University of Colombo, Sri Lanka

University of Colombo School of Computing

BACHELOR OF SCIENCE IN INFORMATION SYSTEMS
BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Third Year Examination — Semester I - 2022

IS 3005/ IS 3105 /SCS 3215 — Professional Practice

192

(2 Hours)

Answer All Questions

Number of Pages = 10 Number of Questions = 4

To be completed by the candidate

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Important Instructions

- The duration of the paper is **2** Hours.
- The medium of instructions and questions is English. Answer questions in English.
- This paper has **4** questions on **10** pages.
- Answer **all** questions.
- **Write your answers on and only on the space provided** on this question paper.
- Do not tear off any part of this answer book. Under no circumstances may this book (or any part of this book), used or unused, be removed from the Examination Hall by a candidate.
- Questions appear on both sides of the paper. If a page is not printed, please inform the supervisor immediately.
- Any electronic device capable of storing and retrieving text, including electronic dictionaries and mobile phones, are **not allowed**.
- Non-programmable Calculators may be used.

To be completed by the examiners

1	
2	
3	
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Total	

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1. (a). Give an example for **Algorithmic bias.**

[4 marks]

A government develops a AI modle that indicates the families who are to obtain gov. subsidies and other benifits. the modle is built only using already collected anonymous data.

(b). List **three(3)** fundamental rights recognized in the Sri Lanka constitutions which could be exercised without the support or assistance of others.

[3 marks]

1) Right for free speech
2) Right live
3) Right to follow any religion or belief

(c). Discuss the possible harms caused by **Metaverse.**

[6 marks]

1) Online harassment and abuse
2) Identity theft.
3) Addiction
4) potential health risks
5) privacy risks
6) Data mismanagement

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(d). Differentiate **equity** and **equality** with a suitable example or diagram.

[6 marks]

Imagine a classroom where students come from different economic backgrounds. The school gives each student a laptop for learning, which represents **equality**—everyone receives the same tool.

However, some students may not have internet access at home, limiting their ability to use the laptop effectively. To achieve **equity**, the school provides those students with additional resources, like portable Wi-Fi devices, ensuring all students can fully participate in their learning, regardless of their starting point.

(e). Argue the use of open or free software at universities by stating four (4) freedoms provided by these software.

[6 marks]

1) University students are free from charge.
2) Enhances and speeds up the learning process
3) Makes teaching easy.
4) Promotes independence among students.

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2. (a). List **eight (8)** common characteristics of a matured profession.

[8 marks]

1) Specialized knowledge
2) Accreditation and certification.
3) Code of ethics
4) Continuous professional development.
5) Atonomy and independence
6) professional association
7) Service to the public
8) Accountability

(b). List **five (5)** professional organizations working in the field of software development and related fields.

[5 marks]

1) Institute of Electrical and Eletronic Engineers
2) Association for Computing Machinery.
3) Association Software professionals
4) Association for Women in Computing.
5) Association for the Advancement of Artificial Intelligence.

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(c). Legal and medical professions are considered as highly regulated professions. However, **computing professionals** are not being regulated as legal and medical professionals.

i. Briefly discuss **three (3)** benefits and advantages for a computing professional **not being** in a highly regulated profession.

[6 marks]

NOT

1) Lower barriers to enter into the profession.
2) Flexibility promotes innovation at a faster pace
3) No extensive certification or licensing → rapid career growth

ii. Briefly discuss **three (3)** drawbacks and disadvantages for a computing professional being in a highly regulated profession.

[6 marks]

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3. This question is based on the ACM Code of Ethics and Professional Conduct.

(a). List **two (2)** advantages of adhering to the ACM Code of Ethics and Professional Conduct.

[6 marks]

1) Enhances trust and credibility
2) Guides ethical decision making

(b). Briefly explain what is meant by **transparency** in the context of software development, providing your own example.

[6 marks]

A project hosted on Github where all development discussions, bug reports and code changes are visible to everyone promotes transparency.

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(c). List **three (3)** digital public goods.

[3 marks]

the internet
Kali Linux
LibreOffice

(d). List **five (5)** duties of computing professionals to prevent or minimize any possible harms caused.

[10 marks]

1) Ensure data privacy and security
2) Develope reliable and safe systems
3) Address ethical implications
4) Communicate risks clearly.
5) Adhere to legal and regulatory req.s

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4. You have been requested to create a worm which destroys harmful worms in other computers. Before creating the requested worm, you are analyzing the morality of creating the requested worm using Act-Utilitarianism.

(a). Briefly discuss **two (2)** the key characteristics of a *worm.*

[5 marks]

1) Replicates itself inorder to spread to other computers
2) uses a computer network to spread.

(b). Briefly discuss what is meant by *Act Utilitarianism.*

[5 marks]

this is a moral theory that suggests an individual should evaluate the consequences of each specific action and choose the action that maximizes overall happiness

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(c). Clearly stating your assumption, evaluate the morality of creating the requested anti-worm using Act-utilitarianism together with values and logical arguments.

[8 marks]

Assumptions:

1. The requested worm will only target and destroy harmful worms without causing any additional damage to the infected systems.
2. The worm will not harm any data, software, or user privacy on the affected computers.
3. The worm will operate without the explicit consent of the affected computer users.
4. The harmful worms in question are causing significant damage (e.g., data breaches, system failures, financial loss).
5. The created worm will spread automatically without user control.

Evaluating the Morality Using Act Utilitarianism:

According to **act utilitarianism**, the morality of creating this antivirus worm would depend on the consequences of the action, particularly whether the worm maximizes overall happiness or well-being.

1. Benefits of the Antivirus Worm (Maximizing Happiness):

- **Reduction of harm caused by malicious worms**: Harmful worms can cause significant damage to personal data, corporate systems, and critical infrastructure. If the created worm effectively neutralizes these threats, it will prevent these harms, thereby benefiting users by protecting their data and maintaining system integrity.
- **Enhanced system security**: The worm would reduce the number of cyberattacks, minimizing financial and operational losses for individuals and businesses. This would likely increase the overall well-being of society by creating a safer digital environment.
- **Increased happiness for those affected**: If the harmful worms are destroyed, users whose systems are infected would experience relief, reduced stress, and security, leading to greater overall happiness.

2. Potential Drawbacks (Minimizing Unhappiness):

- **Lack of consent from users**: One major ethical concern is that the antivirus worm would spread without the consent of users. This lack of autonomy may cause discomfort, as users may be unhappy with an unsolicited program affecting their computers, even if the intention is positive.
- **Potential unforeseen consequences**: Even if the worm is intended to only destroy harmful worms, there is always the risk of unforeseen side effects. For instance, it could mistakenly interfere with legitimate software, cause system instability, or expose vulnerabilities that could be exploited in other ways. These unintended harms could negate some of the positive effects and reduce overall happiness.
- **Violation of legal or ethical boundaries**: Distributing a worm, even for benevolent purposes, might violate cybersecurity laws and norms. If this action is deemed illegal, it could lead to legal repercussions for the creators, creating more harm than good and potentially reducing trust in the broader cybersecurity community.

3. Overall Evaluation:

- **Maximization of Happiness**: If the worm effectively neutralizes malicious threats without harming systems, it could bring about greater overall happiness by reducing the damage caused by harmful worms and creating a more secure computing environment.
- **Minimization of Unhappiness**: The primary concerns would stem from violating user autonomy, legal issues, and potential unforeseen harm. However, if these risks are minimal or mitigated (for example, by making the worm highly targeted and ensuring its safety), the action could still result in a net positive outcome.

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(d). Briefly discuss **three (3)** the limitations of Act-utilitarianism.

[7 marks]

1) Too much for making everyday decisions
2) Difficult to predict consequences.
3) Ignores individual rights

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