Grade 13 A/L ICT · Lesson 13

Lesson 13 A/L Exam Practice: Questions and Answers

This practice paper assesses **Lesson 13: New Trends and Future Directions in ICT** (syllabus competency 13). 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. Qubit state counts, agent scores, votes and green-ICT savings were recomputed by code.

Paper I – Multiple choice questions (30)

1. Intelligent computing systems mainly

A. print paper only
B. adapt, learn or optimise
C. use steam only
D. ban networks
E. ignore all sensors

2. Emotional computing is also called

A. batch payroll only
B. quantum computing only
C. affective computing
D. CRT repair
E. punch-card sorting

3. AI is best described as

A. only a brand of keyboard
B. only wooden abacuses
C. only radio valves
D. techniques for tasks that usually need human intelligence
E. only ink for printers

4. Man–machine coexistence means

A. machines never helping people
B. people and machines working together usefully
C. banning all computers
D. people never using tools
E. removing all sensors

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5. M2M stands for

A. math-to-music
B. man-to-museum
C. map-to-memory
D. mail-to-modem
E. machine-to-machine

6. A farm soil sensor sending data to a gateway is mainly

A. vinyl records only
B. M2M / device coexistence
C. chalkboard only
D. handwritten letters only
E. fountain pens only

7. A software agent mainly

A. only prints banners
B. only powers a CRT
C. only stores paper files
D. senses, decides and acts with autonomy
E. only melts solder

8. Autonomy means the agent

A. has no goals
B. cannot read input
C. needs a human click every CPU cycle
D. never runs
E. works with limited direct control

9. A multi-agent system contains

A. exactly one frozen variable
B. several interacting agents
C. only a single LED
D. only a vinyl disk
E. only a paper form

10. Utility score 0.40×80 + 0.35×70 + 0.25×90 equals

A. 0.0
B. 100.0
C. 50.0
D. 79.0
E. 10.0

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11. With 4 YES votes out of 5 and threshold 3 the decision is

A. WAIT
B. NO
C. YES
D. TIE
E. ABORT

12. A price-watch shopping bot is an example of

A. a fountain pen
B. a steam engine
C. a CRT yoke
D. a punch card press
E. an agent application

13. The von Neumann model mainly uses

A. only abacuses
B. only steam looms
C. only vinyl disks
D. CPU, memory and a stored program
E. only paper ledgers

14. A classic von Neumann concern is

A. the CPU–memory bottleneck
B. lack of chairs
C. too many paperclips
D. ink colour only
E. window size only

15. Nature-inspired computing includes

A. only handwriting drills
B. only stamp collecting
C. genetic or swarm-style algorithms
D. only chalk dust
E. only candle making

16. Biology-inspired computing includes

A. only knitting patterns
B. only weather vanes
C. only sundials
D. only pottery wheels
E. neural or DNA-computing ideas

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17. A qubit differs from a classical bit because it can be in

A. a superposition of basis states
B. only ink states
C. only steam states
D. only paper states
E. only wooden states

18. 3 qubits span

A. 3 states
B. 1 state
C. 6 states
D. 9 states
E. 8 basis states

19. 5 qubits span

A. 32 basis states
B. 64 states
C. 5 states
D. 10 states
E. 16 states

20. Keeping top 40% of population 50 leaves

A. 20 parents
B. 10
C. 5
D. 50
E. 40

21. Green ICT saving from 12000 to 7800 kWh is

A. 12000 kWh
B. 4200 kWh
C. 100 kWh
D. 1000 kWh
E. 7800 kWh

22. Neuromorphic hardware is inspired by

A. only pencil erasers
B. only bicycle chains
C. only oven timers
D. neural brain structures
E. only door hinges

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23. Proactiveness means

A. only reacting once then quitting forever
B. never planning
C. removing sensors
D. banning goals
E. taking initiative toward goals

24. Social ability refers to

A. communicating with users or other agents
B. formatting floppies
C. ignoring messages
D. melting RAM
E. tuning pianos

25. A doctor using diagnostic software is mainly

A. pure brick retail
B. man–machine coexistence
C. floppy formatting
D. CRT glow
E. M2M only

26. Machine learning improves systems mainly by

A. printing punch cards forever
B. removing all memory
C. learning patterns from data
D. banning electricity
E. melting the CPU

27. Beyond von Neumann designs often add

A. parallelism or specialised accelerators
B. more quill pens
C. more candle light
D. more parchment
E. more abacus beads only

28. Entanglement in quantum computing refers to

A. tying ethernet cables only
B. gluing keycaps only
C. sorting stamps only
D. a quantum correlation between qubits
E. folding paper only

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29. Percent energy cut from 12000 to 7800 kWh is

A. 50.0%

B. 10.0%

C. 35.0%

D. 5.0%

E. 25.0%

30. Cooperation in an MAS means agents

A. never interact

B. ban messages

C. work toward shared goals

D. power off forever

E. delete each other

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Paper II Part A – Structured questions

1. Trends in computing *(8 marks)*

(i) Describe intelligent and emotional computing. *(3 marks)*
(ii) Explain artificial intelligence briefly. *(2 marks)*
(iii) Compare man–machine and M2M coexistence. *(3 marks)*

2. Agents and MAS *(8 marks)*

(i) Define a software agent and list four characteristics. *(3 marks)*
(ii) Explain multi-agent systems and calculate the utility score 0.40×80+0.35×70+0.25×90. *(3 marks)*
(iii) With YES=4 / 5 and threshold 3, state the decision. *(2 marks)*

3. Beyond von Neumann *(8 marks)*

(i) Explain the von Neumann model and one limitation. *(3 marks)*
(ii) Describe nature-inspired and biology-inspired computing. *(3 marks)*
(iii) Population 50 keep 40% → how many parents? *(2 marks)*

4. Quantum and applications *(8 marks)*

(i) State qubit, superposition and 2^n basis states for n=3 and n=5. *(3 marks)*
(ii) Give two application areas for new computing models. *(3 marks)*
(iii) Green ICT: 12000 → 7800 kWh. Saving and percent? *(2 marks)*

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Paper II Part B – Essay questions

1. Living with intelligent systems *(10 marks)*

(i) Discuss intelligent computing, AI and emotional computing for a Sri Lankan service (bank, hospital or school). *(4 marks)*
(ii) Evaluate man–machine versus M2M coexistence in that setting. *(3 marks)*
(iii) State two benefits and two risks. *(3 marks)*

2. Agent systems in practice *(10 marks)*

(i) Explain software agents and MAS with characteristics. *(4 marks)*
(ii) Design an agent application for e-commerce or network monitoring. *(3 marks)*
(iii) Show the utility score 79.0 and the majority vote decision YES with working. *(3 marks)*

3. New computing models *(11 marks)*

(i) Compare von Neumann computing with beyond-VN and quantum ideas. *(4 marks)*
(ii) Explain nature- and biology-inspired methods with the keep-20-of-50 example. *(4 marks)*
(iii) Discuss applications and a green-ICT energy example (4200 kWh, 35.0%). *(3 marks)*

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Exam tips

- Intelligent ≠ emotional: both are syllabus terms – define each.
- AI = techniques; intelligent computing = broader systems view.
- Man–machine: human in partnership; M2M: devices among themselves.
- Agent traits: autonomy, reactivity, proactiveness, social ability.
- MAS: cooperate / coordinate / compete.
- Utility = weighted sum of scores.
- Von Neumann: stored program + CPU–memory link.
- Beyond VN: parallel, neuromorphic, in-memory.
- Nature vs biology inspired – give one example each.
- n qubits → 2^n basis states.
- Quantum is not magic speed for every app.
- Beyond boxes (GenAI, 6G, blockchain) are interest only.

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Answers and explanations

Paper I

1. **B** – Adaptive.
2. **C** – Affective.
3. **D** – Human-like tasks.
4. **B** – Teamwork.
5. **E** – Machine–machine.
6. **B** – Devices talk.
7. **D** – Sense–decide–act.
8. **E** – Limited control.
9. **B** – Many agents.
10. **D** – Weighted sum.
11. **C** – 4≥3 → YES.
12. **E** – E-commerce agent.
13. **D** – Stored program.
14. **A** – CPU–memory.
15. **C** – Evolution / swarm.
16. **E** – Neural / DNA.
17. **A** – Superposition.
18. **E** – 2^3=8.
19. **A** – 2^5=32.
20. **A** – 50×0.4.
21. **B** – 12000−7800.
22. **D** – Brain-inspired.
23. **E** – Initiative.
24. **A** – Communication.
25. **B** – Human + machine.
26. **C** – From data.
27. **A** – Parallel / accelerators.
28. **D** – Qubit correlation.
29. **C** – 4200/12000.
30. **C** – Shared goals.

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Paper II Part A – model answers and marking points

1. *(8 marks)*

(i) (3 marks)
Intelligent (1); emotional/affective (1); example (1).

New trends in computing (syllabus 13.1)



AI systems sense, decide and act; emotional computing reacts to human affect.

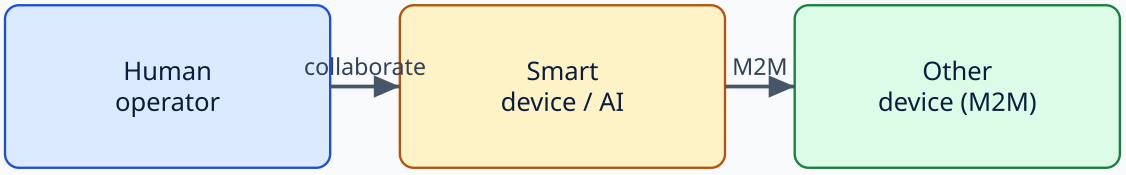
Coexistence: humans with machines, and machines cooperating with machines (M2M).

Trends.

(ii) (2 marks)
Definition (1); link to intelligent systems (1).

(iii) (3 marks)
Man–machine (1); M2M (1); example each (1).

Man–machine and machine–machine coexistence



Example: driver + car AI; sensors on a farm talk to a gateway without a person in the loop.

Coexistence.

🎯 Examiner tip: keep M2M distinct from ordinary single-user apps.

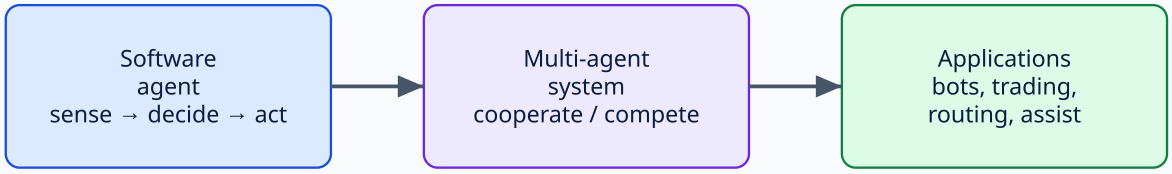
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2. *(8 marks)*

(i) (3 marks)

Definition (1); four traits (2).

Software agents and multi-agent systems



Traits often cited: autonomy, reactivity, proactiveness, social ability.

Example score 0.4×80 + 0.35×70 + 0.25×90 = 79.0 (utility agent).

Agents.

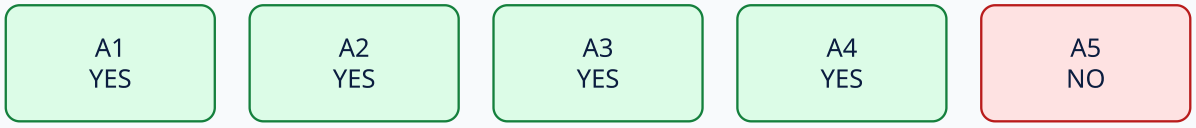
(ii) (3 marks)

MAS idea (1); score 79.0 (2).

(iii) (2 marks)

YES with reason (2).

Multi-agent majority decision



4 of 5 vote YES (threshold 3) → group decision YES.

Vote.

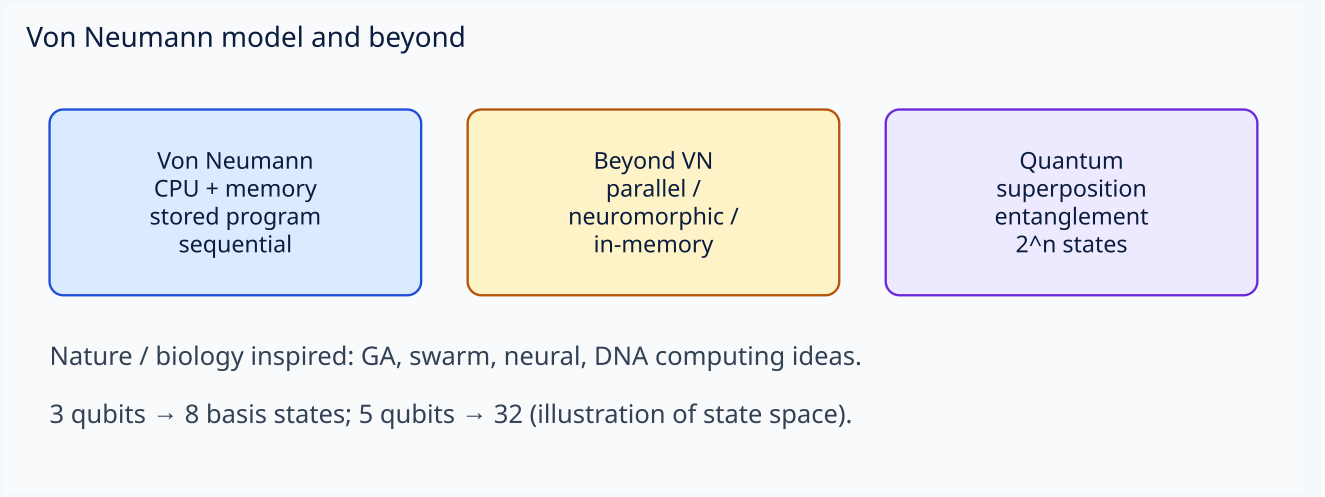
🎯 Examiner tip: show the weighted-sum working.

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3. *(8 marks)*

(i) (3 marks)

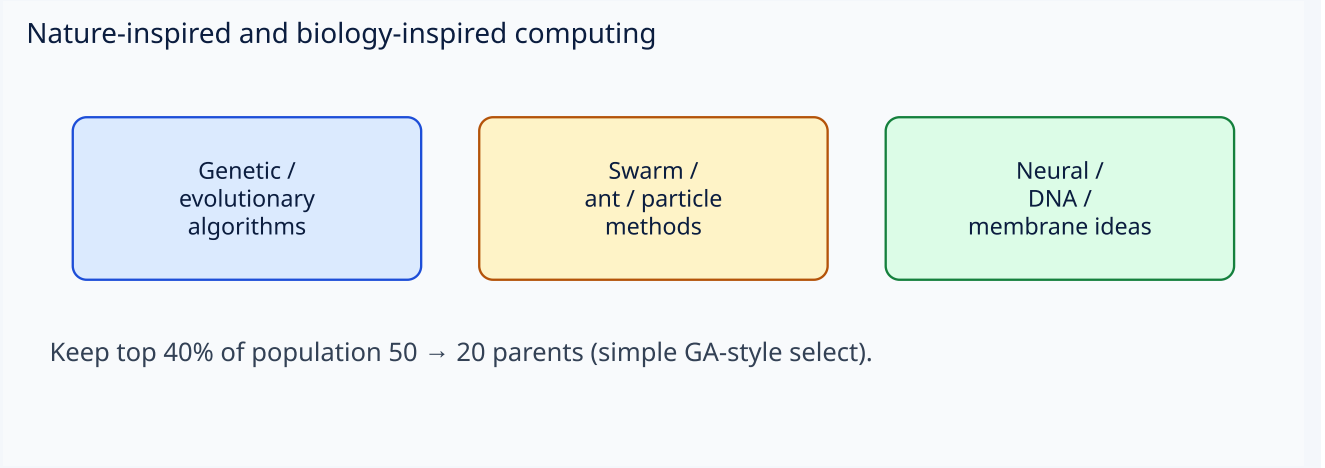
CPU/memory/program (2); bottleneck (1).



VN.

(ii) (3 marks)

Nature example (1); biology example (1); use (1).



Inspired.

(iii) (2 marks)

20 with method (2).

🎯 Examiner tip: name GA or swarm explicitly.

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4. *(8 marks)*

> **(i)** (3 marks)
> Definitions (1); 8 and 32 (2).

> **(ii)** (3 marks)
> Two areas with brief detail (3).

> **(iii)** (2 marks)
> 4200 kWh and 35.0% (2).

🎯 Examiner tip: write 2^n, not only the final number.

Paper II Part B – model answers and marking points

1. *(10 marks)*

> **(i)** (4 marks)
> Each theme linked to the service (4).

> **(ii)** (3 marks)
> Contrast (2); ethics/safety (1).

> **(iii)** (3 marks)
> Benefits (1); risks (2).

🎯 Examiner tip: use one concrete local example throughout.

2. *(10 marks)*

> **(i)** (4 marks)
> Agent (2); MAS + traits (2).

> **(ii)** (3 marks)
> Goals, sense/act, interaction (3).

> **(iii)** (3 marks)
> Score working (2); vote (1).

🎯 Examiner tip: separate single-agent from multi-agent roles.

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3. *(11 marks)*

> **(i)** (4 marks)
> VN (1); beyond (1); quantum basics (2).

> **(ii)** (4 marks)
> Nature (1); biology (1); calculation (2).

> **(iii)** (3 marks)
> Apps (1); green numbers (2).

> 🎯 Examiner tip: Beyond-2026 topics (GenAI, 6G) are optional colour only.

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