

Ethics is a set of moral principles that govern the behaviour of a group or individual.

Computer Ethics

Computer ethics is set of moral principles that regulate the use of computers.

Some common issues of computer ethics include:

1. **INTELLECTUAL PROPERTY RIGHTS** – this covers, for example, copyright, plagiarism, cracking, software licencing.
2. **PRIVACY ISSUES** – this covers, for example, hacking, data protection and malware like virus, spyware or any illegal access to another person's personal data
3. **EFFECTS OF COMPUTERS ON SOCIETY** – this covers factors such as job losses, environmental effects, and social impacts and so on.

For example, while it is easy to duplicate copyrighted electronic (or digital) content, computer ethics would suggest that it is wrong to do so without the author's approval. And while it may be possible to access someone's personal information on a computer system, computer ethics would advise that such an action is unethical.

As technology advances, computers continue to have a greater impact on society. Therefore, computer ethics promotes the discussion of how much influence computers should have in areas such as artificial intelligence and human communication. As the world of computers evolves, computer ethics continues to create ethical standards that address new issues raised by new technologies.

Intellectual Property Rights:

Intellectual property (IP) is a category of property that includes intangible creations of the human intellect.

Examples of copyrightable works include movies, videos, photos, books, diaries, articles, and software.

Copyright is a legal concept, enacted by most governments, that grants the creator of an original work exclusive rights to its use and distribution, usually for a limited time, with the intention of enabling the creator of intellectual wealth (e.g. the photographer of a photograph or the author of a book) to receive compensation for their work and be able to financially support themselves.

Copyright is a form of intellectual property (as patents, trademarks and trade secrets are), applicable to any expressible form of an idea or information that is substantive and discrete.

Copyright Issues: Very briefly, copyright gives the author of a work the right...

- ...to reproduce the work.
- ...to permit copies to be made by others.
- ...to prepare derivative works.
- ...to display the copyrighted work publicly.

Plagiarism is the practice of taking someone else's work or ideas and passing them off as one's own.

“**Plagiarism** is the deliberate or reckless representation of another’s words, thoughts, or ideas as one’s own without attribution in connection with submission of academic work, whether graded or otherwise.”

Plagiarism is considered academic dishonesty and a breach of Computer ethics. It is subject to sanctions like expulsion.

Plagiarism is not a crime *per se* but in academia and industry it is a serious ethical offense, and cases of plagiarism can constitute copyright infringement.

Cracking

Software cracking is the modification of software to remove or disable features which are considered undesirable by the person cracking the software, usually related to break license.

Software Licencing:

Following are types of software licence:

Freeware is copyrighted computer software which is made available for use free of charge, for an unlimited time. Authors of freeware often want to "give something to the community", but also want to retain control of any future development of the software.

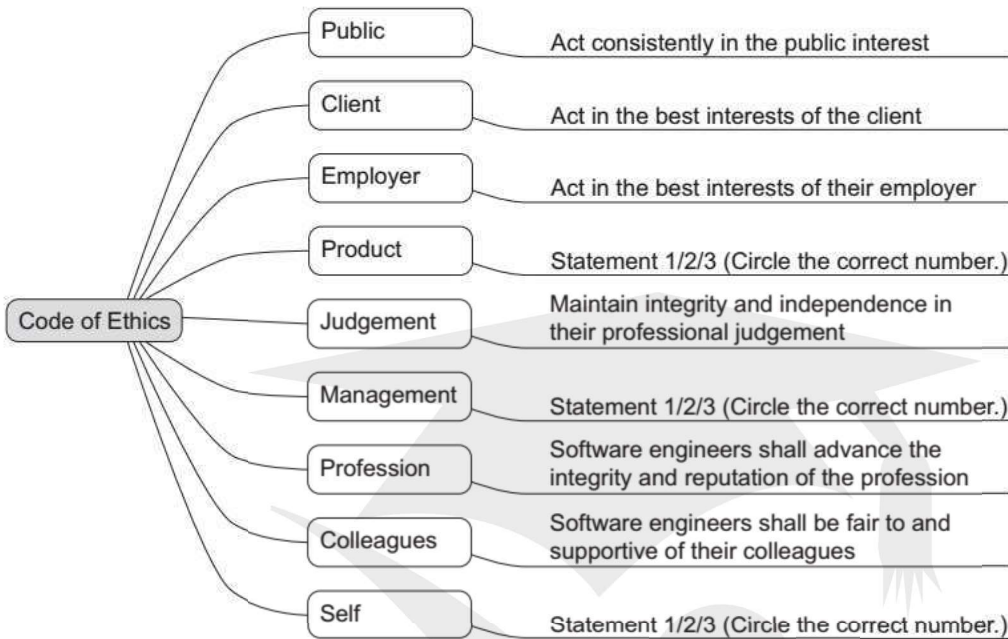
The term **shareware** refers to commercial software that is copyrighted, but which may be copied for others for the purpose of their trying it out with the understanding that they will pay for it if they continue to use it.

Free software is computer software that is distributed along with its source code, and is released under terms that guarantee users the freedom to study, adapt/modify, and distribute the software.

Free Software	Freeware	Shareware
Without any copyright	With copyright	With copyright
With source code	Without source code	Without source
Free for lifetime	Free for lifetime	Free for trial period

Exam-style Questions

1 The ACM and IEEE set out eight principles for ethics and professional practice. The categories, with a short explanation, are shown in this diagram.



Statement 1: Team leaders should subscribe to and promote an ethical approach to the management of software development and maintenance.

Statement 2: Software engineers shall participate in lifelong learning regarding the practice of the profession.

Statement 3: Software and related modifications meet the highest possible standards.

a) These three statements need to be added to the diagram. Circle the correct numbers on the diagram to indicate the positions for Statement 1, Statement 2 and Statement 3. [2]

b) For each of these three workplace scenarios, unethical behaviour is demonstrated. Explain the principle(s) which are not being met.

I Workplace scenario 1

A large project is devolved to project teams, each led by a project leader. One project leader fails to inform his manager that he has major concerns that:

- their team's software contribution is taking much longer to write and test than anticipated
- they are consequently at risk of spending over their allocated budget. [3]

ii Workplace scenario 2

The software house is about to train a number of programmers in a new programming language. Two employees are refusing to attend the training. [2]

iii The company is developing some monitoring software which requires sensors placed in a nature reserve.

One employee considers the sensors will be a danger to some of the wildlife, but is told by his manager that the matter is none of his concern. [2]

2 A team of software engineers is developing a new e-commerce program for a client. State **three** of the principles of the ACM/IEEE Software Engineering Code of Ethics. Illustrate each one, with an example, describing how it will influence their working practices.

1

2

3

[6]

3 Bobby is a senior programmer at a software house which produces intruder detection software. He also runs his own software company which develops and sells various computer applications. The following table shows seven activities which Bobby carries out.

Put a tick (✓) in the appropriate column to identify if the activity is ethical or unethical. [7]

Activity	Ethical	Unethical
Gives away passwords used in the intruder detection software		
Uses source code developed at the software house for the software he develops for his own company		
Insists that staff work to deadlines		
Turns down training opportunities offered by his employer		
Writes and sells software that reads confidential data from client computers		
Fakes test results of safety-critical software		
Has the software applications developed overseas for sale in his own country		

4(a) Give the definition of the terms firewall and authentication. Explain how they can help with the security of data.

Firewall

Authentication

[3]

A bank holds personal data about its customers and their financial data.

Q4(a) Describe the difference between security and integrity of data.
security.....

integrity.....



Candidate Example Response

Example candidate response – high

8 Five computing terms are described below.

Write the name of the term being described.

Software that anyone can download for free from the Internet and then use without having to pay any fees. The usual copyright laws apply and a user license is important.

.....Freeware.....

Software that gives the user the chance to try it out free of charge before actually buying it. The software is subject to the usual copyright laws. As a rule, not all the features found in the full version are available at this stage.

.....Shareware.....

Software where users have freedom to run, copy, change and adapt it. This is an issue of liberty and not of price since the software guarantees freedom and the right to study and modify the software by having access to the actual source code.

.....Free Software.....

Set of principles that regulates the use of computers in everyday life. This covers intellectual property rights, privacy issues and the effects of computers on society in general.

.....Computer Ethics.....

The taking of somebody's idea or software and claim that the idea or software code were created by the "taker".

.....Plagiarism.....

[5]

Examiner comment – high

This candidate managed to give the correct term for all 5 definitions.

Total mark awarded = 5 out of 5

Example candidate response – middle

8 Five computing terms are described below.

Write the name of the term being described.

Software that anyone can download for free from the Internet and then use without having to pay any fees. The usual copyright laws apply and a user license is important.

Free software

Software that gives the user the chance to try it out free of charge before actually buying it. The software is subject to the usual copyright laws. As a rule, not all the features found in the full version are available at this stage.

Shareware

Software where users have freedom to run, copy, change and adapt it. This is an issue of liberty and not of price since the software guarantees freedom and the right to study and modify the software by having access to the actual source code.

Freeware

Set of principles that regulates the use of computers in everyday life. This covers intellectual property rights, privacy issues and the effects of computers on society in general.

Computer ethics/
Laws

The taking of somebody's idea or software and claim that the idea or software code were created by the "taker".

Plagiarism

[5]

Examiner comment – middle

This candidate has made a common error and mixed up the definitions of freeware and free software.

Total mark awarded = 3 out of 5

Example candidate response – low

8 Five computing terms are described below.

Write the name of the term being described.

Software that anyone can download for free from the Internet and then use without having to pay any fees. The usual copyright laws apply and a user license is important.

..... Free software

Software that gives the user the chance to try it out free of charge before actually buying it. The software is subject to the usual copyright laws. As a rule, not all the features found in the full version are available at this stage.

..... Shareware

Software where users have freedom to run, copy, change and adapt it. This is an issue of liberty and not of price since the software guarantees freedom and the right to study and modify the software by having access to the actual source code.

..... Freeware

Set of principles that regulates the use of computers in everyday life. This covers intellectual property rights, privacy issues and the effects of computers on society in general.

..... Copyright law

The taking of somebody's idea or software and claim that the idea or software code were created by the "taker".

..... plagiarism

[5]

Examiner comment – low

This candidate has made the common error of mixing up the definitions of freeware and free software. They are also incorrect with Copyright law. This is one part of computer ethics but not the entirety, so it doesn't match the full definition.

Total mark awarded = 2 out of 5

Topical Past Papers

Q 1) Summer 2015 P12

8 Five computing terms are described below. Write the name of the term being described.

Software that anyone can download for free from the Internet and then use without having to pay any fees. The usual copyright laws apply and a user license is important.
.....

Software that gives the user the chance to try it out free of charge before actually buying it. The software is subject to the usual copyright laws. As a rule, not all the features found in the full version are available at this stage.

Software where users have freedom to run, copy, change and adapt it. This is an issue of liberty and not of price since the software guarantees freedom and the right to study and modify the software by having access to the actual source code.....

Set of principles that regulates the use of computers in everyday life. This covers intellectual property rights, privacy issues and the effects of computers on society in general.....

The taking of somebody's idea or software and claim that the idea or software code were created by the "taker". [5]

Examiner's comments on Question 8

Some candidates demonstrated a good level of knowledge of computing terms and gained full marks but a number of vague and confused responses were also give. Some candidates confused freeware and free software, and some candidates referred to trial software, which was too vague.

Q 2) Winter 2015 P13

4 (a) Computer ethics involves a number of different topics.

(i) A student made the following statement on an examination paper:

"It allows a user to have the freedom to run, copy, change and adapt the software and then pass it on to a colleague, friend or family member."

Identify which computer term the student was describing.

..... [1]

(ii) Explain what is meant by computer ethics.

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..... [3]

Q 3) Winter 2015 P11

13 Identify which **five** computer terms are being described below.

(a) A system designed to prevent unauthorised access to or from a private network or intranet; it examines all data traffic to and from the network and filters out anything that does not meet certain criteria.

..... [1]

(b) Software that can be used on a trial basis before buying the full version; it often does not include all the features of the full version or has a time limit before it stops working.

.....[1]

(c) A protocol for transmitting private documents via the Internet; it uses two keys to encrypt the data – a public key and a private key.

.....[1]

(d) A standard adopted by the electronic music industry for controlling devices that produce music, such as synthesisers and sound cards.

..... [1]

(e) A device that allows audio signals to be converted into electrical signals which can be interpreted by a computer after being converted into digital signals.

..... [1]

Examiners' Comments Question 13(a) (b) (c) (d) and (e)

Many candidates were able to gain at least two or three marks in this section. Some confused shareware for freeware or free software, demonstrating they were unsure of their knowledge in this area.

Q 4) Summer 2016 P11 & P13

1 Some software can be described as free, freeware or shareware.

Tick (✓) the appropriate boxes in the table below to show which features apply to these three types of software. [3]

Software feature	Free	Freeware	Shareware
Software source code can be freely accessed and modified as required			
All the features of the full version of the software are not made available; the full version needs to be purchased first			
The original software is subject to all copyright laws			
It is possible to distribute modified versions or copies of the software to friends and family			

Examiner's Report

Very few candidates were able to identify the correct software features for all three types of software. Many candidates were only able to identify one or two. Many candidates confused the software features of free software and freeware. The software features correctly identified for the software type, for most occasions, was for shareware.

Q 5) Summer 2016 P12

8 (a) Five statements and three types of software are shown below. Draw lines to connect each statement with the correct type of software. [3]

Statement	Type of software
Users have the freedom to pass on the software to friends and family as they wish.	
Users can download this software free of charge, but they cannot modify the source code in any way.	Free software
Users are allowed to try out the software for a trial period only before being charged.	Freeware
Users can study the software source code and modify it, where necessary, to meet their own needs, without breaking copyright laws.	Shareware
Users can obtain a free trial version of the software, but this often does not contain all the features of the full version.	

Describe three ethical issues that should be considered when using computers.

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Q 6) Winter 2016 P12

12 Explain the differences between freeware and free software.
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..... [4]

Examiner Report
Many candidates could not provide an accurate response to the question, most giving a vague description of freeware

Q 9) March 2018 P12 (India)

1 Some types of software can be described as free software or freeware.

Draw lines to link each description to a correct type of software. A description can be linked to more than one type of software. [2]

Description	Type of software
Free to download	Free software
Code can be modified and redistributed	Freeware
Subject to copyright legislation	

Comments on Question 1

Some candidates provided the correct connections between the type of software and the description. Some candidates confused the two types of software and provided a mixed response or a completely incorrect response.

Some candidates only used a single line to connect a description to a piece of software, sometimes leaving one description without a connection. It would be helpful if candidates understood that some questions will indicate that one line is required as a connection and some questions will indicate that there may be more than one line that can be given as a connection. Candidates should thoroughly read the question to understand if one or multiple lines should be given from each box.

Q 10) Summer 2019 P11

8 (c) The art gallery is concerned about computer ethics relating to its website.

Explain what is meant by computer ethics **and** why the art gallery is concerned about computer ethics.

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..... [4]

Q 11) Winter 2019 P13

6 Jesse is taking his Computer Science examination. He answers five questions about ethics.

(a) For the first question, he writes the answer:

“This type of software can be copied and shared without the permission of the owner.”

State what Jesse is describing.

..... [1]

(b) For the second question, he writes the answer:

“With this type of software, the owner still retains the copyright for the software, but he gives away copies of it for free.”

State what Jesse is describing.

..... [1]

(c) For the third question, he writes the answer:

“This type of software is often a trial version of the full software. To use the full version the user normally needs to pay a fee.”

State what Jesse is describing.

..... [1]

(d) For the fourth question, he writes the answer:

“This is when a person copies another person’s computer program and tries to claim it as his own.”

State what Jesse is describing.

..... [1]

(e) For the fifth question, he writes the answer:

“This is the legal protection that a person can obtain, to provide protection against his work being stolen.”

State what Jesse is describing.

..... [1]

Q 12) March 20 P12

8 A student website provides research support and software downloads.

(c) The website owners are also concerned about the ethical issues of copyright and plagiarism.

(i) State what is meant by the term copyright.

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..... [1]

(ii) State what is meant by the term plagiarism.

.....
..... [1]

Q 13) March 21 P12

7 Adeel has used a high-level language to program a mobile application.

(c) Adeel is considering distributing his application as free software or shareware.

Explain the difference between free software and shareware.

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[5]

(d) Adeel is concerned about his application being plagiarised.

Define the term plagiarism.

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[1]

(e) Adeel copyrights his application.

State why Adeel copyrights his application.

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[1]

Marking Scheme

Q 1) Summer 2015 P12

8 1 mark per correct word

Freeware

Shareware

Free software

(Computer) Ethics

Plagiarism

Q 2) Winter 2015 P13

4 (a) (i) Free software / open source software

- (ii) Any **three** from:
- Set of principles/laws that regulate the use of computers
 - Covers intellectual property rights (e.g. copying of software)
 - Privacy issues (e.g. accessing personal information)
 - Impact of computers on society (relevant examples can be credited)