Kuldip (IT22018)

1. Differentiate between ethics, Law and professional responsibility with suitable examples from the computing field:

Ethics, Law and Professional Responsibility in Computing:

1. Ethics: Ethics refers to moral principles that guides what is right or wrong behavior, even when not enforced by law.

Example: A software engineer choosing not to misuse user data, even if there is no strict legal restriction.

2. Law: Law consists of rules and regulations enforced by government authorities, and violation can result in legal penalties.

Example: Illegal software piracy or unauthorized access to systems under cybercrime laws.

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3. Professional Responsibility: Professional responsibility refers to duties and standards expected from computing professionals according to professional codes and workplace policies.

Example: Following the ACM Code of Ethics, ensuring software safety and maintaining confidentiality of client data.

Difference: Ethics guides more behavior, law enforces legal rules and professional responsibility ensures proped conduct within the profession.

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2. Discuss any two historical cases of ethical failures in technology and explain the lessons learned from them:

Case 1: Facebook - Cambridge Analytica Scandal (2018):

Personal data of millions of facebook users was collected without proper consent and used for political advertising.

Lesson Learned: The case highlighted the importance of data privacy, informed consent, transparency in data usage and stronger data protection regulations.

Case 2: Volkswagen Emissions ~~Scandle~~ Scandal (2015):

Volkswagen used software to manipulate emission test results, misleading regulators and customers.

Lesson Learned: This incident showed the need for honesty, accountability and ethical responsibility in software development, as misuse of technology can cause environmental harm and damage public trust.

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These cases demonstrate that unethical use of technology can lead to legal penalties, loss of reputation, and societal harm.

3. Explain the principles of software engineering ethics, highlighting the issues related to professional responsibility. Discuss how the ACM / IEEE Code of Ethics guides ethical decision making in software engineering practices.

Principles of Software Engineering Ethics:

Software engineering ethics focuses on developing software ~~responsibility~~ responsibly while ensuring safety, quality, honesty, and respect for users and society. Key issues related to professional

responsibility include maintaining software reliability, protecting user privacy, avoiding harm, respecting intellectual property, and being honest about system limitations or risks.

Role of the ACM / IEEE Code of Ethics:

The ACM / IEEE Code of Ethics guides ethical decision making by requiring software engineers to act in the public interest, deliver high-quality products, maintaining professional competence, respect confidentiality and accept accountability for their work. It helps professionals make responsible decisions when facing ethical dilemmas in software development and deployment.

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4. Compare and Contrast Utilitarianism and Deontology (Kantian ethics) as ethical frame works. How would each approach handle a software privacy dilemma?

Utilitarianism vs. Deontology (Kantian Ethics):

1. Utilitarianism:

This framework judges actions based on their consequences. An action is considered ethical if it produces the greatest good for the greatest number of people. The focus is on overall outcomes and benefits.

2. Deontology (Kantian Ethics):

This framework judges actions based on their consequences. An action is considered ethical if it moral duties and rules, regardless of consequences. According to Kant, actions are ethical if they follow

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universal moral principles and respect individual as ends in themselves.

Handling a Software Privacy Dilemma :

- A Utilitarian approach might allow limited use of personal data if it benefits the majority (e.g., using health data to prevent disease out breaks).
- A Deontological approach would prioritize respecting user privacy and consent, even if violating privacy could produce beneficial outcomes.

Thus, utilitarianism focuses on consequences, while deontology focuses on moral duties and rights.

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5. Explain virtue Ethics and describe how it can guide ethical decision making for software engineers:

Virtue Ethics:

Virtue Ethics is an ethical framework that focuses on the character and moral qualities of an individual rather than rules or consequences. It emphasizes developing virtues such as honesty, responsibility, fairness and integrity to guide ethical behavior.

Guidance for software engineers:

Virtue ethics encourages software engineers to act with honesty in reporting system limitations, responsibility in protecting user data, fairness in avoiding biased systems, and professionalism in delivering reliable and safe software. By developing good moral characters, engineers are more likely to make ethical decisions

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even in complex and uncertain situations.

6. Why is explainability a key ethical requirement for AI systems used in high-stakes domains like credit lending or criminal justice? Discuss two societal harms that can occur if an AI system operates as a black box:

Importance of Explainability in AI Systems:

Explainability is a key ethical requirement in high-stakes domains such as credits lending or criminal justice because decisions made by AI can significantly affect people's lives. Explainable systems allow users and authorities to understand how decisions are made, ensure fairness, detect error or ~~bans~~ bias, and maintain accountability and trust.

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Societal Harms of Black-Box AI Systems:

1. Unfair Discrimination: Individuals maybe denied loans or recieve unfair Legal outcomes without knowing the reason, making it difficult to challenge biased decisions.

2. Lack of Accountability: When decisions cannot be explained, it becomes difficult to identify responsibility for mistakes or harmful outcomes, reducing public trust in technology.

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7. What are the key principles of the ACM codes of Ethics? Why are such professional codes important for computing professionals?

Key Principles of the ACM Code of Ethics:

1. Contribute to society and human well-being.
2. Avoid harm to others.
3. Be honest and trustworthy in professional work.
4. Respect privacy and maintain confidentiality.
5. Give proper credit for intellectual property.
6. Maintain professional competence and integrity.
7. Promote ethical practices within organizations and the profession.

Importance of Professional Codes:

Professional codes help computing professionals make ethical decisions, ensure accountability, protect public interest, prevent misuse of technology, and maintain

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trust and integrity in the computing professionals.

8. What is whistleblowing? Discuss the ethical considerations and challenges a computing professional might face when deciding to blow the whistle:

Whistleblowing:

Whistleblowing is the act of reporting illegal, unethical, or harmful activities within an organization to authorities, management, or the public in order to prevent harm or wrongdoing.

Ethical Considerations and Challenges:

1. Loyalty vs Public Interest: Balancing responsibility to the organization with the duty to protect society.

2. Risk of Retailation: Possibility of job loss, Legal action or damage to professional reputation.

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3. Accuracy of Evidence : Ensuring the information is correct and supported by evidence before reporting.

4. Confidentiality Issues: Avoiding unnecessary disclosure of sensitive information while exposing wrongdoing.

These challenges make whistleblowing a complex ethical decision for computing professionals.

9. The ACM Code of Ethics emphasizes both contribute to society and human well-being and respect privacy. Describe a realistic scenario where these two principles might come into conflict for a data scientist. How might the code guide a professional in resolving this tension?

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Scenario of Conflict:

A data scientist working fora a public healthe organization analyzes user health data and diso discovers patterns that could help prevent the spread of a disease. Sharing this data could benefit the society and improve public health, but it may also expose sensitive personal information, creating a conflict with the principle of respecting privacy.

Guidance from the ACM Code of Ethics:

The code suggests minimizing harm by protecting individual privacy while serving the public good. The data scientist should use analyzed OR aggregated data, obtain proper consent where possible, follow legal and organizational policies, and ensure

transparency about how data is used. This helps balance societal benefit with respect for individual privacy.

10. Explain the difference between copyright, patents, and trademarks in the context of software and digital products.

Copyrights, Patents, and Trademarks in Software and Digital Products:

1. Copyright: Protects the original expression of ideas such as source codes, software documentation, and digital content. It prevents unauthorized copying, distribution, or modification of the work.

2. Patent: Protects new and useful inventions or technical solutions, such as innovative algorithms, processes, or software-based technologies. It prevents others from making, using, or selling the invention without permission.

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3. Trade mark: Protects brand names, logos, symbols, or product names that distinguish a software or digital product in the marketplace.

Difference: Copyright protects creative expression, patents protect inventions or functionality, and trademarks protect brand ~~identif~~ identity.

11. Compare open-source licensing with proprietary software licensing. What are the ethical implications of each model?

Open-Source vs Proprietary Software licensing:

1. Open-Source Licensing:

- Software code is freely available to use, modify, and distribute.
- Example: Linux, Apache.

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- Ethical Implications : Promotes collaboration, transparency, and equal access, but requires proper attribution and adherence to license terms.

2. Proprietary Software Licensing :

- Software is owned by an individual or company: users must pay for usage, and cannot modify or redistribute it.

- Example: Microsoft Windows, Adobe Photoshop.

- Ethical Implications : Protects intellectual property and incentivizes innovation, but may limit access for those who cannot afford it.

Key Difference : Open-Source prioritizes freedom and sharing, while proprietary prioritizes ownership and control.

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12. Define professional dissent and whistleblowing in computing. What are the key ethical considerations and potential risks a professional must weigh before deciding to blow the whistle on harmful or unethical practices within their organization?

Professional Dissent and whistleblowing:

- Professional Dissent: Expressing disagreement with organizational policies or practices that are unethical, unsafe, or harmful while remaining part of the organization.
- Whistleblowing: Reporting illegal, unethical, or harmful practices to authorities, management, or the public to prevent harm.

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Key Ethical Considerations and Potential Risks:

1. Duty vs Loyalty: Balancing responsibility to society and the organization.

2. Accuracy and Evidence: Ensuring the ~~reporting~~ reported issue is true and well-documented.

3. Potential Harm: Considering consequences for users, colleagues, and the organization.

4. Retaliation Risk: Risk of job loss, legal action, or damage to reputation.

5. Confidentiality: Avoiding unnecessary disclosure of sensitive information.

Professionals must weigh these factors carefully to make responsible and ethical decisions.

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13. Discuss the concept of informed consent in personal data collection. What ethical principles should organizations follow when collecting user data?

Informed Consent in Personal Data Collection:

Informed consent means that users are fully aware of what personal data is being collected, how it will be used, and any potential risks, and they voluntarily agree to provide their information.

Ethical Principles for Organization:

1. Transparency: Clearly explain what data is collected, how it will be used, and who will access it.
2. Voluntariness: Ensures users can freely choose to provide or ~~withold~~ withhold consent.
3. Purpose Limitation: Collect data only for specified and legitimate purposes.

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4. Data Minimization: Gather only the data necessary for the intended purpose.

5. Security and Privacy: Protect user data from unauthorized access or misuse.

Following these principles ensures users' rights are respected and trust is maintained.

14. What are the ethical concerns associated with surveillance technologies? Explain with examples how these technologies can be misused.

Ethical Concerns of Surveillance Technologies:

Surveillance technologies, such as CCTV cameras, facial ~~reg~~ recognition, and online monitoring tools, raise issues of privacy, consent, data security, and potential abuse of power.

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Examples of Misuse:

1. Invasion of Privacy: Monitoring employees or citizens without their knowledge or consent.

2. Discrimination: Facial recognition systems misidentifying certain racial or gender groups.

3. Data Exploitation: Selling or Sharing collected data without users' consent.

4. Government or Corporate Overreach: Tracking individuals beyond legitimate security or operational needs.

Ethically, organizations should balance security needs with individual rights, ensure transparency, obtain consent, and limit use to authorized purposes.

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15. Compare and contrast copyright and patents as form of intellectual property protection in computing. What type of software asset is each best suited for and why?

Copyright VS Patents in Computing :

1. Copyright : Protects the original expression of ideas, such as source code, software documentation, and digital content. It prevents unauthorized copying or distribution

• Best Suited For : Software code, applications, and digital media, because it safeguards creative expression rather than functional ideas.

2. Patent : Protects novels and useful inventions or technical solutions, including innovatives algorithms, processes, or software-based technologies. It prevents others from making, using or selling the invention without permission.

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• Best Suited For: Unique algorithms, encryption methods or software processes, because patents protect functional and inventive aspects of software.

Key Difference: Copyright protects how software is expressed; patents protect how it works or solves a problem.

16. What is algorithmic bias? Explain its causes and suggest measures to ensure fairness in AI systems:

Algorithmic Bias:

Algorithmic Bias occurs when an AI system produces unfair or discriminatory outcomes due to skewed data, flawed design, or biased decision-making process.

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Causes :

1. Biased Training Data : Data that overrepresents or underrepresents certain groups.

2. Human Bias in Design : Developers' unconcious biases reflected in algorithms.

3. Incomplete or Unbalanced Data : Missing information for some populations.

4. Faulty Model Assumptions : Incorrect assumptions leading to unfair results.

Measures to Ensure Fairness :

1. Use diverse and balanced datasets.

2. Conduct regular audits and testing to detect bias.

3. Ensure transparency and explainability of AI decisions.

4. Implement ethical guidelines and human oversight during development and deployment.

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17. Discuss the importance of transparency and explainability in AI. Who should be held accountable when an autonomous system causes harm?

Importance of Transparency and Explainability in AI:

Transparency allows users and stakeholders to understand how an AI system works, while explainability provides clear reasons for its decisions. These are essential to build trust, detect errors or bias, ensure fairness, and maintain accountability, especially in high stakes domains like healthcare, finance or criminal justice.

Accountability for Harm:

Responsibility should be shared among:

1. Developers: For designing and testing the system responsibly.
2. Organizations/Deployers: For proper implementation, monitoring, and ethical use of the AI.

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3. Operators / Users : For using the system correctly according to guidelines.

Clear ~~notes~~ roles help ensure accountability and prevent misuse of ~~automo~~ autonomous systems.

18. Discuss the role of ethical Leadership in IT organizations. How can leaders foster an ethical culture within their teams?

Role of Ethical Leadership in IT Organizations:

Ethical Leadership ensures that technology is developed and used responsibly, protects user data, promotes fairness, and encourages compliance with laws and professional standards. It builds trust among employees, clients, and stakeholders and reduces risks of unethical practices or misuse of technology.

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Fostering an Ethical Cultural :

1. Lead by Example : Demonstrate honesty, integrity, and responsible decision-making.

2. Set Clear Ethical Guidelines: Establish and communicate organizational policies on ethical behavior.

3. Encourage Transparency and Open Communication: Create an environment where employees can voice concerns without fear.

4. Provide Training and Accountability: Educate teams on ethical standards and ensure consequences for unethical actions.

These practices help embed ethical values throughout the organization.

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19. Differentiate between ethical hacking and cybercrime. Under what condition is hacking considered ethical?

Ethical Hacking VS Cybercrime:

1. Ethical Hacking: Authorized testing of computer systems or networks to identify vulnerablities and improve security.

- Example: A security professional performing penetration testing with the organization's permission.

2. Cybercrime: Unauthorized access or attacks on systems or data with malicious intent, such as theft, damage, or disruption.

- Example: Hacking into a bank system to steal money.

Conditions for Ethical Hacking:

- Performed with proper authorization from the system owner.
- Aimed at identifying and fixing security issues, not exploiting them.

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- Follows legal regulations and professional ethical standards.
- Ensures no harm or data loss occurs during testing.

20. Explain the concept of responsible disclosure in cybersecurity. What ethical guidelines should a security reseancher follow when discovering a vulnerability?

Responsible Disclosure in Cybersecurity:

Responsible disclosure is the practice where a security ~~reshe~~ researcher privately informs an organization about a discovered vulnerability, giving them time to fix it before making the information public. This helps prevent malicious exploitation while improving system security.

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Ethical Guidelines for Security Researchers:

1. Confidentiality: Do not share the vulnerability publicly until it is addressed.

2. Integrity: Avoid exploiting the vulnerability for personal gain.

3. Accuracy: Provide clear and verifiable details about the issue.

4. Accountability: Report the issue to the proper authority or organization responsibly.

5. Non-Maleficence: Ensure that testing or reporting does not cause harm to users or systems.

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21. What is the digital divide? Discuss its social implications and suggest measures to bridge this gap?

Digital Divide:

The digital divide is the gap between individuals, communities, or regions that have access to modern information and communication technologies (ICT) and those that do not.

Social Implications:

1. Unequal Access to education: Limited access to online learning resources for disadvantaged groups.

2. Economic Inequality: Reduced job and business opportunities for those without digital access.

3. Social Exclusion: Limited participation in governance, civic activities, and social networks.

4. Urban-Rural Gap: Disparities between urban and rural areas in technology access and opportunities.

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Measure to Bridge the Gap:

1. Provide affordable internet and digital devices.
2. Implement digital literacy and training ~~systems~~. programs.
3. Establish public access points such as community centers and libraries.
4. Encourage government and private sector initiatives for inclusive technology deployment.

22. Explain the concept of green computing. How can computer professionals contribute to environmental sustainability?

Green Computing:

Green computing refers to designing, using and disposing of computers and IT systems in an environmentally responsible way to reduce energy consumption, minimize waste, and lower carbon footprint.

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Ways Computing Professionals Can Support Environmental Sustainability:

1. Use energy-efficient hardware and data centers.
2. Optimize software and algorithms to reduce computational waste and energy use.
3. Promote recycling and proper disposal of electronic waste (e-waste).
4. Adopt cloud computing and virtualization to minimize physical resource usage.

These practices help reduce environmental impact while maintaining efficient computing operations.

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23. What is a conflict of interest in the IT workplace? Provide examples and explain how professionals should ethically handle such situations:

Conflict of Interest in The IT Workplace:

A conflict of interest occurs when a professional's personal interests interfere with their professional duties, potentially affecting objectivity or decision-making.

Examples:

1. An IT manager awarding a contract to a company owned by a family member.

2. A software developer recommending a product from a company they have shares in.

Ethical Handling:

1. Disclosure: Inform supervisors or relevant authorities about the conflict.

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2. Recusal: Avoid participating in decisions where a conflict exists.

3. Transparency: Maintain openness to prevent bias.

4. Adherence to policies: Follow organizational and professional ethical guidelines to ensure fair decision-making.

24. Explain the concept of justice and fairness according to any one ~~reg~~ religious tradition or ideology, such as Islam, Hinduism, Christianity, Buddhism, Judaism or communism. How can these principles be applied to promote ethical decision-making in modern professional life?

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Justice and Fairness in Islam:

In Islam, justice ('Adl') is a core principle, emphazing honesty, equality and treating everyone fairly without favoritism. Fairness requires upholding rights, avoiding oppression, and ensuring that actions benefit the community while respecting individual dignity.

Application in Modern Professional Life:

1. Equal opportunity: Ensure fair treatment in hiring, promotions, and rewards.
2. Transparent decision-making: Make decision openly and honestly to prevent biased or favoritism.
3. Accountability: Take responsibility for actions and rectify mistakes that affects others.
4. Ethical Practices: Promote fairness in business, technology, and organizational policies, ensuring that stakeholders' rights are respected.

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By applying these principles, professionals can make decisions that are ethical, just, and socially responsible.

25. What is Aristotle's concept of the Golden Mean, and how does it guide individuals to find a balanced and virtuous course of action between extremes in ethical decision-making?

Aristotle's Golden Mean:

The Golden Mean is Aristotle's concept that virtue lies between two extreme of excess and deficiency. Ethical behavior is achieved by finding a balanced, moderate course of action rather than acting too little or too much.

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Guidance in Ethical Decision-making:

1. Encourages individuals to avoid extremes, such as recklessness or cowardice.

2. Promotes <u>practical</u> <u>wisdom</u> to make balanced and context appropriate choice.

3. Helps develop virtues like honesty, courage, and generosity in a measured way.

4. Supports consistent ethical behavior in personal, professional, and societal contexts by seeking moderation and fairness.

This ~~approch~~ appoarch guides professionals to act responsibly while maintaining integrity and avoiding harmful extremes.

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