Grade 12 A/L ICT · Lesson 5

Lesson 5 A/L Exam Practice: Questions and Answers

This practice paper assesses **Lesson 5: Computer Operating System** (syllabus competency 5). Paper I has 30 five-option MCQs. Paper II Part A has four structured questions; Part B has three essays. Marking points are shown in brackets.

Paper I – Multiple choice questions (30)

1. An operating system is best described as

A. a single user file
B. system software that manages hardware and software resources
C. an application like a word processor
D. a network cable
E. a hardware chip only

2. Which is an OS function?

A. soldering chips
B. writing novels
C. process management
D. building furniture
E. drawing only

3. GUI means

A. Gate Unit Interface
B. Grouped Unique ID
C. General User Index
D. Graphical User Interface
E. Global Utility Input

4. A multi-user OS allows

A. only one person ever
B. many people to use the computer (often at once)
C. one file total
D. no passwords
E. hardware only

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5. A real-time OS is critical when

A. you browse slowly
B. games need no timing
C. printing is optional
D. you edit a school essay
E. deadlines must never be missed (e.g. airbags)

6. CLI stands for

A. Cached Link Index
B. Command Line Interface
C. Central Logic Input
D. Closed Library Item
E. Chip Level Interrupt

7. Firmware is closest to

A. a Word document
B. cloud music
C. a printed book
D. software stored in ROM that starts the hardware
E. a USB game only

8. Time-sharing mainly aims to

A. delete files daily
B. remove all memory
C. ban multitasking
D. disable interrupts
E. give many users fair short turns of the CPU

9. A directory is best described as

A. a printer spool only
B. a container that holds files and other directories
C. a page frame
D. a single CPU register
E. an interrupt vector

10. Contiguous allocation stores a file in

A. RAM only
B. one index pointer alone
C. the CPU cache only
D. one unbroken run of blocks
E. scattered random blocks only

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11. Indexed allocation uses

A. no pointers ever
B. a single linked next only
C. an index block of pointers to data blocks
D. only one continuous run
E. the keyboard buffer

12. Defragmentation mainly

A. deletes the OS
B. turns off paging
C. adds more CPUs
D. formats the BIOS
E. repacks scattered pieces of files closer together

13. Formatting a disk usually

A. writes only one byte forever
B. disables the MMU
C. creates virtual memory alone
D. prepares a file system structure (and may erase data)
E. installs a new CPU

14. Linked allocation stores each block’s

A. pointer to the next block
B. full copy of the OS
C. the PCB
D. the quantum
E. the page table only

15. In the contiguous example (A=2,B=3,C=1 on 10 blocks), free blocks left are

A. 10
B. 0
C. 4
D. 6
E. 1

16. A process is

A. a blank folder
B. a page size
C. a printer cable
D. only a file on disk
E. a program in execution

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17. PCB stands for

A. Process Control Block
B. Printer Cable Bundle
C. Page Cache Buffer
D. Primary CPU Bus
E. Program Code Byte

18. Context switching means

A. turning off interrupts forever
B. formatting a disk
C. deleting a directory
D. changing page size forever
E. saving one process’s state and loading another’s

19. FCFS schedules by

A. arrival / queue order (first come first served)
B. priority only
C. random roulette only
D. largest file first
E. shortest burst only

20. For the FCFS jobs in the notes, average waiting time is

A. 5.75 ms
B. 0 ms
C. 4.0 ms
D. 1 ms
E. 22 ms

21. SJF prefers

A. the longest job always
B. the ready job with the shortest burst
C. disk formatting
D. GUI themes
E. only idle time

22. For the SJF jobs in the notes, average waiting time is

A. 0 ms
B. 5.75 ms
C. 7 ms
D. 4.0 ms
E. 16 ms

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23. Throughput of 20 jobs in 10 s is

A. 20 jobs/s
B. 0.5 jobs/s
C. 10 jobs/s
D. 200 jobs/s
E. 2 jobs/s

24. The MMU mainly

A. translates logical addresses to physical ones
B. prints documents
C. formats only USB sticks
D. draws icons
E. edits spreadsheets

25. Virtual memory lets a process

A. never use disk
B. use more address space than physical RAM by using disk
C. disable the CPU
D. delete the page table
E. avoid all addresses

26. Logical address 3500 with 1 KB pages → page, offset

A. page 0, offset 3500
B. page 5, offset 0
C. page 3, offset 428
D. page 4, offset 428
E. page 1, offset 1024

27. If page 3 maps to frame 5, physical address is

A. 5548
B. 3500
C. 5120
D. 428
E. 1024

28. A device driver is

A. a user password
B. a folder icon
C. a mechanical gear only
D. software that lets the OS talk to a hardware device
E. a page fault alone

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29. Spooling is useful because

A. it freezes the CPU

B. it deletes every print job

C. jobs can queue on disk while a slow device catches up

D. it removes the OS

E. it disables multitasking

30. With 16-bit logical addresses and 1 KB pages, page-number bits are

A. 16

B. 1

C. 6

D. 8

E. 10

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Paper II Part A – Structured questions

1. Operating system need and types *(8 marks)*

(i) Define an operating system and name three of its main functions. *(3 marks)*
(ii) Distinguish multi-user and multi-tasking OS. Give one real-time example. *(3 marks)*
(iii) Compare CLI and GUI in one clear point each. *(2 marks)*

2. Files, directories and allocation *(8 marks)*

(i) Explain directory hierarchy with root and path idea. *(2 marks)*
(ii) Compare contiguous, linked and indexed allocation (one strength each). *(3 marks)*
(iii) A disk has 10 blocks. Files A=2, B=3, C=1 use contiguous allocation from block 0. State the ranges and free count. Also state total blocks for a 5-data-block indexed file (one-level). *(3 marks)*

3. Processes and scheduling *(8 marks)*

(i) Define process and PCB. Name three fields kept in a PCB. *(3 marks)*
(ii) Explain context switching and why the short-term scheduler matters. *(2 marks)*
(iii) Using FCFS on P1(0,5), P2(1,3), P3(2,8), P4(3,6), find each waiting time and the average. Then give the SJF average for the notes' SJF set. *(3 marks)*

4. Memory, paging and I/O *(8 marks)*

(i) Explain MMU and virtual memory in two sentences. *(2 marks)*
(ii) Page size = 1024 B. For logical address 3500, find page number and offset. If the page is in frame 5, find the physical address. *(4 marks)*
(iii) Define device driver and spooling with one benefit of spooling. *(2 marks)*

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Paper II Part B – Essay questions

1. Role of the operating system *(10 marks)*

(i) Explain why a computer needs an OS. Include at least four managed resources. *(4 marks)*
(ii) Classify OS by number of users and by number of tasks, with one example each. *(3 marks)*
(iii) Describe CLI and GUI and when each is useful in a Sri Lankan school computer lab. *(3 marks)*

2. Storage and process control *(10 marks)*

(i) Compare contiguous, linked and indexed file allocation for fragmentation and random access. *(4 marks)*
(ii) Explain process states and the role of interrupts in moving between them. *(3 marks)*
(iii) Why might SJF give a lower average waiting time than FCFS? Use the lesson numbers briefly. *(3 marks)*

3. Paging, drivers and spooling *(11 marks)*

(i) Describe paging: page, frame, page table, and how a logical address is split. *(4 marks)*
(ii) Work the full calculation: LA=3500, page size 1024, frame=5 → PA. Also give page bits for 16-bit LA with 10-bit offset. *(4 marks)*
(iii) Explain device drivers and spooling with one school-lab printing example. *(3 marks)*

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Exam tips

- Memorise OS functions: process, memory, file, device, security, UI.
- Multi-user ≠ multi-tasking – define both if the question asks for classification.
- Draw directory trees with a clear root when explaining hierarchy.
- Allocation: contiguous = start+length; linked = next pointer; indexed = index block.
- Always show FCFS/SJF start and finish times before the average.
- Waiting time = start − arrival; turnaround = finish − arrival.
- Paging: page = LA // size; offset = LA % size; PA = frame×size + offset.
- MMU translates; virtual memory extends address space with disk.
- Spooling = queue on disk for slow devices (classic: printers).
- In Paper I, watch for ‘only’ and ‘never’ wording traps.
- In Paper II, one mark ≈ one clear point or one correct calculation step.
- Beyond boxes (containers, zRAM) are for interest – exam tests the syllabus only.

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Answers and explanations

Paper I

1. **B** – OS sits between apps and hardware.
2. **C** – Process, memory, file and device management.
3. **D** – Windows, icons, menus, pointers.
4. **B** – Accounts and shared resources.
5. **E** – Hard deadlines.
6. **B** – Typed commands.
7. **D** – BIOS/UEFI style.
8. **E** – Interactive sharing.
9. **B** – Folders in a hierarchy.
10. **D** – Start + length.
11. **C** – Index lists block numbers.
12. **E** – Improves sequential read.
13. **D** – Creates FAT/inode layout.
14. **A** – Chain of blocks.
15. **C** – 10−(2+3+1)=4.
16. **E** – Running instance.
17. **A** – Holds state, registers, ID.
18. **E** – Scheduler swaps CPU.
19. **A** – Non-preemptive queue order.
20. **A** – (0+4+6+13)/4 = 5.75.
21. **B** – Shortest Job First.
22. **D** – (0+3+6+7)/4 = 4.
23. **E** – 20/10 = 2.
24. **A** – Memory Management Unit.
25. **B** – RAM + swap/page file.
26. **C** – 3500//1024=3, 3500%1024=428.
27. **A** – 5×1024+428=5548.
28. **D** – Printer, disk, NIC drivers.
29. **C** – Simultaneous Peripheral Operations On-Line.
30. **C** – 16−10=6 → 64 pages.

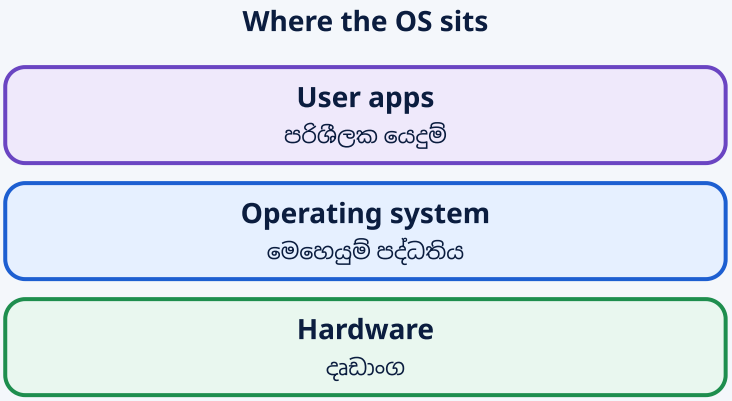
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Paper II Part A – model answers and marking points

1. *(8 marks)*

(i) (3 marks)
System software managing resources / hardware–software bridge (1); any three of: process, memory, file, device, security, user interface (2).

(ii) (3 marks)
Multi-user: many people/accounts (1); multi-tasking: many programs at once (1); e.g. airbag / ABS / industrial controller (1).



OS between apps and hardware.

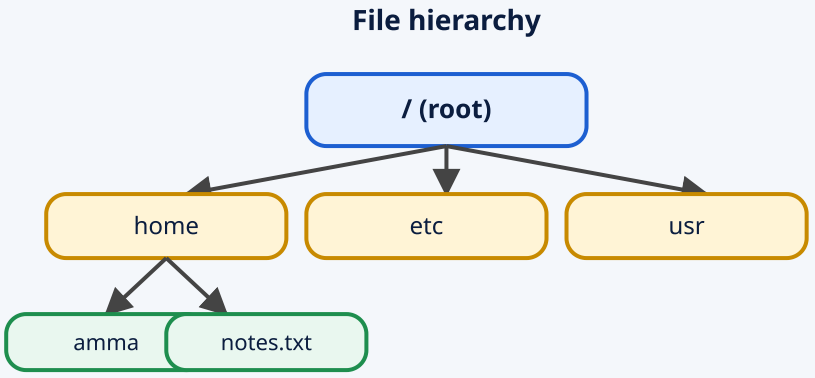
(iii) (2 marks)
CLI: typed commands / scriptable (1); GUI: icons/windows / easier for beginners (1).

🎯 Examiner tip: always name a Sri Lankan school/home example when the mark scheme allows.

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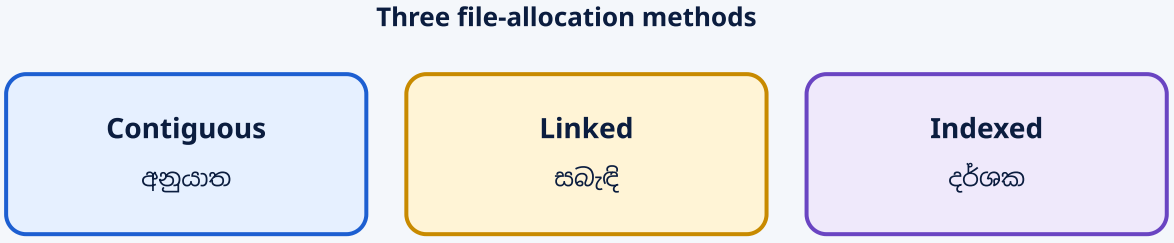
2. *(8 marks)*

(i) (2 marks)
Tree of folders from a root (1); path names locate a file (1).



Directory tree.

(ii) (3 marks)
Contiguous: fast sequential / simple (1); linked: no large hole needed (1); indexed: direct access via index (1).



Allocation methods.

(iii) (3 marks)
A 0–1, B 2–4, C 5–5 (1); free 4 (1); indexed total 1+5=6 (1).

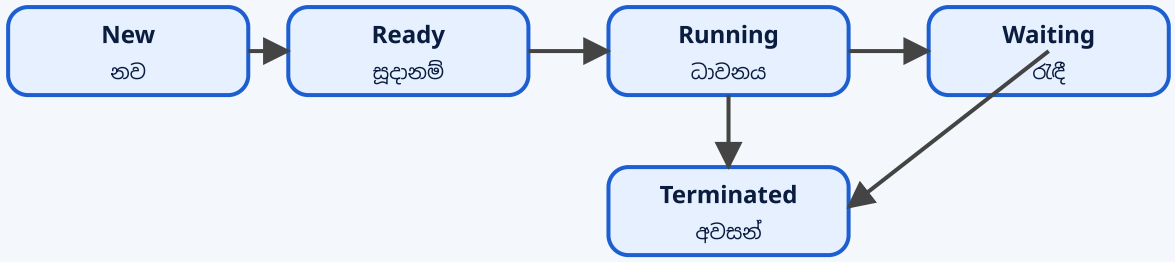
🎯 Examiner tip: draw a short block diagram for allocation – markers like visual answers.

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3. *(8 marks)*

(i) (3 marks)
Process = program in execution (1); PCB = Process Control Block (1); e.g. PID, state, registers, PC, memory limits, open files (1 for any three).

Process states (simplified)

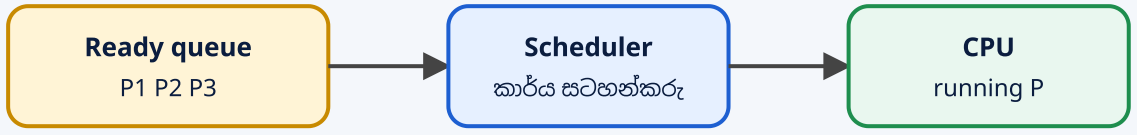


Process states.

(ii) (2 marks)
Save/restore PCB so another process runs (1); short-term picks who gets the CPU next (1).

(iii) (3 marks)
Waits 0,4,6,13 (1); avg 5.75 ms (1); SJF avg 4.0 ms (1).

CPU scheduling idea



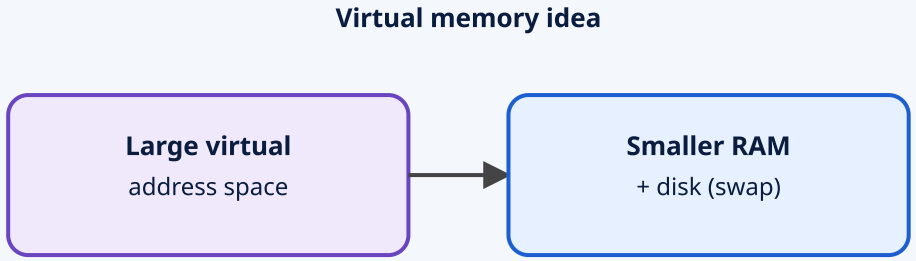
FCFS vs SJF idea.

🎯 Examiner tip: show the Gantt / start–finish times – average alone without working loses marks.

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4. *(8 marks)*

(i) (2 marks)
MMU maps logical→physical (1); virtual memory uses disk so address space can exceed RAM (1).



Virtual memory idea.

(ii) (4 marks)
page = 3500//1024 = 3 (1); offset = 428 (1); PA = 5×1024+428 = 5548 (2).



Paging address split.

(iii) (2 marks)
Driver = software interface to a device (1); spooling queues jobs on disk so CPU/work continues while device is slow (1).

🎯 Examiner tip: write the division and remainder for paging – markers want the working.

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Paper II Part B – model answers and marking points

1. *(10 marks)*

> **(i)** (4 marks)
> Hides hardware complexity / fair sharing / safety (1); CPU, memory, files/disk, devices/I/O, users/security (3 for four items).

> **(ii)** (3 marks)
> Single vs multi-user (1); single vs multi-tasking (1); examples named (1).

> **(iii)** (3 marks)
> CLI definition + lab use e.g. scripts/admin (1.5); GUI definition + beginners/Office (1.5).

🎯 Examiner tip: structure the essay with short headings matching the parts.

2. *(10 marks)*

> **(i)** (4 marks)
> Contiguous: external frag / excellent sequential & random if contiguous (1.5); linked: little external frag / poor random (1.5); indexed: little external / good random via index (1).

> **(ii)** (3 marks)
> Ready/running/waiting (blocked) (+new/terminated) (2); interrupt / I/O completion / timer moves states (1).

> **(iii)** (3 marks)
> Short jobs not stuck behind long ones (1); FCFS avg 5.75 vs SJF 4.0 in notes (2).

🎯 Examiner tip: quote the averages with units (ms) and show which jobs ran first.

3. *(11 marks)*

> **(i)** (4 marks)
> Fixed-size pages in logical space / frames in physical (1); page table maps page→frame (1); address = page number + offset (1); example idea 3500→3|428 (1).

> **(ii)** (4 marks)
> 3 and 428 (1); PA=5548 (2); page bits=6 (1).

> **(iii)** (3 marks)
> Driver talks to printer hardware (1); spool queues many students' jobs on disk (1); CPU free / fair order (1).

🎯 Examiner tip: box the final PA clearly after the working.

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