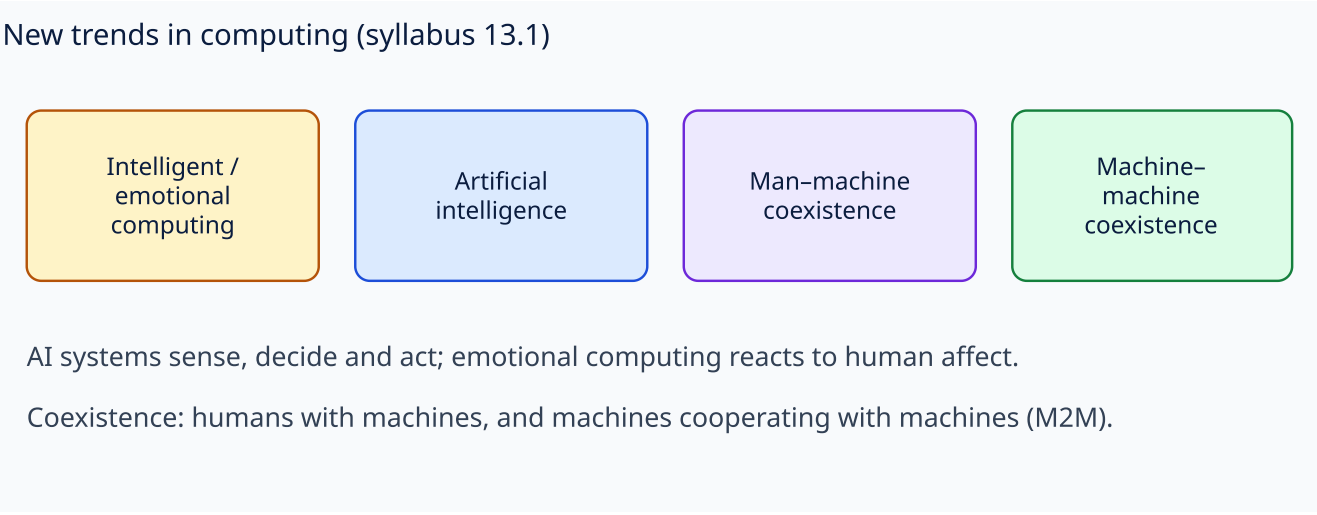
Grade 13 A/L ICT · Lesson 13

13.1 New Trends in Computing

Syllabus 13.1. Computing keeps changing. **Intelligent and emotional computing** builds systems that sense context and, in some cases, respond to human emotion. **Artificial intelligence (AI)** lets machines learn patterns, reason and act. **Man–machine coexistence** means people and machines work together usefully. **Machine-to-machine (M2M) coexistence** means devices exchange data and act with little human help. Together these ideas shape new products, jobs and ethics questions.

1. Intelligent and emotional computing



Four syllabus themes for 13.1

- **Intelligent computing** – hardware and software that adapt, learn or optimise (sensors, smart devices, adaptive algorithms).
- **Emotional computing** (affective computing) – systems that detect or respond to human emotion (voice tone, facial cues, text sentiment) to improve interaction.
- Goal: more natural, helpful human–computer interaction – not “feelings” inside the chip.

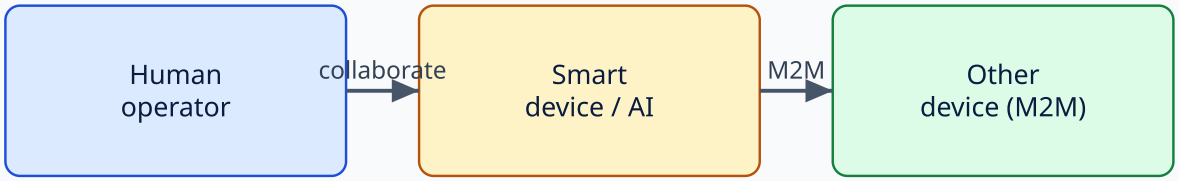
2. Artificial intelligence

- **AI** – techniques that let computers perform tasks that usually need human intelligence: recognising speech/images, planning, recommending, controlling robots.
- Classic ideas: search, knowledge rules, machine learning from data.
- AI is a toolbox used inside intelligent computing products.

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3. Man–machine coexistence

Man–machine and machine–machine coexistence



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

People and machines working together; devices talking to devices

- Humans remain in control for goals and ethics; machines handle speed, memory and repetition.
- Examples: pilot + autopilot; doctor + diagnostic support; student + adaptive tutor.
- Design must be transparent and safe so people trust the partnership.

4. Machine-to-machine coexistence

- **M2M** – devices exchange data and trigger actions without a person in every step (IoT sensors → gateway → cloud → actuator).
- Needs: identity, reliable networks, security and clear failure behaviour.
- Links to earlier IoT ideas, but here the focus is coexistence as a computing trend.

🧱 **Worked example: A hospital uses AI image screening with a radiologist reviewing flagged cases. Which coexistence is this, and why is it not pure M2M?**
Man–machine coexistence: the human radiologist stays in the decision loop. It is not pure M2M because a person reviews and takes responsibility.

💡 Think of AI as the “brain skills”, man–machine as teamwork with people, and M2M as teamwork among devices.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026, generative AI (large language and multimodal models) and on-device AI chips are common in phones and PCs; affective computing appears in call-centre and education tools. Edge AI and 5G/early 6G research cut latency for M2M. These are interest updates – the exam tests the syllabus themes above.

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Key Words

Intelligent computing – Adaptive, learning or optimising computer systems.

Emotional computing – Systems that detect or respond to human emotion.

Artificial intelligence – Techniques for tasks that usually need human intelligence.

Machine learning – Improving performance from data rather than only fixed rules.

Man–machine coexistence – People and machines working together usefully.

M2M – Machine-to-machine data exchange and action.

Affective computing – Another name often used for emotion-aware systems.

Autonomy – Ability to operate with limited direct human control.

Human–computer interaction – How people and computers communicate.

Sensor – Device that measures the physical world for intelligent systems.

Actuator – Device that performs an action in the physical world.

Ethics in AI – Fairness, privacy, safety and accountability in AI use.

Sample Q&A

1. What is intelligent computing?

> **Answer:** Computing that adapts, learns or optimises to solve problems.

2. What does emotional computing try to do?

> **Answer:** Detect or respond to human emotion to improve interaction.

3. Define artificial intelligence briefly.

> **Answer:** Techniques that let machines perform tasks needing human-like intelligence.

4. Give one man–machine coexistence example.

> **Answer:** Pilotilot assisting a pilot; or doctor with diagnostic software.

5. What is M2M coexistence?

> **Answer:** Devices exchanging data and acting with little human intervention.

6. Why do ethics matter for AI?

> **Answer:** To protect privacy, fairness, safety and clear responsibility.

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MCQ

1. Intelligent computing systems mainly

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

2. Emotional computing is also called

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

3. AI is best described as

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

4. Man–machine coexistence means

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

5. M2M stands for

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

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

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7. A doctor using diagnostic software is mainly

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

8. 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

9. Emotional computing uses cues such as

A. only tide tables
B. only stamp collections
C. only lunar phases
D. only steam pressure
E. voice tone, face or text sentiment

10. A key ethics concern for AI is

A. naming folders only
B. privacy, fairness and safety
C. making icons prettier only
D. choosing wallpaper only
E. sorting paperclips only

11. Which term means: “Adaptive, learning or optimising computer systems”?

A. Artificial intelligence
B. Actuator
C. Autonomy
D. M2M
E. Intelligent computing

12. Which term means: “Systems that detect or respond to human emotion”?

A. Human–computer interaction
B. Machine learning
C. Ethics in AI
D. Emotional computing
E. Affective computing

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13. Which term means: “Techniques for tasks that usually need human intelligence”?

A. Sensor
B. Intelligent computing
C. Autonomy
D. Artificial intelligence
E. Man–machine coexistence

14. Which term means: “Improving performance from data rather than only fixed rules”?

A. Machine learning
B. Human–computer interaction
C. Emotional computing
D. M2M
E. Actuator

15. Which term means: “People and machines working together usefully”?

A. Man–machine coexistence
B. Ethics in AI
C. Artificial intelligence
D. Sensor
E. Affective computing

16. Which term means: “Machine-to-machine data exchange and action”?

A. Machine learning
B. Actuator
C. Autonomy
D. Intelligent computing
E. M2M

17. Which term means: “Another name often used for emotion-aware systems”?

A. Ethics in AI
B. Affective computing
C. Man–machine coexistence
D. Emotional computing
E. Human–computer interaction

18. Which term means: “Ability to operate with limited direct human control”?

A. M2M
B. Artificial intelligence
C. Autonomy
D. Sensor
E. Intelligent computing

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19. Which term means: “How people and computers communicate”?

A. Emotional computing
B. Human–computer interaction
C. Actuator
D. Machine learning
E. Affective computing

20. Which term means: “Device that measures the physical world for intelligent systems”?

A. Man–machine coexistence
B. Autonomy
C. Ethics in AI
D. Sensor
E. Artificial intelligence

Structured Questions

1. Describe intelligent computing and emotional computing with one example each. *(2 marks)*

> Definitions; one example each.

2. Explain artificial intelligence and how it relates to intelligent computing. *(2 marks)*

> AI definition; used inside intelligent products.

3. Discuss man–machine coexistence with two real examples. *(3 marks)*

> Idea; two examples; safety/trust note.

4. Explain M2M coexistence and list two requirements for it to work well. *(2 marks)*

> Definition; network/security/identity.

5. Compare man–machine and machine–machine coexistence. *(2 marks)*

> Human in the loop vs devices among themselves.

Summary

- Intelligent computing adapts and optimises.
- Emotional computing responds to human affect.
- AI provides techniques for intelligent behaviour.
- Man–machine: people and machines as partners.
- M2M: devices cooperate with little human help.

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MCQ answer key – 13.1

1. **C** – Adaptive systems.
2. **E** – Affective.
3. **A** – Human-like tasks.
4. **D** – Teamwork.
5. **C** – Machine–machine.
6. **B** – Devices talk.
7. **A** – Human + machine.
8. **C** – From data.
9. **E** – Affect cues.
10. **B** – Responsible AI.
11. **E** – Intelligent computing – Adaptive, learning or optimising computer systems.
12. **D** – Emotional computing – Systems that detect or respond to human emotion.
13. **D** – Artificial intelligence – Techniques for tasks that usually need human intelligence.
14. **A** – Machine learning – Improving performance from data rather than only fixed rules.
15. **A** – Man–machine coexistence – People and machines working together usefully.
16. **E** – M2M – Machine-to-machine data exchange and action.
17. **B** – Affective computing – Another name often used for emotion-aware systems.
18. **C** – Autonomy – Ability to operate with limited direct human control.
19. **B** – Human–computer interaction – How people and computers communicate.
20. **D** – Sensor – Device that measures the physical world for intelligent systems.

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