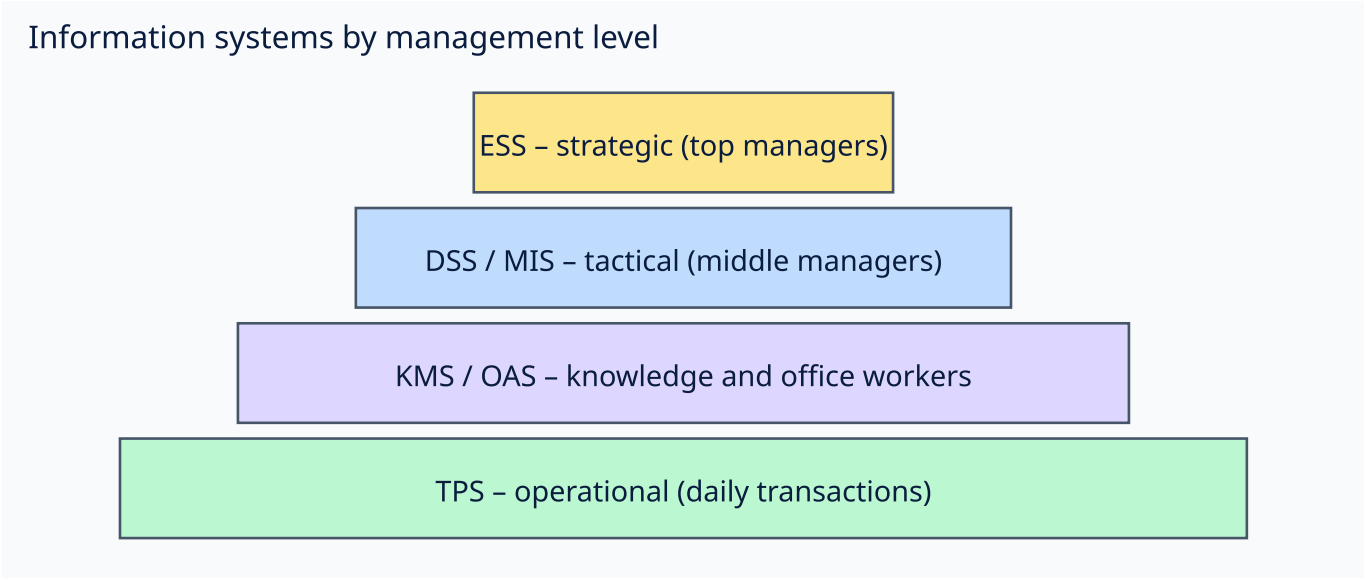
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Grade 12 A/L ICT · Lesson 7

7.2 Types of Information Systems

Syllabus 7.2. Organisations use different **manmade information systems** for different objectives. You compare **OAS, TPS, MIS, DSS, ESS, GIS, KMS, CMS, ERP** and **smart systems** by who uses them and what they do.

1. Systems by management level



Information systems pyramid

System	Objective / function	Example
OAS	Office productivity: documents, email, scheduling	Word processor, shared calendar
TPS	Record day-to-day transactions accurately	Supermarket POS, ATM
MIS	Summary reports for middle managers	Monthly sales report
DSS	Models and what-if analysis for semi-structured decisions	Loan approval model
ESS	Dashboards for strategic decisions by top managers	CEO KPI dashboard
GIS	Store and analyse location (map) data	Flood-risk map
KMS	Capture and share organisational knowledge	Company wiki, FAQ base
CMS	Create and manage website content without coding	WordPress
ERP	Integrate all departments in one database	SAP, Odoo
Smart system	Sensors + AI to act automatically	Smart traffic lights

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2. How they link

A **TPS** produces the raw data; an **MIS** summarises it; a **DSS** uses it in models; an **ESS** shows key trends to top management. **ERP** joins these across departments.

🧱 **Worked example: A supermarket chain: name the system for (a) each sale, (b) weekly branch report, (c) choosing where to open a new branch.**
(a) **TPS** (POS). (b) **MIS**. (c) **DSS** with **GIS** location data; the CEO sees the result on an **ESS** dashboard.

💡 Remember the ladder: TPS (operations) → MIS (control) → DSS (analysis) → ESS (strategy).

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026 many ERP and CMS products include generative-AI assistants that draft reports and pages.

Key Words

Office Automation System – Tools for office work like documents and email.

Transaction Processing System – Records routine daily transactions.

Management Information System – Produces summary reports for managers.

Decision Support System – Uses models for what-if decision analysis.

Executive Support System – Dashboards for strategic top-level decisions.

Geographical Information System – Stores and analyses map-based data.

Knowledge Management System – Captures and shares expert knowledge.

Content Management System – Manages website content without coding.

Enterprise Resource Planning – Integrates all departments in one system.

Smart system – Uses sensors and AI to act automatically.

Dashboard – Visual summary of key indicators.

What-if analysis – Testing results of changing input values.

Sample Q&A

1. What is the main job of a TPS?

Answer: To record routine transactions accurately and quickly.

2. MIS vs DSS?

Answer: MIS gives regular summary reports; DSS supports specific decisions with models.

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3. Who uses an ESS?

> **Answer:** Top (strategic) managers.

4. Give a use of GIS.

> **Answer:** Mapping flood-risk areas or planning bus routes.

5. Why use ERP?

> **Answer:** One shared database removes duplicate data between departments.

6. What is a CMS?

> **Answer:** Software to create and manage web content, e.g. WordPress.

MCQ

1. A supermarket POS that records each sale is a

A. TPS
B. ESS
C. GIS
D. CMS
E. KMS

2. Monthly summary reports for middle managers come from a

A. OAS
B. MIS
C. TPS
D. CMS
E. smart system

3. What-if analysis for a loan decision uses a

A. DSS
B. TPS
C. KMS
D. CMS
E. OAS

4. A CEO KPI dashboard is an

A. TPS
B. OAS
C. ESS
D. GIS
E. CMS

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5. Analysing flood-risk maps uses a

A. OAS
B. GIS
C. TPS
D. ERP
E. CMS

6. WordPress is an example of a

A. DSS
B. GIS
C. TPS
D. CMS
E. ESS

7. One integrated database for HR, finance and stock is

A. ERP
B. GIS
C. OAS
D. DSS
E. KMS

8. Smart traffic lights that adapt using sensors are a

A. CMS
B. closed TPS
C. KMS only
D. OAS
E. smart system

9. Which term means: “Tools for office work like documents and email”?

A. Office Automation System
B. Dashboard
C. Management Information System
D. Geographical Information System
E. Content Management System

10. Which term means: “Records routine daily transactions”?

A. What-if analysis
B. Transaction Processing System
C. Knowledge Management System
D. Decision Support System
E. Enterprise Resource Planning

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11. Which term means: “Produces summary reports for managers”?

A. Smart system
B. Office Automation System
C. Executive Support System
D. Management Information System
E. Content Management System

12. Which term means: “Uses models for what-if decision analysis”?

A. Geographical Information System
B. Transaction Processing System
C. Dashboard
D. Enterprise Resource Planning
E. Decision Support System

13. Which term means: “Dashboards for strategic top-level decisions”?

A. Smart system
B. What-if analysis
C. Management Information System
D. Knowledge Management System
E. Executive Support System

14. Which term means: “Stores and analyses map-based data”?

A. Office Automation System
B. Geographical Information System
C. Dashboard
D. Content Management System
E. Decision Support System

15. Which term means: “Captures and shares expert knowledge”?

A. What-if analysis
B. Enterprise Resource Planning
C. Executive Support System
D. Knowledge Management System
E. Transaction Processing System

16. Which term means: “Manages website content without coding”?

A. Office Automation System
B. Smart system
C. Content Management System
D. Management Information System
E. Geographical Information System

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17. Which term means: “Integrates all departments in one system”?

A. Knowledge Management System
B. Decision Support System
C. Transaction Processing System
D. Enterprise Resource Planning
E. Dashboard

18. Which term means: “Uses sensors and AI to act automatically”?

A. Management Information System
B. Content Management System
C. Smart system
D. What-if analysis
E. Executive Support System

19. Which term means: “Visual summary of key indicators”?

A. Office Automation System
B. Enterprise Resource Planning
C. Dashboard
D. Geographical Information System
E. Decision Support System

20. Which term means: “Testing results of changing input values”?

A. Knowledge Management System
B. Smart system
C. Transaction Processing System
D. Executive Support System
E. What-if analysis

Structured Questions

1. Compare TPS and MIS. *(2 marks)*

> TPS records transactions (operational); MIS summarises them into reports (tactical).

2. Explain DSS with an example. *(2 marks)*

> Models and what-if for semi-structured decisions; e.g. pricing model.

3. State two features of an ESS. *(2 marks)*

> Summarised dashboards; external and trend data for strategy.

4. Why do firms adopt ERP? *(4 marks)*

> Integrates departments; single data source; reduces duplication; faster reporting.

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5. Match systems to a supermarket chain. *(4 marks)*

> POS = TPS; weekly report = MIS; new branch = DSS + GIS; CEO = ESS.

Summary

- TPS records daily transactions.
- MIS summarises for managers.
- DSS and ESS support decisions.
- GIS maps; KMS shares knowledge; CMS manages web content.
- ERP integrates; smart systems act with sensors.

MCQ answer key – 7.2

1. **A** – TPS.
2. **B** – MIS.
3. **A** – DSS.
4. **C** – ESS.
5. **B** – GIS.
6. **D** – CMS.
7. **A** – ERP.
8. **E** – Smart.
9. **A** – Office Automation System – Tools for office work like documents and email.
10. **B** – Transaction Processing System – Records routine daily transactions.
11. **D** – Management Information System – Produces summary reports for managers.
12. **E** – Decision Support System – Uses models for what-if decision analysis.
13. **E** – Executive Support System – Dashboards for strategic top-level decisions.
14. **B** – Geographical Information System – Stores and analyses map-based data.
15. **D** – Knowledge Management System – Captures and shares expert knowledge.
16. **C** – Content Management System – Manages website content without coding.
17. **D** – Enterprise Resource Planning – Integrates all departments in one system.
18. **C** – Smart system – Uses sensors and AI to act automatically.
19. **C** – Dashboard – Visual summary of key indicators.
20. **E** – What-if analysis – Testing results of changing input values.

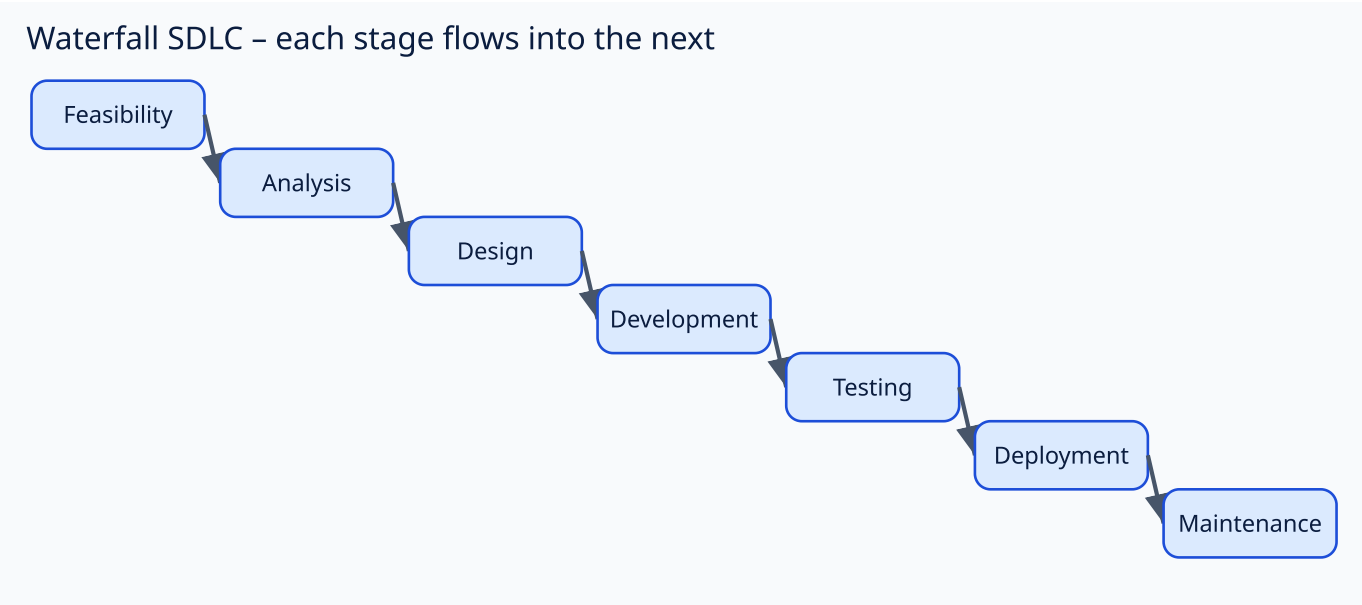
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7.3 System Development Models and Methodologies

Syllabus 7.3. Software is built using a **development model**: **Waterfall**, **Spiral**, **Agile**, **Prototyping** or **RAD**. You learn the SDLC stages in Waterfall, the phases of Spiral, when each model fits, and the **structured** and **object-oriented** methodologies. A simple project plan shows the **critical path**.

1. Waterfall and the SDLC



Waterfall stages

In **Waterfall** each stage (feasibility → analysis → design → development → testing → deployment → maintenance) is finished and signed off before the next starts. It suits projects with **clear, stable requirements**.

2. Other models

Spiral
Repeated loops: planning → risk analysis → engineering → evaluation. Best for large, risky projects.

Agile
Short sprints deliver working parts; customer feedback each sprint. Best when requirements change.

Prototyping
Build a quick model, let users try it, refine. Best when users are unsure of needs.

RAD
Rapid Application Development: reusable components, time-boxed, heavy user involvement.

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3. Methodologies

Structured methodology splits the system into **processes and data flows** (DFDs, top-down). **Object-oriented** methodology models **objects** with attributes and methods (classes, inheritance, UML).

4. Planning a project: critical path

Task	Activity	Weeks	After	Earliest start	Earliest finish	Slack
A	Feasibility	2	–	0	2	0
B	Analysis	4	A	2	6	0
C	Design	3	B	6	9	0
D	Hardware order	2	B	6	8	5
E	Coding	4	C	9	13	0
F	Testing	2	D,E	13	15	0
G	Deployment	1	F	15	16	0

🧱 **Worked example: Find the project duration and the critical path.**
Forward pass: EF(E) = 13, EF(D) = 8, so F starts at 13. Duration = **16 weeks**. Tasks with zero slack form the **critical path A–B–C–E–F–G**. Task D has slack 5 weeks.

💡 A delay on any critical task delays the whole project; a delay within slack does not.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* DevOps in 2026 joins development and operations with continuous integration and delivery (CI/CD) pipelines.

Key Words

SDLC – System Development Life Cycle – stages to build a system.

Waterfall model – Sequential stages, each finished before the next.

Spiral model – Risk-driven loops of planning, risk, engineering, evaluation.

Agile – Iterative short sprints with constant customer feedback.

Prototyping – Building a quick trial model for users to test.

RAD – Rapid development with reusable parts and time-boxing.

Structured methodology – Process and data-flow based top-down approach.

Object-oriented methodology – Models the system as interacting objects.

Sprint – Short fixed time box in Agile.

Risk analysis – Finding and reducing project risks.

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Critical path – Longest chain of tasks with zero slack.

Gantt chart – Bar chart of tasks against time.

Sample Q&A

1. When is Waterfall suitable?

> **Answer:** When requirements are clear and stable.

2. Name the four Spiral phases.

> **Answer:** Planning, risk analysis, engineering, evaluation.

3. Why is Agile popular?

> **Answer:** It handles changing requirements and delivers working software early.

4. What is a prototype?

> **Answer:** A quick working model shown to users to refine requirements.

5. Structured vs object-oriented?

> **Answer:** Structured: processes and data flows; OO: objects with data and methods.

6. What is the critical path?

> **Answer:** The longest path of dependent tasks; it fixes the project duration.

MCQ

1. Sequential stages each signed off before the next describes

A. Agile
B. Waterfall
C. Spiral
D. RAD
E. Prototyping

2. A model driven by risk analysis in loops is

A. RAD
B. Agile
C. Spiral
D. Prototyping
E. Waterfall

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3. Short sprints with customer feedback describe

A. Spiral
B. Waterfall
C. closed system
D. Agile
E. TPS

4. Users unsure of needs try a quick model in

A. Spiral only
B. Prototyping
C. Waterfall
D. Direct changeover
E. ESS

5. Classes, objects and inheritance belong to

A. structured methodology
B. Waterfall stages
C. DFD level 0
D. pilot deployment
E. object-oriented methodology

6. For the plan in this note, project duration is

A. 11 weeks
B. 14 weeks
C. 20 weeks
D. 18 weeks
E. 16 weeks

7. Critical path tasks have slack of

A. zero
B. the largest value
C. one week
D. negative only
E. equal to duration

8. In the plan, which task is NOT critical?

A. C
B. A
C. D
D. E
E. F

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9. Which term means: “System Development Life Cycle – stages to build a system”?

A. SDLC
B. Spiral model
C. Object-oriented methodology
D. RAD
E. Critical path

10. Which term means: “Sequential stages, each finished before the next”?

A. Sprint
B. Waterfall model
C. Gantt chart
D. Agile
E. Structured methodology

11. Which term means: “Risk-driven loops of planning, risk, engineering, evaluation”?

A. Spiral model
B. Prototyping
C. Risk analysis
D. Object-oriented methodology
E. SDLC

12. Which term means: “Iterative short sprints with constant customer feedback”?

A. Critical path
B. Sprint
C. Waterfall model
D. RAD
E. Agile

13. Which term means: “Building a quick trial model for users to test”?

A. Spiral model
B. Gantt chart
C. Risk analysis
D. Prototyping
E. Structured methodology

14. Which term means: “Rapid development with reusable parts and time-boxing”?

A. SDLC
B. Critical path
C. Object-oriented methodology
D. RAD
E. Agile

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15. Which term means: “Process and data-flow based top-down approach”?

A. Waterfall model
B. Prototyping
C. Structured methodology
D. Sprint
E. Gantt chart

16. Which term means: “Models the system as interacting objects”?

A. Object-oriented methodology
B. Spiral model
C. RAD
D. SDLC
E. Risk analysis

17. Which term means: “Short fixed time box in Agile”?

A. Structured methodology
B. Waterfall model
C. Sprint
D. Agile
E. Critical path

18. Which term means: “Finding and reducing project risks”?

A. Object-oriented methodology
B. Prototyping
C. Gantt chart
D. Risk analysis
E. Spiral model

19. Which term means: “Longest chain of tasks with zero slack”?

A. RAD
B. Critical path
C. SDLC
D. Sprint
E. Agile

20. Which term means: “Bar chart of tasks against time”?

A. Risk analysis
B. Prototyping
C. Waterfall model
D. Structured methodology
E. Gantt chart

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Structured Questions

1. List the Waterfall SDLC stages in order. *(6 marks)*

> Feasibility; analysis; design; development; testing; deployment; maintenance.

2. Describe the Spiral model phases. *(5 marks)*

> Planning; risk analysis; engineering; evaluation; repeated each loop.

3. Compare Agile with Waterfall. *(4 marks)*

> Agile iterative and flexible; Waterfall sequential; Agile delivers early; Waterfall needs fixed requirements.

4. When would you use prototyping or RAD? *(4 marks)*

> Unclear user needs; short deadline; reusable components; users available.

5. Find the duration and critical path of the given plan. *(4 marks)*

> Forward pass; duration 16 weeks; path A–B–C–E–F–G; D slack 5.

Summary

- Waterfall: sequential, stable requirements.
- Spiral: risk-driven loops.
- Agile, prototyping and RAD handle change.
- Structured vs object-oriented methods.
- Critical path = longest zero-slack chain.

MCQ answer key – 7.3

1. **B** – Waterfall.
2. **C** – Spiral.
3. **D** – Agile.
4. **B** – Prototyping.
5. **E** – OO.
6. **E** – Longest path.
7. **A** – Zero slack.
8. **C** – D has slack 5.
9. **A** – SDLC – System Development Life Cycle – stages to build a system.
10. **B** – Waterfall model – Sequential stages, each finished before the next.
11. **A** – Spiral model – Risk-driven loops of planning, risk, engineering, evaluation.
12. **E** – Agile – Iterative short sprints with constant customer feedback.
13. **D** – Prototyping – Building a quick trial model for users to test.

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14. **D** – RAD – Rapid development with reusable parts and time-boxing.
15. **C** – Structured methodology – Process and data-flow based top-down approach.
16. **A** – Object-oriented methodology – Models the system as interacting objects.
17. **C** – Sprint – Short fixed time box in Agile.
18. **D** – Risk analysis – Finding and reducing project risks.
19. **B** – Critical path – Longest chain of tasks with zero slack.
20. **E** – Gantt chart – Bar chart of tasks against time.

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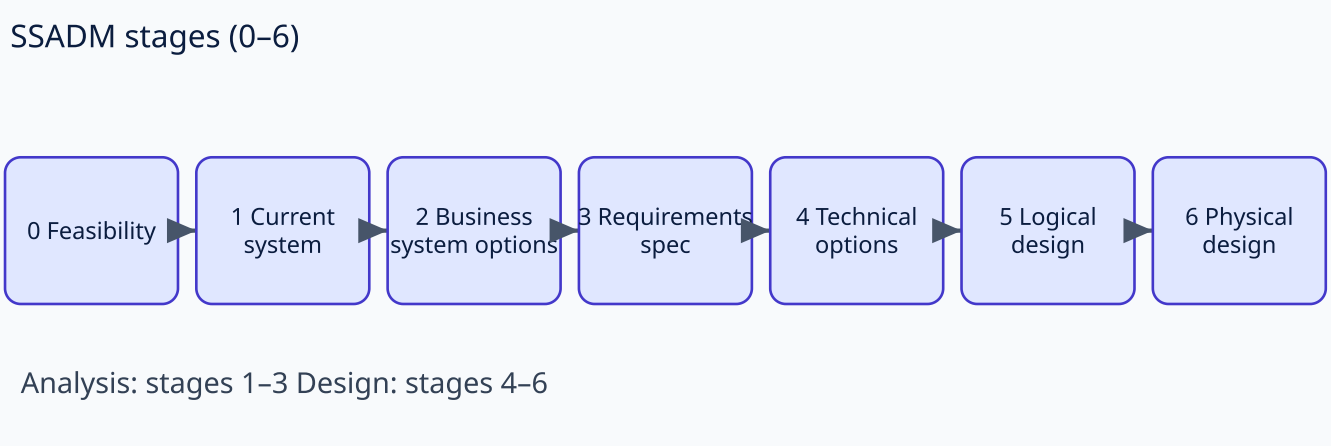
Grade 12 A/L ICT · Lesson 7

7.4 Structured Systems Analysis and Design Method (SSADM)

Syllabus 7.4. SSADM is a structured, Waterfall-style method for analysing and designing information systems. You define SSADM and list the **SDLC stages** it covers, from feasibility to physical design.

1. What is SSADM?

SSADM was developed for UK government projects. It uses three main **views** of a system: **data flow modelling** (how data moves), **logical data modelling** (what data is stored) and **entity event modelling** (how data changes over time).



SSADM stages 0 to 6

2. Stages covered

- Stage 0 – Feasibility study: is the project worth doing?
- Stage 1 – Investigation of the current system (DFDs, LDS of today).
- Stage 2 – Business system options (BSO): choose what the new system will do.
- Stage 3 – Requirements specification: detailed functional and non-functional needs.
- Stage 4 – Technical system options: hardware/software choices.
- Stage 5 – Logical design: dialogues, logical processes and data.
- Stage 6 – Physical design: tables, files, programs specification.

SSADM covers the **analysis and design** part of the SDLC. Development, testing, deployment and maintenance follow after Stage 6.

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🧱 **Worked example: A school wants a new library system. Which SSADM stage produces each item: (a) cost-benefit report, (b) DFD of the current card system, (c) table layouts?**
(a) Stage 0 feasibility. (b) Stage 1 investigation of current system. (c) Stage 6 physical design.

💡 Analysis asks WHAT the system must do; design decides HOW it will do it.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Modern teams often mix SSADM-style models with Agile sprints and UML tools.

Key Words

SSADM – Structured Systems Analysis and Design Method.

Feasibility study – Checks if a project is worth doing.

Current system investigation – Studying how the existing system works.

Business system options – Alternative scopes for the new system.

Requirements specification – Detailed statement of what the system must do.

Technical system options – Hardware and software choices.

Logical design – Design independent of technology.

Physical design – Design using actual tables, files and programs.

Data flow modelling – Showing how data moves between processes.

Logical data modelling – Showing what data is stored and related.

Entity event modelling – Showing how events change entities.

Structured method – Step-by-step top-down development approach.

Sample Q&A

1. Define SSADM.

Answer: A structured, step-by-step method for analysing and designing information systems.

2. How many SSADM stages?

Answer: Seven: stage 0 to stage 6.

3. What happens in stage 2?

Answer: Business system options are proposed and one is chosen.

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4. Logical vs physical design?

> **Answer:** Logical is technology-independent; physical uses real tables and programs.

5. Name the three SSADM views.

> **Answer:** Data flow, logical data and entity event modelling.

6. Which SDLC stages does SSADM cover?

> **Answer:** Feasibility, analysis and design (up to physical design).

MCQ

1. SSADM stands for

A. System Security And Data Management
B. Standard System Access Design Mode
C. Structured Systems Analysis and Design Method
D. Structured Software Assembly Development Model
E. Simple Software And Data Model

2. SSADM stage 0 is

A. feasibility study
B. coding
C. maintenance
D. physical design
E. testing

3. Choosing between business system options is stage

A. 4
B. 0
C. 6
D. 5
E. 2

4. Table and file layouts are produced in

A. current system study
B. physical design
C. requirements only
D. business options
E. feasibility

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5. Technology-independent design is

A. physical design
B. pilot design
C. logical design
D. direct design
E. black box design

6. SSADM is closest in style to

A. Prototyping
B. Agile
C. RAD
D. Waterfall
E. Spiral only

7. Which is NOT an SSADM view?

A. none of these
B. data flow modelling
C. logical data modelling
D. user training modelling
E. entity event modelling

8. Hardware/software choices are made in

A. current system investigation
B. technical system options
C. feasibility
D. acceptance testing
E. maintenance

9. Which term means: “Structured Systems Analysis and Design Method”?

A. Current system investigation
B. Physical design
C. Technical system options
D. Entity event modelling
E. SSADM

10. Which term means: “Checks if a project is worth doing”?

A. Feasibility study
B. Business system options
C. Data flow modelling
D. Logical design
E. Structured method

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11. Which term means: “Studying how the existing system works”?

A. Requirements specification
B. Current system investigation
C. Physical design
D. SSADM
E. Logical data modelling

12. Which term means: “Alternative scopes for the new system”?

A. Technical system options
B. Entity event modelling
C. Business system options
D. Feasibility study
E. Data flow modelling

13. Which term means: “Detailed statement of what the system must do”?

A. Current system investigation
B. Logical design
C. Structured method
D. Logical data modelling
E. Requirements specification

14. Which term means: “Hardware and software choices”?

A. Technical system options
B. SSADM
C. Physical design
D. Entity event modelling
E. Business system options

15. Which term means: “Design independent of technology”?

A. Structured method
B. Data flow modelling
C. Feasibility study
D. Logical design
E. Requirements specification

16. Which term means: “Design using actual tables, files and programs”?

A. Technical system options
B. Current system investigation
C. SSADM
D. Physical design
E. Logical data modelling

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17. Which term means: “Showing how data moves between processes”?

A. Feasibility study
B. Entity event modelling
C. Logical design
D. Business system options
E. Data flow modelling

18. Which term means: “Showing what data is stored and related”?

A. Current system investigation
B. Logical data modelling
C. Structured method
D. Physical design
E. Requirements specification

19. Which term means: “Showing how events change entities”?

A. SSADM
B. Technical system options
C. Entity event modelling
D. Business system options
E. Data flow modelling

20. Which term means: “Step-by-step top-down development approach”?

A. Structured method
B. Logical data modelling
C. Feasibility study
D. Logical design
E. Requirements specification

Structured Questions

1. Define SSADM and state one advantage. *(2 marks)*

> Structured analysis/design method; clear documentation and standard steps.

2. List SSADM stages 0–6. *(6 marks)*

> Feasibility; current system; BSO; requirements; technical options; logical design; physical design.

3. Explain the three SSADM views. *(3 marks)*

> Data flow (movement); logical data (storage); entity event (change over time).

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4. Distinguish logical and physical design. *(2 marks)*

> Logical: what, technology-free; physical: how, real tables and programs.

5. Map library-system outputs to SSADM stages. *(3 marks)*

> Cost-benefit stage 0; current DFD stage 1; tables stage 6.

Summary

- SSADM is a structured method.
- Seven stages: 0 to 6.
- Analysis = stages 1–3; design = 4–6.
- Three views: data flow, logical data, entity event.
- Logical design before physical design.

MCQ answer key – 7.4

1. **C** – Full form.
2. **A** – Stage 0.
3. **E** – Stage 2.
4. **B** – Stage 6.
5. **C** – Logical.
6. **D** – Structured sequential.
7. **D** – Three views only.
8. **B** – Stage 4.
9. **E** – SSADM – Structured Systems Analysis and Design Method.
10. **A** – Feasibility study – Checks if a project is worth doing.
11. **B** – Current system investigation – Studying how the existing system works.
12. **C** – Business system options – Alternative scopes for the new system.
13. **E** – Requirements specification – Detailed statement of what the system must do.
14. **A** – Technical system options – Hardware and software choices.
15. **D** – Logical design – Design independent of technology.
16. **D** – Physical design – Design using actual tables, files and programs.
17. **E** – Data flow modelling – Showing how data moves between processes.
18. **B** – Logical data modelling – Showing what data is stored and related.
19. **C** – Entity event modelling – Showing how events change entities.
20. **A** – Structured method – Step-by-step top-down development approach.

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Grade 12 A/L ICT · Lesson 7

7.5 Preliminary Investigation and Feasibility Study

Syllabus 7.5. Before building a new system, analysts do a **preliminary investigation**: identify problems in the current system, suggest alternative solutions and prioritise needs. A **feasibility study** then checks **technical, economic, operational and organisational** feasibility, often with a **cost–benefit** and **payback** calculation.

1. Preliminary investigation

- Identify problems: slow service, errors, duplicated data, lost files.
- Suggest alternative solutions: improve manual process, buy a package, build a new system.
- Prioritise needs: urgent and high-benefit problems first.

2. Four types of feasibility

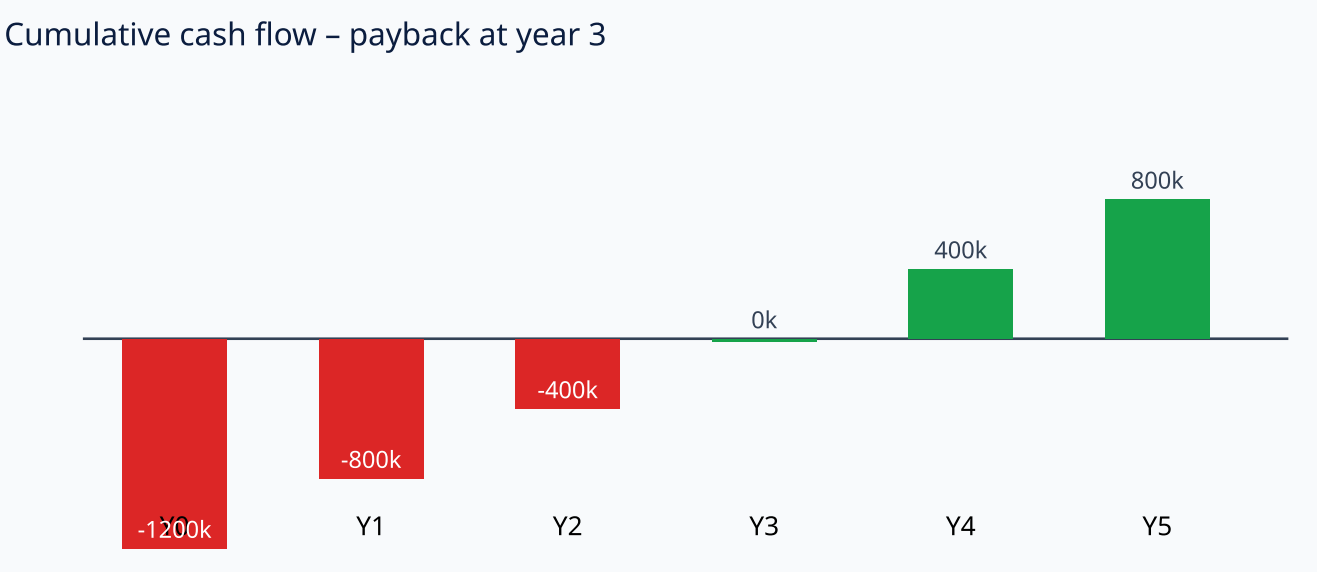
Technical
Do we have (or can we get) the hardware, software and skills?

Economic
Do benefits outweigh costs? (cost–benefit, payback)

Operational
Will users accept and use it in daily work?

Organisational
Does it fit the goals, structure and policies of the organisation?

3. Cost–benefit and payback



Cumulative cash flow

Year	Cumulative cash

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Year 0	Rs. −1,200,000
Year 1	Rs. −800,000
Year 2	Rs. −400,000
Year 3	Rs. 0
Year 4	Rs. 400,000
Year 5	Rs. 800,000

🧱 **Worked example: A system costs Rs. 1,200,000 to build. It saves Rs. 500,000 a year and costs Rs. 100,000 a year to run. Find the payback period and the 5-year ROI.**
Net benefit = Rs. 500,000 − Rs. 100,000 = **Rs. 400,000 per year**. Payback = Rs. 1,200,000 ÷ Rs. 400,000 = **3 years**. 5-year net gain = 5 × Rs. 400,000 − Rs. 1,200,000 = Rs. 800,000, so ROI = Rs. 800,000 ÷ Rs. 1,200,000 × 100 = **66.67%**.

💡 Shorter payback = less risk. Always use net yearly benefit (benefit minus running cost).

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Cloud subscriptions in 2026 turn large one-time costs into monthly costs, which changes payback sums.

Key Words

Preliminary investigation – First study of problems and possible solutions.

Feasibility study – Study of whether a project is practical and worthwhile.

Technical feasibility – Availability of technology and skills.

Economic feasibility – Whether benefits exceed costs.

Operational feasibility – Whether users will accept and use the system.

Organisational feasibility – Fit with organisation goals and policies.

Cost–benefit analysis – Comparing total costs with total benefits.

Payback period – Time for net benefits to repay the cost.

Return on investment – Net gain as a percentage of cost.

Tangible benefit – Benefit measured in money.

Intangible benefit – Benefit hard to measure, e.g. customer goodwill.

Alternative solution – Another possible way to solve the problem.

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Sample Q&A

1. Tasks in preliminary investigation?

> **Answer:** Identify problems, suggest alternatives, prioritise needs.

2. Why do a feasibility study?

> **Answer:** To avoid wasting money on a project that cannot succeed.

3. Define economic feasibility.

> **Answer:** Checking that benefits outweigh costs.

4. What is operational feasibility?

> **Answer:** Whether staff will accept and use the new system.

5. Calculate payback for the example.

> **Answer:** Rs. 1,200,000 ÷ Rs. 400,000 = 3 years.

6. Give an intangible benefit.

> **Answer:** Better customer satisfaction or staff morale.

MCQ

1. Checking if staff will accept a new system is

A. operational feasibility
B. black box testing
C. technical feasibility
D. direct deployment
E. economic feasibility

2. Comparing costs with benefits is

A. economic feasibility
B. technical feasibility
C. operational feasibility
D. data migration
E. unit testing

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3. Having the right hardware and skills is

A. gap analysis
B. technical feasibility
C. organisational feasibility
D. economic feasibility
E. pilot deployment

4. Cost Rs. 1,200,000, net benefit Rs. 400,000 a year: payback is

A. 2 years
B. 2.4 years
C. 6 years
D. 4 years
E. 3 years

5. 5-year ROI in the worked example is about

A. 41.67%
B. 66.67%
C. 100.00%
D. 150.00%
E. 33.33%

6. Fit with company goals and policies is

A. organisational feasibility
B. phased deployment
C. technical feasibility
D. black box
E. system testing

7. Customer goodwill is a

A. payback period
B. intangible benefit
C. tangible cost
D. hardware cost
E. running cost

8. The FIRST task of a preliminary investigation is to

A. migrate data
B. train all users
C. identify problems in the current system
D. write program code
E. deploy in parallel

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9. Which term means: “First study of problems and possible solutions”?

A. Intangible benefit
B. Organisational feasibility
C. Payback period
D. Preliminary investigation
E. Technical feasibility

10. Which term means: “Study of whether a project is practical and worthwhile”?

A. Alternative solution
B. Cost–benefit analysis
C. Feasibility study
D. Economic feasibility
E. Return on investment

11. Which term means: “Availability of technology and skills”?

A. Preliminary investigation
B. Operational feasibility
C. Tangible benefit
D. Technical feasibility
E. Payback period

12. Which term means: “Whether benefits exceed costs”?

A. Intangible benefit
B. Economic feasibility
C. Return on investment
D. Feasibility study
E. Organisational feasibility

13. Which term means: “Whether users will accept and use the system”?

A. Tangible benefit
B. Technical feasibility
C. Alternative solution
D. Operational feasibility
E. Cost–benefit analysis

14. Which term means: “Fit with organisation goals and policies”?

A. Economic feasibility
B. Preliminary investigation
C. Payback period
D. Intangible benefit
E. Organisational feasibility

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15. Which term means: “Comparing total costs with total benefits”?

A. Feasibility study
B. Operational feasibility
C. Cost–benefit analysis
D. Return on investment
E. Alternative solution

16. Which term means: “Time for net benefits to repay the cost”?

A. Technical feasibility
B. Preliminary investigation
C. Payback period
D. Organisational feasibility
E. Tangible benefit

17. Which term means: “Net gain as a percentage of cost”?

A. Economic feasibility
B. Cost–benefit analysis
C. Intangible benefit
D. Feasibility study
E. Return on investment

18. Which term means: “Benefit measured in money”?

A. Tangible benefit
B. Operational feasibility
C. Alternative solution
D. Technical feasibility
E. Payback period

19. Which term means: “Benefit hard to measure, e.g. customer goodwill”?

A. Return on investment
B. Preliminary investigation
C. Organisational feasibility
D. Economic feasibility
E. Intangible benefit

20. Which term means: “Another possible way to solve the problem”?

A. Cost–benefit analysis
B. Feasibility study
C. Tangible benefit
D. Alternative solution
E. Operational feasibility

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Structured Questions

1. Describe the three tasks of a preliminary investigation. *(3 marks)*

> Identify problems; suggest alternative solutions; prioritise information needs.

2. Explain technical and operational feasibility. *(2 marks)*

> Technical: hardware, software, skills available; operational: users accept and use it.

3. Explain economic and organisational feasibility. *(2 marks)*

> Economic: benefits exceed costs; organisational: fits goals, structure, policy.

4. Calculate payback and 5-year ROI for the example. *(3 marks)*

> Net Rs. 400,000/yr; payback 3 years; ROI 66.67%.

5. Distinguish tangible and intangible benefits. *(2 marks)*

> Tangible measured in money (saved wages); intangible not easily measured (goodwill).

Summary

- Investigate problems, alternatives and priorities.
- Feasibility: technical, economic, operational, organisational.
- Net benefit = benefit − running cost.
- Payback = cost ÷ net yearly benefit.
- ROI = net gain ÷ cost × 100.

MCQ answer key – 7.5

1. **A** – Operational.
2. **A** – Economic.
3. **B** – Technical.
4. **E** – Cost ÷ net.
5. **B** – Net gain ÷ cost.
6. **A** – Organisational.
7. **B** – Intangible.
8. **C** – Problems first.
9. **D** – Preliminary investigation – First study of problems and possible solutions.
10. **C** – Feasibility study – Study of whether a project is practical and worthwhile.
11. **D** – Technical feasibility – Availability of technology and skills.
12. **B** – Economic feasibility – Whether benefits exceed costs.
13. **D** – Operational feasibility – Whether users will accept and use the system.
14. **E** – Organisational feasibility – Fit with organisation goals and policies.
15. **C** – Cost–benefit analysis – Comparing total costs with total benefits.

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16. **C** – Payback period – Time for net benefits to repay the cost.
17. **E** – Return on investment – Net gain as a percentage of cost.
18. **A** – Tangible benefit – Benefit measured in money.
19. **E** – Intangible benefit – Benefit hard to measure, e.g. customer goodwill.
20. **D** – Alternative solution – Another possible way to solve the problem.

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Grade 12 A/L ICT · Lesson 7

7.6 Requirement Analysis and Analysis Tools: DFD, LDS and BSO

Syllabus 7.6. To understand the current system, analysts gather **functional** and **non-functional requirements** (IEEE style "The system shall…") and use analysis tools: **business activity model**, **data flow diagrams** (context and level 1), **elementary process descriptions**, **document flow diagrams** and the **logical data structure**. Finally they propose and select **business system options (BSO)**.

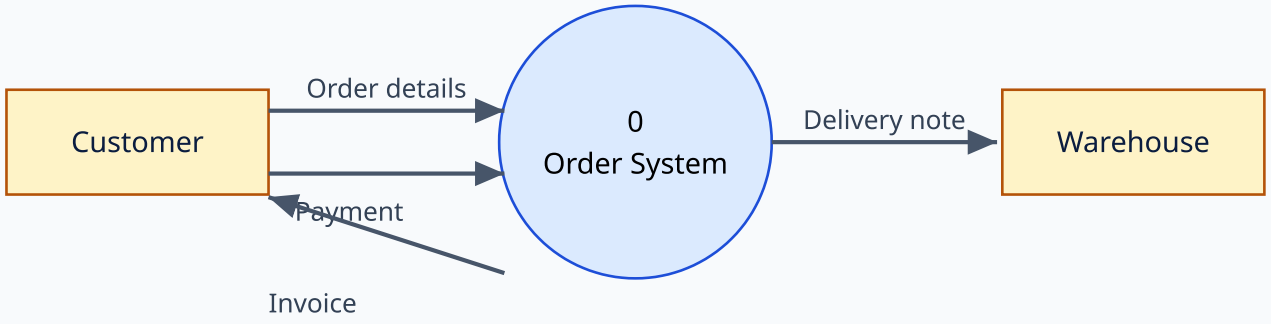
1. Requirements

Type	Meaning	IEEE-style example
Functional	What the system must do	The system shall issue a receipt for each payment.
Non-functional	How well it must do it (quality)	The system shall respond within 2 seconds for 50 users.

2. Data flow diagrams

DFD symbols: **external entity** (source/sink, square), **process** (rounded box, numbered), **data store** (open box, D1), **data flow** (named arrow). The **context diagram** (level 0) shows the whole system as one process; **level 1** splits it into main processes; processes that cannot be split further are **elementary processes**, each written up as an **EPD**.

Context diagram (level 0) – one process, external entities



Context diagram of an order system

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🧱 **Worked example: Level 1 of the order system has processes 1 Record order, 2 Check stock, 3 Take payment, 4 Issue invoice. Is it balanced with the context diagram?**
Context inputs = {Order details, Payment}, outputs = {Delivery note, Invoice}. Level 1 external inputs = {Order details, Payment}, outputs = {Delivery note, Invoice}. They match, so the DFD is **balanced**. Level 1 has **4 processes**.

3. Other tools

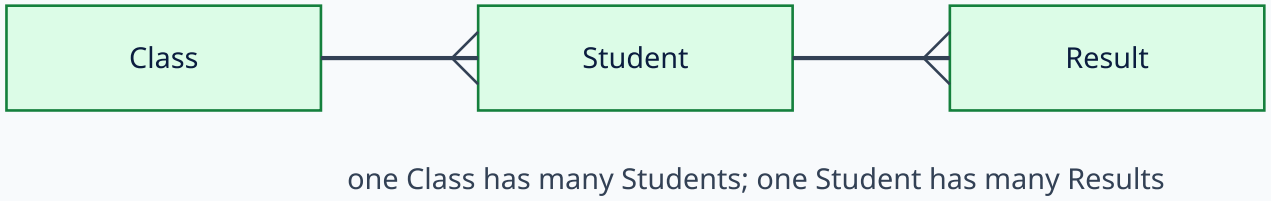
Business activity model
Shows business activities and events, without technology.

Document flow diagram
Shows how paper/electronic documents move between people.

Logical data structure
Entities and their relationships (e.g. one-to-many).

BSO
2–3 options (minimum, medium, full) with costs; users choose one.

Logical data structure – one-to-many relationships



Logical data structure

Elementary process description

```
PROCESS 1 Record order
  READ order details from Customer
  IF customer exists THEN
     WRITE order to D1 Orders
  ELSE
     REJECT order
  ENDIF
END PROCESS
```

💡 A DFD shows data movement, not timing or decisions – no loops or IF arrows.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026 analysts often generate first-draft DFDs and user stories with AI tools, then check them with users.

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Key Words

Functional requirement – What the system must do.

Non-functional requirement – Quality such as speed, security, usability.

Data flow diagram – Diagram of data moving between processes, stores and entities.

Context diagram – Level 0 DFD showing the system as one process.

External entity – Source or receiver of data outside the system.

Data store – Place where data is held in a DFD.

Elementary process – Lowest-level process not split further.

Elementary process description – Short logic description of an elementary process.

Document flow diagram – Shows movement of documents between people.

Logical data structure – Entities and relationships of stored data.

Business activity model – Model of business activities and events.

Business system options – Alternative scopes proposed for the new system.

Sample Q&A

1. Why is requirement analysis needed?

> **Answer:** To capture exactly what users need before design, avoiding costly changes later.

2. Functional vs non-functional?

> **Answer:** Functional: what it does; non-functional: how well (speed, security).

3. Name the four DFD symbols.

> **Answer:** External entity, process, data store, data flow.

4. What is a context diagram?

> **Answer:** A level 0 DFD with the whole system as one process and its external entities.

5. What is DFD balancing?

> **Answer:** Inputs and outputs of a parent process equal those of its child diagram.

6. Why propose BSOs?

> **Answer:** To let management choose scope and cost of the new system.

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MCQ

1. “The system shall print a receipt” is a

A. data store
B. functional requirement
C. non-functional requirement
D. test case
E. external entity

2. “Response within 2 seconds” is a

A. functional requirement
B. process
C. data flow
D. BSO
E. non-functional requirement

3. A level 0 DFD is called a

A. EPD
B. document flow diagram
C. Gantt chart
D. context diagram
E. LDS

4. In a DFD, a Customer outside the system is a

A. elementary process
B. process
C. external entity
D. data dictionary
E. data store

5. Level 1 in the example has

A. 4 processes
B. 1 process
C. 3 processes
D. 6 processes
E. 0 processes

6. A DFD is balanced when

A. there are no data stores
B. all flows are unnamed
C. parent and child have the same external inputs and outputs
D. every process has a loop
E. it has exactly 7 processes

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7. Entities and one-to-many links are shown in an

A. LDS
B. EPD
C. Gantt chart
D. document flow only
E. context diagram

8. A process that is not split further is

A. an external entity
B. a data store
C. a BSO
D. a context diagram
E. an elementary process

9. Which term means: “What the system must do”?

A. Data store
B. Business activity model
C. Data flow diagram
D. Functional requirement
E. Elementary process description

10. Which term means: “Quality such as speed, security, usability”?

A. Elementary process
B. Document flow diagram
C. Context diagram
D. Business system options
E. Non-functional requirement

11. Which term means: “Diagram of data moving between processes, stores and entities”?

A. Logical data structure
B. Data flow diagram
C. Elementary process description
D. External entity
E. Functional requirement

12. Which term means: “Level 0 DFD showing the system as one process”?

A. Context diagram
B. Non-functional requirement
C. Document flow diagram
D. Data store
E. Business activity model

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13. Which term means: “Source or receiver of data outside the system”?

A. Logical data structure
B. External entity
C. Business system options
D. Elementary process
E. Data flow diagram

14. Which term means: “Place where data is held in a DFD”?

A. Context diagram
B. Functional requirement
C. Data store
D. Business activity model
E. Elementary process description

15. Which term means: “Lowest-level process not split further”?

A. Document flow diagram
B. Business system options
C. Non-functional requirement
D. Elementary process
E. External entity

16. Which term means: “Short logic description of an elementary process”?

A. Elementary process description
B. Data store
C. Functional requirement
D. Logical data structure
E. Data flow diagram

17. Which term means: “Shows movement of documents between people”?

A. Elementary process
B. Non-functional requirement
C. Document flow diagram
D. Context diagram
E. Business activity model

18. Which term means: “Entities and relationships of stored data”?

A. External entity
B. Logical data structure
C. Data flow diagram
D. Elementary process description
E. Business system options

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19. Which term means: “Model of business activities and events”?

A. Functional requirement
B. Data store
C. Document flow diagram
D. Business activity model
E. Context diagram

20. Which term means: “Alternative scopes proposed for the new system”?

A. Elementary process
B. Non-functional requirement
C. Logical data structure
D. External entity
E. Business system options

Structured Questions

1. Define functional and non-functional requirements with IEEE-style examples. *(2 marks)*

> Functional “shall issue receipt”; non-functional “shall respond in 2 s”.

2. Name and draw the four DFD symbols. *(4 marks)*

> Entity square; process rounded; store open box; flow named arrow.

3. Explain context and level 1 DFDs. *(2 marks)*

> Context: one process + entities; level 1: main processes, stores, flows.

4. Check balancing for the order system. *(3 marks)*

> Context in {Order details, Payment}, out {Invoice, Delivery note}; level 1 same; balanced.

5. What are BSOs and how is one chosen? *(2 marks)*

> 2–3 options of different scope/cost; management selects after comparing benefits.

Summary

- Functional = what; non-functional = how well.
- DFD: entity, process, store, flow.
- Context → level 1 → elementary processes + EPDs.
- LDS shows entities and relationships.
- BSOs give options; one is selected.

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MCQ answer key – 7.6

1. **B** – What it does.
2. **E** – Quality.
3. **D** – Context.
4. **C** – Entity.
5. **A** – Count.
6. **C** – Same flows.
7. **A** – LDS.
8. **E** – Elementary.
9. **D** – Functional requirement – What the system must do.
10. **E** – Non-functional requirement – Quality such as speed, security, usability.
11. **B** – Data flow diagram – Diagram of data moving between processes, stores and entities.
12. **A** – Context diagram – Level 0 DFD showing the system as one process.
13. **B** – External entity – Source or receiver of data outside the system.
14. **C** – Data store – Place where data is held in a DFD.
15. **D** – Elementary process – Lowest-level process not split further.
16. **A** – Elementary process description – Short logic description of an elementary process.
17. **C** – Document flow diagram – Shows movement of documents between people.
18. **B** – Logical data structure – Entities and relationships of stored data.
19. **D** – Business activity model – Model of business activities and events.
20. **E** – Business system options – Alternative scopes proposed for the new system.

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Grade 12 A/L ICT · Lesson 7

7.7 Logical and Physical Design of the Proposed System

Syllabus 7.7. Design turns requirements into a blueprint. In **logical design** you redraw **DFDs for the proposed system**, write **elementary process descriptions in pseudocode**, design the **user interface** and the **logical data structure**. In **physical design** you specify **tables and records**, build a **data dictionary** and design the **database**.

1. Logical design

Logical design removes physical details (who, where, paper) from the current DFD and adds new requirements. Analysts build **bottom-up**: start from elementary processes, group them into level 1, then check the **context diagram** still balances.

EPD in pseudocode

```
PROCESS 2.1 Validate admission
  INPUT StudentID, Name, DateOfBirth
  IF StudentID length <> 6 THEN
     DISPLAY "Invalid ID"
  ELSE IF age < 5 THEN
     DISPLAY "Too young"
  ELSE
     WRITE record to D1 Students
  ENDIF
END PROCESS
```

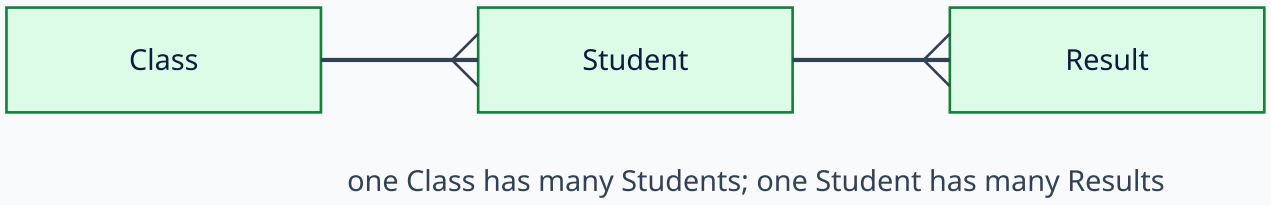
2. User interface design

- Consistent layout, colours and button positions.
- Clear labels, input masks and drop-down lists to reduce errors.
- Helpful error messages and confirmation before delete.

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3. Physical design and data dictionary

Logical data structure – one-to-many relationships



one Class has many Students; one Student has many Results

Proposed LDS

Field	Type	Size (bytes)
StudentID	Text	6
Name	Text	30
DateOfBirth	Date	8
ClassCode	Text	4
Phone	Text	10
Record total		58

🧱 **Worked example: Estimate the Student table size for 1500 records.**
Record size = 6 + 30 + 8 + 4 + 10 = **58 bytes**. Table = 58 × 1500 = **87,000 bytes ≈ 84.96 KB**.

A **data dictionary** stores metadata for every field: name, type, size, format, validation rule, primary/foreign key and description. The **database design** then sets primary keys (StudentID), foreign keys (ClassCode) and indexes.

💡 Logical = what data and processes; physical = exact tables, field types and sizes.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Low-code platforms in 2026 can generate forms and tables directly from a data dictionary.

Key Words

Logical design – Technology-independent design of processes and data.

Physical design – Design with actual tables, fields and programs.

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Logical DFD – DFD of the proposed system without physical details.	**Pseudocode** – Structured English for process logic.
User interface – Screens and forms users interact with.	**Data dictionary** – Store of metadata describing every field.
Record specification – Fields, types and sizes in one record.	**Table specification** – Structure, keys and indexes of a table.
Primary key – Field that uniquely identifies a record.	**Foreign key** – Field linking to a primary key in another table.
Validation rule – Check that input data is sensible.	**Bottom-up design** – Building from elementary processes up to context.

Sample Q&A

1. What is logical design?

> **Answer:** A technology-free design of what the new system processes and stores.

2. Activities in logical design?

> **Answer:** Logical DFDs, EPDs, UI design, logical data structure.

3. What does a data dictionary contain?

> **Answer:** Field name, type, size, format, validation and key information.

4. Record size for the Student table?

> **Answer:** 58 bytes.

5. Why use a foreign key?

> **Answer:** To link related tables, e.g. Student.ClassCode to Class.

6. Give two UI design rules.

> **Answer:** Consistency; clear error messages (also drop-downs to avoid typing errors).

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MCQ

1. Designing exact tables and field sizes is

A. pilot deployment
B. logical design
C. black box testing
D. physical design
E. feasibility

2. Metadata about every field is kept in the

A. data dictionary
B. test log
C. Gantt chart
D. context diagram
E. BSO report

3. A field that uniquely identifies a record is a

A. process
B. primary key
C. foreign key
D. validation rule
E. data flow

4. Record size of the Student table is

A. 70 bytes
B. 116 bytes
C. 58 bytes
D. 5 bytes
E. 48 bytes

5. 1500 records of 58 bytes need

A. 87,000 bytes
B. 88,500 bytes
C. 174,000 bytes
D. 1,500 bytes
E. 8,700 bytes

6. Building from elementary processes up to the context diagram is

A. black box
B. top-down testing
C. direct changeover
D. bottom-up design
E. phased deployment

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7. Process logic in structured English is

A. a foreign key
B. an entity
C. a Gantt bar
D. a data store
E. pseudocode

8. Using drop-down lists on forms mainly

A. increases storage
B. removes primary keys
C. reduces input errors
D. deletes validation
E. slows the system

9. Which term means: “Technology-independent design of processes and data”?

A. Validation rule
B. Logical design
C. Data dictionary
D. Logical DFD
E. Table specification

10. Which term means: “Design with actual tables, fields and programs”?

A. Pseudocode
B. Record specification
C. Physical design
D. Primary key
E. Bottom-up design

11. Which term means: “DFD of the proposed system without physical details”?

A. Foreign key
B. User interface
C. Logical design
D. Logical DFD
E. Table specification

12. Which term means: “Structured English for process logic”?

A. Physical design
B. Validation rule
C. Primary key
D. Data dictionary
E. Pseudocode

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13. Which term means: “Screens and forms users interact with”?

A. Logical DFD
B. User interface
C. Bottom-up design
D. Record specification
E. Foreign key

14. Which term means: “Store of metadata describing every field”?

A. Logical design
B. Validation rule
C. Table specification
D. Pseudocode
E. Data dictionary

15. Which term means: “Fields, types and sizes in one record”?

A. Physical design
B. Record specification
C. Primary key
D. Bottom-up design
E. User interface

16. Which term means: “Structure, keys and indexes of a table”?

A. Table specification
B. Logical DFD
C. Data dictionary
D. Logical design
E. Foreign key

17. Which term means: “Field that uniquely identifies a record”?

A. Validation rule
B. Pseudocode
C. Physical design
D. Primary key
E. Record specification

18. Which term means: “Field linking to a primary key in another table”?

A. Foreign key
B. Bottom-up design
C. User interface
D. Logical DFD
E. Table specification

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19. Which term means: “Check that input data is sensible”?

A. Pseudocode
B. Data dictionary
C. Validation rule
D. Primary key
E. Logical design

20. Which term means: “Building from elementary processes up to context”?

A. Record specification
B. User interface
C. Physical design
D. Foreign key
E. Bottom-up design

Structured Questions

1. Describe logical design and its activities. *(5 marks)*

> Technology-free; logical DFDs; EPDs; UI design; LDS.

2. Write an EPD in pseudocode to validate a 6-character StudentID. *(2 marks)*

> IF length <> 6 THEN error ELSE write record ENDIF.

3. List contents of a data dictionary entry. *(6 marks)*

> Name; type; size; format; validation; key; description.

4. Calculate the Student record and table size. *(2 marks)*

> 58 bytes; 58 × 1500 = 87,000 bytes ≈ 84.96 KB.

5. Distinguish primary and foreign keys with an example. *(2 marks)*

> Primary StudentID unique; foreign ClassCode links to Class table.

Summary

- Logical design is technology-free.
- Build bottom-up from elementary processes.
- EPDs are written in pseudocode.
- Data dictionary holds field metadata.
- Record size = sum of field sizes.

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MCQ answer key – 7.7

1. **D** – Physical.
2. **A** – Data dictionary.
3. **B** – Primary key.
4. **C** – Sum of fields.
5. **A** – Record × count.
6. **D** – Bottom-up.
7. **E** – Pseudocode.
8. **C** – Fewer errors.
9. **B** – Logical design – Technology-independent design of processes and data.
10. **C** – Physical design – Design with actual tables, fields and programs.
11. **D** – Logical DFD – DFD of the proposed system without physical details.
12. **E** – Pseudocode – Structured English for process logic.
13. **B** – User interface – Screens and forms users interact with.
14. **E** – Data dictionary – Store of metadata describing every field.
15. **B** – Record specification – Fields, types and sizes in one record.
16. **A** – Table specification – Structure, keys and indexes of a table.
17. **D** – Primary key – Field that uniquely identifies a record.
18. **A** – Foreign key – Field linking to a primary key in another table.
19. **C** – Validation rule – Check that input data is sensible.
20. **E** – Bottom-up design – Building from elementary processes up to context.

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Grade 12 A/L ICT · Lesson 7

7.8 Developing and Testing the System

Syllabus 7.8. After design, programmers do **program development** and **database development**. The system is then **tested** with planned **test cases**, using **white box** and **black box** testing at four levels: **unit, integration, system and acceptance** testing.

1. Development

Program development codes each module from the EPDs and UI designs. **Database development** creates tables, keys, indexes and validation rules from the data dictionary.

2. Test cases

A **test case** states the input, the **expected output** and later the actual result. Good test data includes **normal**, **boundary** (extreme) and **erroneous** values.

Function under test

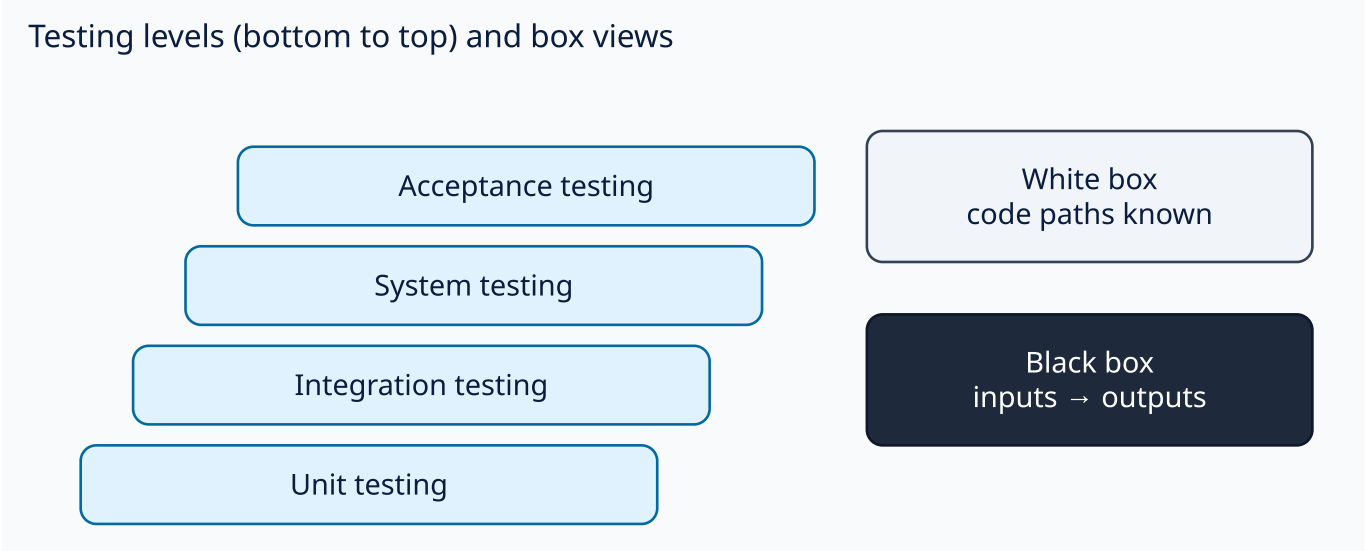
```
FUNCTION grade(m)
  IF m < 0 OR m > 100 THEN RETURN "Invalid"
  IF m >= 75 THEN RETURN "A"
  IF m >= 65 THEN RETURN "B"
  IF m >= 50 THEN RETURN "C"
  IF m >= 35 THEN RETURN "S"
  RETURN "W"
END FUNCTION
```

Test	Mark input	Class	Expected output
1	−1	Invalid	Invalid
2	0	Valid	W
3	1	Valid	W
4	99	Valid	A
5	100	Valid	A
6	101	Invalid	Invalid

🧱 **Worked example: Design boundary value tests for a mark field that accepts 0–100.** Test just below, on and just above each limit: **−1, 0, 1, 99, 100, 101**. 4 are valid and 2 (−1, 101) must be rejected. For **white box** coverage of grade(), one test per branch needs **6 tests** (Invalid, A, B, C, S, W).

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3. Testing methods and levels



Testing levels

White box
Tester knows the code; tests paths, loops and conditions.

Black box
Tester checks inputs vs expected outputs without seeing code.

Unit → Integration
Test each module, then modules working together.

System → Acceptance
Test the whole system, then users confirm it meets requirements.

💡 Developers do unit tests; the client does acceptance tests.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Automated test pipelines in 2026 run thousands of unit tests every time code is changed.

Key Words

Program development – Writing code for each module.

Database development – Creating tables, keys and rules.

Test case – Input with expected output for a test.

White box testing – Testing with knowledge of internal code.

Black box testing – Testing inputs and outputs without seeing code.

Unit testing – Testing one module alone.

Integration testing – Testing modules working together.

System testing – Testing the complete system against the specification.

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Acceptance testing – Users confirm the system meets their needs.

Boundary value – Value on or next to a valid limit.

Erroneous data – Invalid data that should be rejected.

Expected output – Result the system should produce.

Sample Q&A

1. What is a test case?

> **Answer:** A planned input with its expected output (and actual result).

2. White box vs black box?

> **Answer:** White box uses the code structure; black box only inputs and outputs.

3. List the four test levels.

> **Answer:** Unit, integration, system, acceptance.

4. Boundary tests for 0–100?

> **Answer:** −1, 0, 1, 99, 100, 101.

5. Who does acceptance testing?

> **Answer:** The client / end users.

6. Why integration testing?

> **Answer:** Modules that work alone may fail when passing data to each other.

MCQ

1. Testing with full knowledge of the code is

A. acceptance testing
B. black box testing
C. pilot testing
D. white box testing
E. direct testing

2. Checking outputs for given inputs without code is

A. black box testing
B. white box testing
C. unit coding
D. gap analysis
E. data migration

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3. Testing a single module alone is

A. parallel running
B. system testing
C. acceptance testing
D. unit testing
E. integration testing

4. Users confirming the system meets needs is

A. white box testing
B. unit testing
C. integration testing
D. BSO
E. acceptance testing

5. For a 0–100 field, which value is erroneous?

A. 0
B. 99
C. 1
D. 100
E. 101

6. Boundary value tests for 0–100 use

A. 50 only
B. −50, 150
C. 10, 20, 30
D. −1, 0, 1, 99, 100, 101
E. 0 and 100 only

7. grade(70) returns

A. A
B. B
C. C
D. S
E. Invalid

8. Branch coverage of grade() needs at least

A. 4 tests
B. 10 tests
C. 12 tests
D. 6 tests
E. 1 test

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9. Which term means: “Writing code for each module”?

A. Erroneous data
B. Unit testing
C. Program development
D. Test case
E. System testing

10. Which term means: “Creating tables, keys and rules”?

A. Integration testing
B. Database development
C. Acceptance testing
D. White box testing
E. Expected output

11. Which term means: “Input with expected output for a test”?

A. Program development
B. Black box testing
C. Test case
D. System testing
E. Boundary value

12. Which term means: “Testing with knowledge of internal code”?

A. White box testing
B. Unit testing
C. Erroneous data
D. Database development
E. Acceptance testing

13. Which term means: “Testing inputs and outputs without seeing code”?

A. Boundary value
B. Black box testing
C. Expected output
D. Test case
E. Integration testing

14. Which term means: “Testing one module alone”?

A. Unit testing
B. Program development
C. White box testing
D. System testing
E. Erroneous data

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15. Which term means: “Testing modules working together”?

A. Database development
B. Acceptance testing
C. Integration testing
D. Expected output
E. Black box testing

16. Which term means: “Testing the complete system against the specification”?

A. Program development
B. Boundary value
C. Unit testing
D. Test case
E. System testing

17. Which term means: “Users confirm the system meets their needs”?

A. Database development
B. Integration testing
C. Acceptance testing
D. White box testing
E. Erroneous data

18. Which term means: “Value on or next to a valid limit”?

A. Black box testing
B. Boundary value
C. Test case
D. System testing
E. Expected output

19. Which term means: “Invalid data that should be rejected”?

A. Erroneous data
B. White box testing
C. Unit testing
D. Acceptance testing
E. Program development

20. Which term means: “Result the system should produce”?

A. Database development
B. Boundary value
C. Integration testing
D. Black box testing
E. Expected output

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Structured Questions

1. Distinguish program and database development. *(2 marks)*

> Program: coding modules; database: tables, keys, indexes, validation.

2. Explain white and black box testing. *(2 marks)*

> White: internal paths; black: input/output vs specification.

3. Describe the four testing levels in order. *(4 marks)*

> Unit; integration; system; acceptance by users.

4. Design boundary test data for marks 0–100. *(3 marks)*

> −1, 0, 1, 99, 100, 101; valid 4; invalid −1, 101.

5. Write a test case table entry for grade(55). *(4 marks)*

> Input 55; normal data; expected C; record actual result.

Summary

- Develop programs and database from the design.
- Test cases give input and expected output.
- White box = code; black box = behaviour.
- Unit → integration → system → acceptance.
- Use normal, boundary and erroneous data.

MCQ answer key – 7.8

1. **D** – White box.
2. **A** – Black box.
3. **D** – Unit.
4. **E** – Acceptance.
5. **E** – Above limit.
6. **D** – Below/on/above.
7. **B** – 70 ≥ 65.
8. **D** – One per branch.
9. **C** – Program development – Writing code for each module.
10. **B** – Database development – Creating tables, keys and rules.
11. **C** – Test case – Input with expected output for a test.
12. **A** – White box testing – Testing with knowledge of internal code.
13. **B** – Black box testing – Testing inputs and outputs without seeing code.
14. **A** – Unit testing – Testing one module alone.
15. **C** – Integration testing – Testing modules working together.

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16. **E** – System testing – Testing the complete system against the specification.
17. **C** – Acceptance testing – Users confirm the system meets their needs.
18. **B** – Boundary value – Value on or next to a valid limit.
19. **A** – Erroneous data – Invalid data that should be rejected.
20. **E** – Expected output – Result the system should produce.

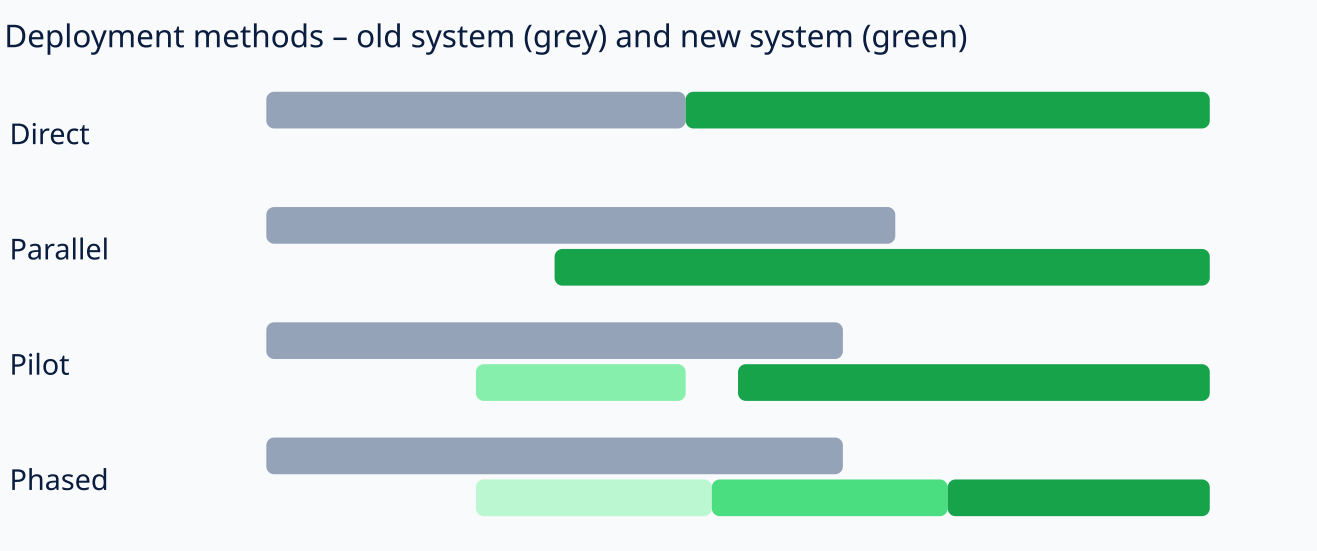
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Grade 12 A/L ICT · Lesson 7

7.9 Deploying the System: Changeover, Training and Maintenance

Syllabus 7.9. Deployment puts the new system into use. You compare the four **changeover methods – direct, parallel, pilot and phased** – and describe **hardware/software installation, data migration, user training**, then **review, support and maintenance**.

1. Changeover methods



Deployment timelines

Method	How	Advantage	Disadvantage
Direct	Old system stops, new starts on one day	Fast, cheap	High risk if new fails
Parallel	Old and new run together for a period	Safe – outputs can be compared	Double work and cost
Pilot	New system used in one branch first	Problems found on a small scale	Slower to reach all sites
Phased	New system introduced module by module	Staff learn gradually	Takes a long time; interfaces needed

🧮 **Worked example: A bank has 20 branches and runs a pilot in 2. What percentage is in the pilot, and why choose pilot?**
2 ÷ 20 × 100 = **10%** of branches. Pilot limits risk: errors affect only 2 branches, then the system is rolled out to the other 18.

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2. Installation, migration and training

- Install and configure hardware, network and software.
- Data migration: convert, clean and load old data; verify record counts.
- User training: manuals, workshops, help desk.

3. Review, support and maintenance

Corrective
Fix bugs found after release.

Adaptive
Change for new laws, hardware or OS.

Perfective
Improve speed or add requested features.

Post-implementation review
Check the system met its objectives.

💡 Critical systems (hospital, bank) prefer parallel or pilot; small low-risk systems can go direct.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Cloud "blue–green" and canary releases in 2026 are modern versions of parallel and pilot changeover.

Key Words

Deployment – Putting a new system into operation.

Direct changeover – Old system replaced by new at once.

Parallel running – Old and new systems run together.

Pilot changeover – New system tried in one part first.

Phased changeover – New system introduced in stages.

Data migration – Moving data from old system to new.

User training – Teaching staff to use the system.

Installation – Setting up hardware and software.

Corrective maintenance – Fixing errors after release.

Adaptive maintenance – Changing for a new environment.

Perfective maintenance – Improving performance or features.

Post-implementation review – Evaluating the system after go-live.

Sample Q&A

1. Name four deployment methods.

Answer: Direct, parallel, pilot, phased.

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2. Why is parallel running safe?

> **Answer:** The old system is still available and outputs can be compared.

3. Main risk of direct changeover?

> **Answer:** If the new system fails there is no fallback.

4. What is data migration?

> **Answer:** Converting and transferring old data into the new system.

5. Pilot percentage for 2 of 20 branches?

> **Answer:** 10%.

6. Three types of maintenance?

> **Answer:** Corrective, adaptive, perfective.

MCQ

1. Old system stops and new starts on the same day is

A. acceptance testing
B. phased
C. direct changeover
D. pilot
E. parallel running

2. Running old and new together is

A. parallel running
B. unit testing
C. direct changeover
D. pilot
E. phased

3. Trying the new system in one branch first is

A. parallel
B. direct
C. pilot changeover
D. black box
E. phased

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4. Introducing payroll first, then stock, then sales is

A. direct
B. phased changeover
C. pilot
D. gap analysis
E. parallel

5. 2 pilot branches out of 20 is

A. 5%
B. 90%
C. 2%
D. 20%
E. 10%

6. Fixing a bug found after release is

A. adaptive maintenance
B. pilot
C. corrective maintenance
D. perfective maintenance
E. data migration

7. Updating software for a new tax law is

A. corrective maintenance
B. perfective maintenance
C. unit testing
D. adaptive maintenance
E. direct changeover

8. The most costly method in staff effort is usually

A. direct changeover
B. pilot in one room
C. a BSO
D. a feasibility study
E. parallel running

9. Which term means: “Putting a new system into operation”?

A. Data migration
B. Installation
C. Perfective maintenance
D. Deployment
E. Parallel running

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10. Which term means: “Old system replaced by new at once”?

A. Corrective maintenance
B. Direct changeover
C. Post-implementation review
D. Pilot changeover
E. User training

11. Which term means: “Old and new systems run together”?

A. Parallel running
B. Installation
C. Deployment
D. Phased changeover
E. Adaptive maintenance

12. Which term means: “New system tried in one part first”?

A. Perfective maintenance
B. Corrective maintenance
C. Data migration
D. Pilot changeover
E. Direct changeover

13. Which term means: “New system introduced in stages”?

A. Parallel running
B. Adaptive maintenance
C. Phased changeover
D. User training
E. Post-implementation review

14. Which term means: “Moving data from old system to new”?

A. Perfective maintenance
B. Data migration
C. Deployment
D. Pilot changeover
E. Installation

15. Which term means: “Teaching staff to use the system”?

A. User training
B. Phased changeover
C. Post-implementation review
D. Direct changeover
E. Corrective maintenance

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16. Which term means: “Setting up hardware and software”?

A. Installation
B. Deployment
C. Adaptive maintenance
D. Parallel running
E. Data migration

17. Which term means: “Fixing errors after release”?

A. User training
B. Corrective maintenance
C. Pilot changeover
D. Perfective maintenance
E. Direct changeover

18. Which term means: “Changing for a new environment”?

A. Post-implementation review
B. Parallel running
C. Phased changeover
D. Adaptive maintenance
E. Installation

19. Which term means: “Improving performance or features”?

A. Corrective maintenance
B. Data migration
C. Deployment
D. Pilot changeover
E. Perfective maintenance

20. Which term means: “Evaluating the system after go-live”?

A. Adaptive maintenance
B. User training
C. Direct changeover
D. Phased changeover
E. Post-implementation review

Structured Questions

1. Compare direct and parallel changeover. *(2 marks)*

> Direct fast/cheap/high risk; parallel safe/comparable/double cost.

2. Explain pilot and phased changeover with examples. *(2 marks)*

> Pilot: one branch first; phased: one module at a time.

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3. Describe activities in installation and data migration. *(2 marks)*

> Set up hardware/network/software; convert, clean, load, verify data.

4. Why is user training needed? Give two methods. *(2 marks)*

> Correct use and acceptance; manuals, workshops, online help.

5. Explain three types of maintenance. *(3 marks)*

> Corrective fixes bugs; adaptive suits new environment; perfective improves features.

Summary

- Four changeovers: direct, parallel, pilot, phased.
- Parallel safest; direct riskiest.
- Install, migrate data, train users.
- Review after go-live.
- Maintenance: corrective, adaptive, perfective.

MCQ answer key – 7.9

1. **C** – Direct.
2. **A** – Parallel.
3. **C** – Pilot.
4. **B** – Phased.
5. **E** – 2/20.
6. **C** – Corrective.
7. **D** – Adaptive.
8. **E** – Double work.
9. **D** – Deployment – Putting a new system into operation.
10. **B** – Direct changeover – Old system replaced by new at once.
11. **A** – Parallel running – Old and new systems run together.
12. **D** – Pilot changeover – New system tried in one part first.
13. **C** – Phased changeover – New system introduced in stages.
14. **B** – Data migration – Moving data from old system to new.
15. **A** – User training – Teaching staff to use the system.
16. **A** – Installation – Setting up hardware and software.
17. **B** – Corrective maintenance – Fixing errors after release.
18. **D** – Adaptive maintenance – Changing for a new environment.
19. **E** – Perfective maintenance – Improving performance or features.
20. **E** – Post-implementation review – Evaluating the system after go-live.

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Grade 12 A/L ICT · Lesson 7

7.10 Off-the-Shelf Packages, Gap Analysis and Business Process Reengineering

Syllabus 7.10. Instead of building software, an organisation can buy an **off-the-shelf package**. You weigh its **advantages and costs**, identify package **capabilities and workflows**, then use **business process gap analysis**, **business process mapping** and **business process reengineering (BPR)** to fit package and business together.

1. Package vs bespoke

Package	Advantage	Disadvantage
Off-the-shelf	Ready quickly, tested, lower initial cost, vendor support	May not fit all needs; licence fees; depends on vendor
Bespoke (custom)	Fits exactly, owned by organisation	Expensive, slow, more bugs at first

🧱 **Worked example: Compare 3-year costs. Package: buy Rs. 600,000 + customise Rs. 300,000 + Rs. 150,000/year. Bespoke: build Rs. 1,500,000 + Rs. 100,000/year.**
Package = Rs. 600,000 + Rs. 300,000 + 3 × Rs. 150,000 = **Rs. 1,350,000**. Bespoke = Rs. 1,500,000 + 3 × Rs. 100,000 = **Rs. 1,800,000**. The package is cheaper by **Rs. 450,000** over 3 years (investment + operational + maintenance).

2. Gap analysis, mapping and BPR

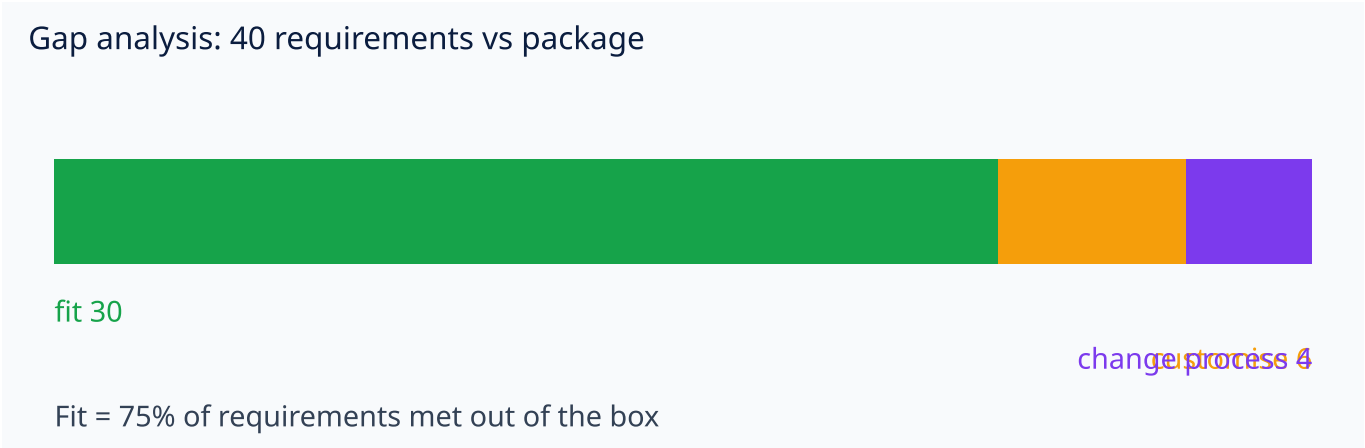
Capability study
List package features and its standard workflows.

Gap analysis
Compare each business requirement with the package: fit or gap.

Process mapping
Map each business activity onto a package workflow step.

BPR
Redesign business processes radically to fit the package and improve.

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Gap analysis result

🧱 **Worked example: A school lists 40 requirements. The package meets 30; 6 need customisation; the rest need a process change. Find the fit percentage and process changes.**
Fit = 30 ÷ 40 × 100 = **75%**. Process changes (BPR) = 40 − 30 − 6 = **4**.

💡 Gap → either customise the package or change the business process (BPR).

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026 most packages are SaaS: you subscribe, configure workflows online, and the vendor updates the software.

Key Words

Off-the-shelf package – Ready-made software sold to many users.

Bespoke software – Software built for one organisation.

Package capability – Feature the package provides.

Workflow – Ordered steps a package expects users to follow.

Gap analysis – Comparing business needs with package features.

Business process mapping – Linking business activities to package steps.

Business process reengineering – Radical redesign of business processes.

Customisation – Changing or configuring a package to fit needs.

Licence fee – Payment for the right to use software.

Investment cost – One-time cost to buy and set up.

Operational cost – Ongoing cost of running the system.

Maintenance cost – Cost of updates and support.

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Sample Q&A

1. Two advantages of off-the-shelf packages?

> **Answer:** Available quickly; already tested (also vendor support).

2. Two disadvantages?

> **Answer:** May not fit needs; ongoing licence fees and vendor dependence.

3. What is gap analysis?

> **Answer:** Comparing each requirement with package features to find gaps.

4. What is process mapping?

> **Answer:** Placing each business activity onto a package workflow step.

5. What is BPR?

> **Answer:** Radically redesigning business processes, often to fit a package.

6. Fit % for 30 of 40?

> **Answer:** 75%.

MCQ

1. Ready-made software sold to many organisations is

A. a data dictionary
B. a context diagram
C. bespoke software
D. a pilot
E. an off-the-shelf package

2. Comparing requirements with package features is

A. LDS
B. payback
C. gap analysis
D. unit testing
E. direct changeover

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3. Radical redesign of business processes is

A. white box testing
B. business process reengineering
C. phased changeover
D. prototyping
E. data migration

4. Linking each business activity to a package step is

A. feasibility
B. acceptance
C. business process mapping
D. black box testing
E. encryption

5. Fit % when 30 of 40 requirements are met

A. 75%
B. 30%
C. 70%
D. 80%
E. 40%

6. 3-year cost of the package in the example

A. Rs. 600,000
B. Rs. 1,050,000
C. Rs. 1,350,000
D. Rs. 1,500,000
E. Rs. 1,800,000

7. A main DISADVANTAGE of a package is

A. no one else uses it
B. it may not fit every business need
C. it takes years to build
D. it is never tested
E. it has no vendor

8. Ongoing licence and support payments are

A. investment only
B. test cases
C. tangible benefits
D. payback period
E. operational and maintenance costs

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9. Which term means: “Ready-made software sold to many users”?

A. Off-the-shelf package
B. Operational cost
C. Customisation
D. Package capability
E. Business process mapping

10. Which term means: “Software built for one organisation”?

A. Bespoke software
B. Maintenance cost
C. Workflow
D. Business process reengineering
E. Licence fee

11. Which term means: “Feature the package provides”?

A. Off-the-shelf package
B. Gap analysis
C. Investment cost
D. Package capability
E. Customisation

12. Which term means: “Ordered steps a package expects users to follow”?

A. Operational cost
B. Bespoke software
C. Workflow
D. Business process mapping
E. Licence fee

13. Which term means: “Comparing business needs with package features”?

A. Package capability
B. Gap analysis
C. Investment cost
D. Maintenance cost
E. Business process reengineering

14. Which term means: “Linking business activities to package steps”?

A. Customisation
B. Business process mapping
C. Operational cost
D. Workflow
E. Off-the-shelf package

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15. Which term means: “Radical redesign of business processes”?

A. Maintenance cost
B. Bespoke software
C. Licence fee
D. Business process reengineering
E. Gap analysis

16. Which term means: “Changing or configuring a package to fit needs”?

A. Customisation
B. Investment cost
C. Business process mapping
D. Package capability
E. Off-the-shelf package

17. Which term means: “Payment for the right to use software”?

A. Operational cost
B. Bespoke software
C. Business process reengineering
D. Workflow
E. Licence fee

18. Which term means: “One-time cost to buy and set up”?

A. Customisation
B. Package capability
C. Maintenance cost
D. Investment cost
E. Gap analysis

19. Which term means: “Ongoing cost of running the system”?

A. Business process mapping
B. Licence fee
C. Workflow
D. Off-the-shelf package
E. Operational cost

20. Which term means: “Cost of updates and support”?

A. Gap analysis
B. Investment cost
C. Business process reengineering
D. Maintenance cost
E. Bespoke software

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Structured Questions

1. Give two advantages and two disadvantages of off-the-shelf packages. *(2 marks)*

> Fast, tested; may not fit, licence fees.

2. Compare 3-year costs of package and bespoke in the example. *(3 marks)*

> Package Rs. 1,350,000; bespoke Rs. 1,800,000; package cheaper by Rs. 450,000.

3. Explain gap analysis and its outcomes. *(2 marks)*

> Requirement vs feature; fit, customise or change process.

4. Calculate fit % and process changes for the school example. *(2 marks)*

> 75%; 4 process changes.

5. Distinguish process mapping and BPR. *(2 marks)*

> Mapping links activities to package steps; BPR redesigns processes.

Summary

- Packages are fast and tested but may not fit.
- Compare investment, operational and maintenance costs.
- Gap analysis finds fit and gaps.
- Mapping places activities on workflows.
- BPR changes the business to fit and improve.

MCQ answer key – 7.10

1. **E** – Package.
2. **C** – Gap analysis.
3. **B** – BPR.
4. **C** – Mapping.
5. **A** – 30/40.
6. **C** – Sum.
7. **B** – Fit.
8. **E** – Ongoing.
9. **A** – Off-the-shelf package – Ready-made software sold to many users.
10. **A** – Bespoke software – Software built for one organisation.
11. **D** – Package capability – Feature the package provides.
12. **C** – Workflow – Ordered steps a package expects users to follow.
13. **B** – Gap analysis – Comparing business needs with package features.
14. **B** – Business process mapping – Linking business activities to package steps.
15. **D** – Business process reengineering – Radical redesign of business processes.

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16. **A** – Customisation – Changing or configuring a package to fit needs.
17. **E** – Licence fee – Payment for the right to use software.
18. **D** – Investment cost – One-time cost to buy and set up.
19. **E** – Operational cost – Ongoing cost of running the system.
20. **D** – Maintenance cost – Cost of updates and support.

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