

7.1.1 Professional bodies, justifying a software licence, and the impact of AI

Name: _____ Class: _____ Date: _____ Total: 30 marks

KEY WORDS artificial intelligence 人工智能 • copyright 版权 • shareware 共享软件 • ethics 伦理
• code of conduct 行为准则

Objective

Sheet 7.1 covers acting ethically, copyright, and what the licence types are. This sheet takes the three parts of 7.1 that the parent sheet only names: joining a **professional ethical body**, **justifying** a licence for a given situation across all four families the syllabus lists, and **artificial intelligence** – its applications and its social, economic and environmental impact. This sheet covers syllabus 7.1.

You must be able to:

- show understanding of the need for and purpose of **ethics** as a computing professional, and the importance of joining a professional ethical body including **BCS** (British Computer Society) and **IEEE** (Institute of Electrical and Electronic Engineers)
- show understanding of the need to act ethically, and the impact of acting ethically or unethically in a given situation
- show understanding of the need for **copyright** legislation
- show understanding of the different types of **software licencing**, and justify the use of a licence for a given situation, including the **Free Software Foundation**, the **Open Source Initiative**, **shareware** and **commercial software**
- show understanding of **Artificial Intelligence** (AI), its applications, and its impact including social, economic and environmental issues

1 Worked examples

Study these first. Each one shows a **method** that a question later on this sheet needs.

■ The professional bodies, and what joining one is actually for

A **computing professional** builds systems that other people have to trust and cannot inspect. Nobody outside the team can tell, by looking, whether a payroll system rounds fairly or whether a medical device logs its failures. **Ethics** 伦理 is what fills that gap where checking cannot.

The two bodies the syllabus names are the **BCS** (British Computer Society) and the **IEEE** (Institute of Electrical and Electronic Engineers). Learn **four reasons** for

joining one:

1. You agree to a published **code of conduct**, so a client knows in advance what standard you hold yourself to.
2. You are **accountable** to the body: it can investigate a complaint and expel a member, which an employer alone cannot do.
3. **Continuing professional development** – the body sets and recognises training, so your competence keeps up with the technology.
4. **Membership is a recognised qualification**, which gives a client or employer evidence of competence without having to test it themselves.

△ In the exam, “act ethically” is never enough on its own. The marks are for the **consequence** in *that* situation – a specific person harmed, a specific trust lost, a specific cost paid.

■ Copyright, and why a licence exists at all

- **Copyright** 版权 gives the author of a program the exclusive right to copy it, change it and pass it on. It exists automatically – no registration is needed – and it is what makes the effort of writing software worth paying for.
- A **licence** is the copyright holder writing down which of those rights you are being given. So **every** licence, including the free ones, rests on copyright. “Open source” does not mean “no copyright”; it means the copyright holder has chosen to grant more rights.

■ Four licence families, and how to choose between them

	Free Software Foundation e.g. GPL	Open Source Initiative e.g. MIT	Shareware	Commercial proprietary
run the program	yes	yes	yes, for a trial period	yes
read the source code	yes	yes	no	no
modify it	yes	yes	no	no
pass it on to others	yes, but under this same licence	yes, and you may keep your changes closed	yes, unchanged, to let them trial it too	no
pay for it	no	no	to keep using it after the trial	yes, and support comes with it

All four are **copyright** works – the licence is the copyright holder saying what you may do. So the exam question is never “which licence is best” but “which fits *this* situation”: ask who needs the **source**, who needs **support**, and who is **paying**.

- **Free Software Foundation** (e.g. the GPL) – free to run, read, modify and pass on, **but** anything you redistribute must carry the same licence. This is called **copyleft**: the freedom is made to travel with the code.
- **Open Source Initiative** (e.g. the MIT licence) – also free to run, read, modify and pass on, **without** the obligation to keep it open. A company may build a closed, paid product on top.
- **Shareware** – a full or partly-limited copy handed out free so you can **try** it. It

is still closed and still copyrighted; after the trial you pay to keep using it.

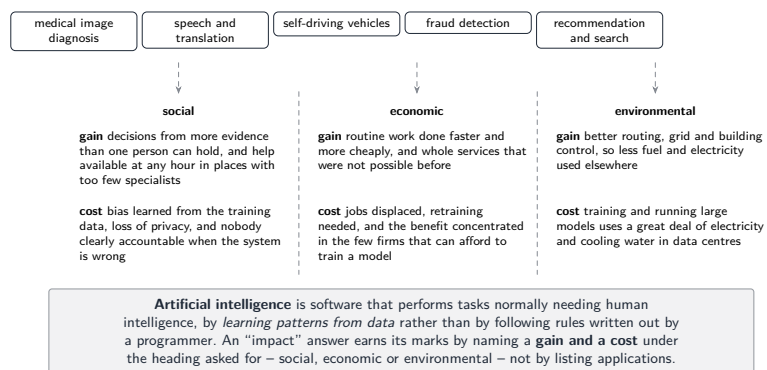
- **Commercial** (proprietary) – you buy a licence to *use* a compiled copy. No source, no modification, and technical **support and updates** are part of what you are paying for.

How to justify one – answer in terms of the *situation*, in this order:

1. Does anyone need to **read or change the source**? If yes, only FSF or OSI will do.
2. If changes will be redistributed, must they **stay open**? Yes → FSF; no → OSI.
3. Does the user need **guaranteed support, updates and someone to blame**? → commercial.
4. Is this a **trial before buying**? → shareware.

■ **Artificial intelligence, and what an “impact” answer must contain**

AI is already used for



- **Artificial intelligence** 人工智能 is software that performs tasks normally requiring human intelligence, by **learning patterns from data** rather than by following rules a programmer wrote out in advance. That second half is the definition mark most answers miss.
- **Applications:** medical image diagnosis, speech recognition and translation, self-driving vehicles, fraud detection, recommendation and search.
- An impact question names a **heading** – social, economic or environmental – and wants a **gain and a cost** under *that* heading. Listing more applications earns nothing.

2 Practice

Now use the methods above.

2.1 State **two** reasons why a computing professional should join a professional ethical body such as the BCS or the IEEE. [2]

2.2 A charity wants to use and modify an existing program, and is happy for its improvements to be available to everyone else too. Name the licence family it should choose and justify your answer. [3]

2.3 Describe what is meant by **shareware**, and state **one** way in which it differs from open-source software. [3]

2.4 State **two** applications of artificial intelligence. [2]

2.5 Explain **one** environmental impact of the growth of artificial intelligence. [2]

3 Exam-style questions

3.1 A licence allows a user to run a program, read and modify its source code, and pass on a modified version – but requires that any version passed on carries this same licence. Which term best describes this licence? [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** commercial
B copyleft, as used by the Free Software Foundation
C shareware
D a permissive open-source licence

3.2 A school is choosing software for its computer room.

(a) The school needs an office suite with guaranteed technical support and regular security updates, and it has a budget for this. State the most suitable licence type and justify your answer. [3]

(b) A teacher wants to try a video-editing package for two weeks before the department decides whether to buy it. State the most suitable licence type, and state **one** limitation the teacher should expect during the trial. [2]

(c) The computing department wants a programming environment that students can install at home at no cost, and that the technician can change to remove features the class should not use. State the most suitable licence type and justify your answer. [2]

3.3 A hospital introduces an AI system that reads patients' scans and flags the ones that probably show a tumour, for a radiologist to check.

(a) State what is meant by **artificial intelligence**. [2]

(b) Describe **one** social benefit and **one** social risk of using this system. [4]

(c) Describe **one** economic impact of introducing this system. [2]

(d) The AI model was trained in a large data centre. State and explain **one** environmental impact of that training. [2]
