

# Professional IT Practices in IT (CS 4001)

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Attempt all questions.

Write your answer for Question 1, 4, 5, 7, 8 directly on the question paper. Answer the remaining questions on the answer sheet in the same order as they appear on the question paper. Attach question paper with answer sheet.

Section

Student Signature

All of your descriptive answers must be no more than four lines on the answer sheet. Each sub-part should not be more than 4 lines. Longer answers in the form of paragraphs will be discarded. ANSWER FOR EACH QUESTION MORE THAN 4 LINES WILL NOT BE CONSIDERED

## Sessional-II Exam

Total Time (Hrs): 3

Total Marks: 100

Total Questions: 8

Question1: Alex is an IT project manager at a mid-sized software company, juggling multiple responsibilities at work and home. Recently, he has been struggling with managing his time effectively and feels overwhelmed. Below is a list of tasks that Alex is dealing with this week: [8x1] (CLO4)

Task	Quadrant No
Prepare for a client presentation scheduled tomorrow.	Imp and urgent
Attend a weekly project update meeting that often drags on without clear outcomes.	Not important but urgent).
Work on a long-term strategic proposal for a new project, which has no immediate deadline but could benefit the company significantly.	Important but not urgent
Respond to a barrage of emails, most of which are generic and not directly related to his work.	Not important and urgent)

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Exercise for 30 minutes every day to maintain his health.	Important but not urgent).
Spend an hour binge-watching a new show on a streaming service each night.	Not important and not urgent).
Resolve a technical issue reported by the client that is affecting their current workflow.	Important and urgent).
Reorganize his desk and files, which he feels is messy but not affecting his productivity immediately.	(Not important and not urgent).

Based on Alex's tasks, place each of them in the appropriate time management quadrant from Stephen Covey's Time Management Matrix:

1. Quadrant I: Important and Urgent
2. Quadrant II: Important but Not Urgent
3. Quadrant III: Not Important but Urgent
4. Quadrant IV: Not Important and Not Urgent

**Question2:** TalentMatch, an IT company specializing in AI-driven recruitment solutions, has developed a platform called "HireSmart AI". The platform uses machine learning algorithms to screen, rank, and recommend job candidates to employers. HireSmart AI boasts significant efficiency, processing thousands of applications in hours compared to days for human recruiters.

However, a recent independent audit reveals that HireSmart AI systematically downgrades female candidates in STEM roles. The bias stems from historical hiring data used to train the AI, which favored male candidates. (CLO1)

The company's leadership faces a dilemma:

1. Fix the bias immediately by halting the platform's use and retraining the AI, but this could take months and result in significant financial losses.
2. Keep using the platform temporarily while gradually addressing the bias in future updates, which would maintain revenue but potentially perpetuate harm to female candidates in the meantime.

Stakeholders are divided. The development team argues for halting operations, citing ethical obligations. Meanwhile, the sales team emphasizes the financial risks of suspending the platform.

**Exam Question:**

2.1 Analyze the company's options using: [2+2]

- a. Deontological ethics: What should TalentMatch do if it prioritizes moral duties over outcomes? Justify your reasoning with specific principles of deontology.
- b. Consequentialist ethics: What should TalentMatch do if it prioritizes the outcomes of its actions? Justify your reasoning with specific principles of consequentialism.

### Expected Answer (Sample Solution):

#### 1. Deontological Ethics:

- TalentMatch should halt the platform immediately and retrain the AI to eliminate bias.
- **Justification:** Deontological ethics emphasizes following moral duties and universal principles, such as fairness and non-discrimination. Continuing to use the biased platform would violate these principles, regardless of financial consequences.

#### 2. Consequentialist Ethics:

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- TalentMatch should continue using the platform while gradually implementing updates to address the bias.
  - **Justification:** Consequentialism focuses on outcomes. By continuing operations, the company can avoid financial losses, retain clients, and ensure long-term business sustainability. The harm to female candidates is seen as temporary and outweighed by overall benefits to the organization and other stakeholders.
- 3. Professional Ethics Obligations:**
- Employees and leadership must prioritize ethical standards set by professional IT bodies (e.g., ACM, IEEE), which emphasize fairness, accountability, and transparency in technology. They have a responsibility to address the bias and communicate openly with clients about the steps being taken.

**Question3:** A young filmmaker, Alex, creates a short film that heavily references a popular, copyrighted movie. The film is a parody, using similar plot elements, characters, and dialogue in a humorous and satirical way. Alex distributes the film online and gains significant attention, including from the original film's studio.

Does the young filmmaker's use of the copyrighted material constitute fair use? Why or why not? Explain your answer, citing relevant legal principles. [4x1] (CLO3)

Consider addressing the following questions in your response

- 3.1 Purpose and Character of the Use
- 3.2 Nature of the Copyrighted Work
- 3.3 Amount and Substantiality of the Portion Used
- 3.4 Effect on the Market for the Original Work

**Solution:**

**Purpose and Character of the Use:**

- Alex's use is transformative, as the parody adds new meaning and expression to the original work.
- The purpose is non-commercial, as Alex is not profiting from the film.

**Nature of the Copyrighted Work:**

- The original work is creative, which generally provides stronger copyright protection.

**Amount and Substantiality of the Portion Used:**

- Alex uses significant portions of the original work, but the use is essential to the parody's purpose.

**Effect on the Market for the Original Work:**

- A parody is unlikely to harm the market for the original work, as it typically targets a different audience and does not compete directly with the original.

Considering these factors, it's likely that Alex's use of the copyrighted material would be considered fair use. The transformative nature of the parody, its non-commercial purpose, and its limited impact on the market for the original work weigh heavily in favor of fair use.

**Question4:** You are provided with a list of Cyber Crime LAWS and some incidents where each one of the laws can be applied. Select the relevant law for each situation. [10x1] (CLO3)

**Laws Table:**

A) USA PATRIOT Act
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<p><b>Description: Enacted after 9/11 to enhance national security by improving the ability to detect and prevent terrorism, including cyberterrorism. It grants law enforcement agencies expanded surveillance capabilities.</b></p>
<p><b>B) Identity Theft and Assumption Deterrence Act (ITADA)</b></p> <p><b>Description: Criminalizes identity theft and provides penalties for individuals who fraudulently use another person's identifying information.</b></p>
<p><b>C) Fraud and Related Activity in Connection with Access Devices Statute</b></p> <p><b>Description: Addresses fraud involving access devices like credit cards, passwords, tokens, or other authentication mechanisms used to access accounts or systems.</b></p>
<p><b>D) Computer Fraud and Abuse Act (CFAA)</b></p> <p><b>Description: Covers unauthorized access to computers, data theft, spreading malware, and other forms of computer-related offenses.</b></p>
<p><b>E) Digital Millennium Copyright Act (DMCA)</b></p> <p><b>Description: Protects copyrighted works in the digital domain and criminalizes the circumvention of copyright protection mechanisms.</b></p>

Scenario	Law (Label)
A hacking group launches a massive Distributed Denial of Service (DDoS) attack on government servers, crippling critical infrastructure like the Department of Defense and energy grids. Intelligence agencies trace the attack to an overseas group planning to disrupt U.S. national security systems.	<b>A</b>
A cybercriminal gains unauthorized access to a company's HR database and steals personal information, including Social Security numbers, of employees. The hacker then applies for credit cards, loans, and even tax refunds in the names of several victims.	<b>B</b>
A hacker uses phishing emails to trick a bank employee into revealing access credentials. Using the stolen credentials, the hacker accesses the bank's internal systems and transfers funds to offshore accounts.	<b>C</b>
An employee at a software company intentionally accesses the company's restricted servers without authorization and copies proprietary source code to start a competing business.	<b>D</b>
A cybercriminal hacks into an online retailer's database, stealing personal details of thousands of customers. They use this information to create fake driver's licenses and open fraudulent credit accounts.	<b>B</b>

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A group of hackers creates a fake payment portal resembling a popular e-commerce site. Users enter their credit card details, which the hackers then use for unauthorized purchases.	<b>C</b>
A disgruntled IT employee at a hospital installs ransomware on patient record systems, locking the hospital out of its critical data. They demand a ransom to unlock the files.	<b>D</b>
A software enthusiast reverse-engineers and distributes a cracked version of paid software	<b>E</b>

**Question5: Identify each of the following as an example of opt-in or opt-out? [10x1] (CLO4)**

Example	Opt-In or Opt-Out
<b>Automatic Enrollments in Programs</b> An e-commerce site offers loyalty points for purchases and states: "You are automatically enrolled in our rewards program. Click here to cancel participation." Customers must actively opt out if they don't want to participate.	<b>Opt-out</b>
<b>Cookie Consent on Websites</b> A website displays a banner: "We use cookies to enhance your experience. Click 'Accept All' to proceed or customize your preferences." The user must click "Accept All" to enable cookies, giving explicit consent.	<b>Opt-in</b>
<b>Data Collection for Surveys</b> A software tool includes a clause in its terms: "By using this software, you agree to allow us to collect usage data. Opt out via settings." Users need to go into the app's settings to disable data collection.	<b>Opt-out</b>
<b>Data Sharing in Mobile Apps</b> A fitness app prompts users: "Allow us to share your activity data with third-party health researchers to improve fitness insights." The user must tap "I Agree" before their data is shared.	<b>Opt-in</b>
<b>Email Marketing</b> A user visits a tech blog and sees a checkbox stating: "Yes, I want to receive weekly newsletters with the latest tech tips and updates." The user must actively check the box to subscribe, giving explicit consent to receive emails.	<b>Opt-in</b>
<b>Medical Research Studies</b> A hospital's patient portal includes a form:	<b>Opt-in</b>

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"I consent to allow my anonymized medical data to be used in research studies." Patients must sign or click "Agree" to participate.	
<b>Pre-Checked Email Subscriptions</b> A user signs up for a service, and the registration form includes a pre-checked box: "Subscribe to our newsletter." If the user doesn't uncheck the box, they will automatically receive the newsletter.	<b>Opt-out</b>
<b>Subscription Services</b> An online course platform asks: "Sign up for our premium membership to gain access to exclusive materials." Users must actively subscribe by clicking a button and entering payment details.	<b>Opt-in</b>
<b>Targeted Advertising</b> A streaming platform includes a privacy notice: "We use your viewing habits to tailor advertisements. Click here to opt out of targeted ads." The user must navigate to this option and manually opt out.	<b>Opt-out</b>
<b>Third-Party Data Sharing</b> A social media platform's settings page includes an option: "Uncheck this box if you do not want your data to be shared with our marketing partners." By default, the box is checked, meaning users must actively uncheck it to opt out.	<b>Opt-out</b>

**Question6:** Read the case study of the Cambridge Analytica scandal. Identify and explain the issues related to privacy and anonymity: [6x2] (CLO4)

### Case Study: The Cambridge Analytica Scandal

In 2018, it was revealed that Cambridge Analytica, a political consulting firm, had harvested the personal data of millions of Facebook users without their consent. The data was used to create targeted political advertisements on Facebook. **Identity Theft:** Cambridge Analytica used a third-party app to collect Facebook users' data, including their names, emails, and friend lists. This data was then used to create fake profiles and steal users' identities. **Electronic Discovery:** During the investigation into the scandal, Facebook was required to hand over internal documents and emails related to Cambridge Analytica. This raised concerns about the privacy of Facebook employees' personal data. **Profiling:** Cambridge Analytica used the harvested data to create detailed profiles of Facebook users, including their interests, behaviors, and demographics. These profiles were then used to target users with personalized political advertisements. **Treating customer data responsibly:** Facebook was criticized for its failure to protect users' data and for allowing third-party apps to harvest data without users' consent. Cambridge Analytica was also criticized for its irresponsible handling of users' data. It was reported that Cambridge Analytica's employees were required to use company-issued laptops and phones, which were monitored by the company. This raised concerns about the company's right to monitor employees' online activities. **Advanced surveillance technology:** Cambridge Analytica used advanced data analytics and machine learning algorithms to create detailed profiles of Facebook users. This raised concerns about the use of surveillance technology to monitor and manipulate users' behavior.

6.1. Which issue is illustrated by Cambridge Analytica's use of a third-party app to collect Facebook users' data without their consent?

6.2. Which issue is raised by Facebook's requirement to hand over internal documents and emails related to Cambridge Analytica during the investigation?

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- 6.3. Which issue is illustrated by Cambridge Analytica's creation of detailed profiles of Facebook users using their harvested data?
- 6.4. Which issue is raised by Facebook's failure to protect users' data and allow third-party apps to harvest data without users' consent?
- 6.5. Which issue is illustrated by Cambridge Analytica's monitoring of employees' online activities using company-issued laptops and phones?
- 6.6. Which issue is raised by Cambridge Analytica's use of advanced data analytics and machine learning algorithms to create detailed profiles of Facebook users?

6.1. Treating customers' data responsibly

6.2. Electronic discovery

6.3. Profiling

6.4. Treating customers' data responsibly

6.5. Identity theft (related to employee surveillance)

6.6. Advanced surveillance technology

Question 7: Portfolio of TechVantage Solutions [10x1] (CLO3)

Company Overview:

TechVantage Solutions is a mid-sized IT technology company specializing in AI-powered analytics platforms, SaaS (Software as a Service) solutions, and custom enterprise software development. The company's flagship product, VantageAI, offers predictive analytics and decision-making tools for financial, healthcare, and logistics industries.

TechVantage's success relies on a combination of cutting-edge algorithms, intuitive software design, and deep industry expertise. The company seeks to protect its intellectual property (IP) to maintain its competitive edge. Chose the best option (copyright, patent, trade secret) for each of the following which should give TechVantage maximum protection and benefit.

A proprietary machine learning algorithm that predicts market trends with 95% accuracy. **ANS Patent**

Justification: The algorithm is novel, non-obvious, and has significant practical utility.

Protection Scope: Patent filed under USPTO for both the method and its implementation.

User Interface Design including dashboards, icons, color schemes, and layout structures. **ANS Copyright**

Protection: Copyright covers the visual design, including dashboards, icons, color schemes, and layout structures.

Application: Ensures competitors cannot replicate the unique, intuitive interface.

User manuals, training videos, and FAQ documents. **ANS Copyright**

Protection: Copyright ensures exclusive rights to distribute and modify these materials.

A secure method for anonymizing and processing sensitive client data. **ANS trade secret**

Protection: Maintained as a trade secret to avoid public disclosure and competitive replication.

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The source code of VantageAI to prevent unauthorized reproduction or distribution. **ANS Copyrighted**  
**Protection:** The source code of VantageAI is copyrighted to prevent unauthorized reproduction or distribution.

The training datasets and specific configurations for AI models. **ANS Trade Secrets**  
**Protection:** Restricted access and secure storage; employees sign NDAs.

A unique compression mechanism enabling rapid data transmission across low-bandwidth networks. **ANS Patent**

**Description:** A unique compression mechanism enabling rapid data transmission across low-bandwidth networks.

**Justification:** The technique offers 30% higher efficiency compared to existing methods.

Long-term plans for product enhancements, market expansion, and feature rollouts. **ANS Trade Secret**  
**Protection:** Shared on a need-to-know basis with executives and project leads.

A multi-layer biometric authentication method combining facial recognition, voice analysis, and behavioral tracking. **ANS Patent**

**Description:** A multi-layer biometric authentication method combining facial recognition, voice analysis, and behavioral tracking.

**Justification:** Enhances security while reducing processing overhead.

Customized Agile methodology for software development. **ANS Patent**

**Description:** Customized Agile methodology for software development.

**Protection:** Detailed documentation is restricted to internal teams and not disclosed externally.

**Solution.**

1. Proprietary machine learning algorithm: Trade Secrets (to maintain secrecy) and Patent (for novel, non-obvious aspects)

2. User Interface Design: Copyright (for original expression) and Trade Secrets (for unique, valuable aspects)

3. User manuals, training videos, and FAQ documents: Copyright (for original expression)

4. Secure method for anonymizing and processing sensitive client data: Patent (for novel, non-obvious aspects) and Trade Secrets (to maintain secrecy)

5. Source code of VantageAI: Copyright (for original expression) and Trade Secrets (to maintain secrecy)

6. Training datasets and specific configurations for AI models: Trade Secrets (to maintain secrecy) and Copyright (for original expression, if applicable)

7. Unique compression mechanism: Patent (for novel, non-obvious aspects) and Trade Secrets (to maintain secrecy)

8. Long-term plans for product enhancements, market expansion, and feature rollouts: Trade Secrets (to maintain secrecy)



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9. Multi-layer biometric authentication method: Patent (for novel, non-obvious aspects) and Trade Secrets (to maintain secrecy)

10. Customized Agile methodology: Trade Secrets (to maintain secrecy) and Copyright (for original expression, if applicable)

Question 8: MCQs: [42x1]

- Which of the following is NOT a valid application of the fair use doctrine under U.S. copyright law?  
A) A student quoting small portions of a book in a research paper with proper citation  
B) A teacher photocopying an entire textbook for distribution in class  
C) A parody show using short clips from a copyrighted film to create satire  
D) A reviewer including short excerpts of a novel in a critical review
- What is the most critical factor in determining whether a piece of information qualifies as a trade secret?  
A) The information must be registered with a government agency.  
B) The information must be accessible only to high-ranking employees.  
C) The company must take reasonable steps to maintain its secrecy.  
D) The information must be shared with business partners under an NDA.
- Which of the following actions would most likely result in copyright infringement?  
A) Sharing a digital version of a public domain novel  
B) Reproducing a song without permission for use in a commercial advertisement  
C) Modifying open-source software for personal use  
D) Using a copyrighted photo in a private presentation without public distribution
- Which of the following characteristics would disqualify a software invention from receiving patent protection?  
A) The software implements a novel algorithm.  
B) The software only automates a process that humans already perform manually.  
C) The software includes a unique and useful user interface design.  
D) The software solves a specific technical problem in a novel way.
- Under what condition is reverse engineering of software considered legal?  
A) When it is performed for the purpose of creating a competing product.  
B) When the software license explicitly prohibits reverse engineering.  
C) When it is done to achieve interoperability with another program.  
D) When the software being reverse-engineered is copyrighted but not patented.
- Which of the following scenarios would most likely violate the DMCA's anti-circumvention provisions?  
A) Modifying software code to fix bugs in a purchased program  
B) Creating a tool to bypass digital rights management (DRM) for personal use  
C) Using open-source software to edit a proprietary file format  
D) Copying a DRM-free version of a file for backup purposes
- What is the primary ethical concern with cybersquatting?  
A) Registering domain names for personal use  
B) Using a domain name similar to a competitor's  
C) Registering domain names to sell them at a profit without intent to use them  
D) Creating websites to host pirated content

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8. Which of the following scenarios is an example of plagiarism but NOT a copyright violation?
- A) **Copying and submitting someone else's essay as your own in a competition**
  - B) Printing and distributing copies of a copyrighted book without permission
  - C) Uploading a copyrighted song to a public platform without the artist's consent
  - D) Using someone else's photography in a commercial advertisement without credit
9. A company reverse-engineers a competitor's software to learn its underlying methods but does not copy any code. Under what condition would this NOT qualify as fair use?
- A) **The reverse engineering was used to create a competing product**
  - B) The purpose of reverse engineering was for educational research
  - C) The company improved upon the software and created a unique product
  - D) The reverse engineering revealed patented algorithms
10. Which of the following is NOT a characteristic of a profession as described in the chapter?
- A) Self-regulation and enforcement of a code of conduct
  - B) Monopoly over the use of professional titles
  - C) **Requirement of legal registration for all professionals**
  - D) Control of entry to the profession by the collective body

### BCS Code of Conduct Sections

The public interest

Duty to relevant authority

Duty to profession

Professional Competence and Integrity

Scenario:

Susan, a software engineer, is developing a financial application for a major UK bank. During testing, she discovers a bug that could lead to minor rounding errors in interest calculations, causing customers to lose small amounts of money. Susan's manager argues that the financial impact is negligible and suggests deploying the software as is.

#### 11. Question:

What should Susan do in accordance with the British Code of Conduct?

- A) Report the issue to her manager and deploy the software as instructed.
- B) **Notify the bank's legal and compliance team about the bug and its implications.**
- C) Ignore the issue because the financial impact is negligible.
- D) Fix the bug only if a customer identifies the problem.

Scenario:

John, a recently certified engineer, is asked to lead the development of a safety-critical system for a hospital. While John has experience in general software development, he lacks expertise in safety-critical systems. However, his manager insists he take on the project due to resource constraints.

#### 12. Question:

How should John respond according to the British Code of Conduct?

- A) Accept the project but rely on senior colleagues for guidance.
- B) Refuse the project and escalate the issue to upper management.
- C) Accept the project and learn safety-critical systems on the job.
- D) **Inform his manager of his limitations and request additional training or support.**

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13. A multinational software corporation has branches in multiple countries. Each branch handles sales and marketing independently but follows centralized financial policies. What is the primary advantage of this geographical organization structure?
- A) It minimizes cultural and market misalignment.
  - B) It ensures uniformity in financial and operational procedures.
  - C) It maximizes resource utilization across countries.
  - D) It eliminates redundancies in product development.
14. In a decentralized organization, decisions are made at the local level to improve efficiency. What is a significant risk of this approach?

Increased compliance with organizational standards.  
Delayed decision-making at higher management levels.  
Duplication of efforts across different units.  
Reduced employee autonomy and motivation.

15. A software firm adopts a matrix organizational structure where project teams are formed by pulling members from different functional units. What is a potential drawback of this structure?

Increased specialization of employees  
Confusion over reporting relationships and priorities  
Reduced flexibility in resource allocation  
Lack of cross-departmental collaboration

16. In a highly functionally specialized organization, which of the following is a key risk?

Duplication of tasks across departments  
Reduced efficiency due to unclear roles  
Limited collaboration across functional units  
Inability to align specialized tasks with long-term organizational goals

17. What is a critical disadvantage of a strict hierarchical organization structure?

Excessive autonomy for lower-level employees  
Overdependence on senior management for decision-making  
Reduced clarity of employee roles and responsibilities  
Difficulty in achieving long-term objectives

18. A company adopts a hybrid organizational structure, combining elements of functional and geographical models. What is the primary challenge of this approach?

Managing conflicting priorities between geographic and functional units  
Maintaining uniformity in organizational policies  
Ensuring resource availability across projects  
Reducing employee specialization in core competencies

19. What is a primary advantage of decentralizing decision-making in an IT organization?

Eliminating redundancies in managerial roles  
Enabling quicker responses to local market changes  
Ensuring tighter control over project budgets  
Increasing uniformity in decision-making processes

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20. Why are bureaucratic structures often criticized in the context of software engineering organizations?

They promote excessive flexibility in decision-making.

**They hinder innovation due to rigid rules and processes.**

They eliminate employee accountability.

They lack a clear chain of command for reporting.

21. When considering equity financing, which of the following is most likely to occur?

A) The founders retain full ownership of the company.

**B) Investors receive a share of the company in exchange for their capital.**

C) The company is required to repay the invested capital with interest.

D) The company issues bonds to raise money.

22. Why is it important for start-ups to carefully evaluate their financing options?

A) To ensure they avoid paying taxes in the early stages

**B) To determine the impact on ownership and control of the business**

C) To minimize the amount of work required by the founders

D) To ensure immediate profits from external investors

23. What is the primary purpose of financial accounting in a business?

A) To make decisions about future investments

**B) To record and summarize financial transactions for external stakeholders**

C) To forecast the company's sales revenue for the year

D) To track the emotional state of customers

24. Which financial statement provides a snapshot of a company's financial position at a specific point in time?

A) Income Statement

B) Cash Flow Statement

**C) Balance Sheet**

D) Statement of Retained Earnings

25. Which of the following methods is primarily used to evaluate the profitability of an investment over time?

A) Payback Period

B) Net Present Value (NPV)

C) Internal Rate of Return (IRR)

**D) All of the above**

26. What is the primary limitation of using the Payback Period as an investment appraisal method?

**A) It disregards future cash flows beyond the payback period.**

B) It is too complicated to calculate.

C) It doesn't take into account the time value of money.

D) It focuses solely on capital expenditure.

27. In the context of investment appraisal, what does a positive Net Present Value (NPV) indicate?

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- A) The project will generate more returns than its costs, making it a potentially profitable investment.
- B) The project will require further financing.
- C) The project is not viable and should be abandoned.
- D) The project will take longer to repay its initial investment.
28. Which of the following is an advantage of using debt financing for a start-up?
- A) The founders maintain full control of the business.
- B) No interest payments are required.
- C) The debt is automatically forgiven if the business fails.
- D) The company does not need to repay the principal.
29. Which of the following is an example of a current liability?
- A) A loan that is due in five years
- B) A bond issued by the company
- C) Accounts payable for goods and services received within the last month
- D) A patent owned by the company
30. Which of the following would not appear on an income statement?
- A) Revenues from sales
- B) Net profit or loss for the period
- C) Interest expense
- D) Cash balances
31. Which of the following investment appraisal techniques takes into account the time value of money?
- A) Payback Period
- B) Discounted Payback Period
- C) Accounting Rate of Return (ARR)
- D) Return on Investment (ROI)
32. Which of the following is a key difference between a fixed-price contract and a time-and-materials contract in software development?
- A) A fixed-price contract involves a set amount of payment regardless of how long the project takes, while a time-and-materials contract involves billing based on actual time and resources used.
- B) A time-and-materials contract guarantees the project will be completed on time.
- C) A fixed-price contract allows for more flexibility in scope changes than a time-and-materials contract.
- D) A time-and-materials contract sets a firm total cost for the project.
33. How does the concept of intellectual property (IP) typically apply in computer contracts?
- A) The software engineer automatically transfers all rights to the client once the project is completed.
- B) The software engineer retains full ownership of the software, and the client is granted only a license to use it.

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- C) Both parties jointly own all intellectual property, regardless of who developed it.
- D) The client is free to distribute and sell the software without any restrictions.

34. Why is software product liability an important ethical concern for software developers?

- A) It ensures the software is free of bugs and guarantees it will work as expected in all scenarios.
- B) It holds developers accountable for damages caused by software defects that result in harm to users or third parties.
- C) It ensures that software developers receive compensation for every project they complete.
- D) It allows software developers to limit their responsibility for any legal consequences.

35. Which of the following is an example of negligence in software development that could lead to liability?

- A) Using a well-known algorithm to develop software
- B) Failing to properly test software in critical systems (e.g., healthcare or transportation) where defects could lead to harm
- C) Creating user-friendly documentation for the software
- D) Ensuring that the software meets basic user requirements

Consider the CMMI framework.

**TABLE 7-1** Definition of CMMI maturity levels

Maturity level	Description
Initial	Process is ad hoc and chaotic; organization tends to over commit and processes are often abandoned during times of crisis
Managed	Projects employ processes and skilled people; status of work products is visible to management at defined points
Defined	Processes are well defined and understood and are described in standards, procedures, tools, and methods; processes are consistent across the organization
Quantitatively managed	Quantitative objectives for quality and process performance are established and are used as criteria in managing projects; specific measures of process performance are collected and statistically analyzed
Optimizing	Organization continually improves its processes based on a quantitative understanding of its business objectives and performance needs

Source Line: Used with permission from Carnegie Mellon University.

Correctly assign each a CMMI level

Scenario	CMMI Level
A development team is often faced with unexpected problems that disrupt the progress of their projects. While the team occasionally identifies solutions to these problems, they tend to react to issues as they arise, without a defined process for anticipating and preventing such problems in the future. They often scramble to meet deadlines, and there is a lack of proactive planning.	1

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A software company faces recurring issues with the same types of defects across multiple projects. The company conducts detailed root cause analyses to identify the underlying reasons for the defects. Based on these analyses, the company implements targeted improvements to its processes to eliminate the root causes. The process improvements are tracked and assessed for their effectiveness.	5
A company has established a project management office (PMO) that is responsible for overseeing all projects. Project managers are required to monitor and track the progress of their projects, ensuring that they are on schedule and within scope. The PMO tracks key milestones and ensures that appropriate corrective actions are taken when projects deviate from the plan. Project managers are trained to understand the importance of monitoring and controlling project performance.	3
A software company has successfully integrated process improvement initiatives across all levels of the organization. It has a culture of continuous improvement, where teams regularly assess the effectiveness of their processes and make adjustments as needed. Lessons learned from completed projects are fed back into the development process, and best practices are consistently refined. The company emphasizes innovation and process optimization.	5
A company has established key performance indicators (KPIs) for all of its projects. It collects and analyzes data on project performance, such as time to complete tasks, defect density, and customer satisfaction. This data is used to make informed decisions about process improvements and resource allocation. The company regularly reviews its processes and metrics to ensure continued efficiency and effectiveness.	4
A large organization has implemented standard software development practices. All teams follow a specific process for requirements gathering, design, coding, testing, and deployment. This process is documented and made available to all team members. However, there is still some flexibility in how the process is applied, depending on the project's specific needs. The organization regularly conducts training to ensure team members are well-versed in the standardized processes.	3
A software development company is experiencing inconsistent project outcomes. Some projects are completed on time, while others face delays and quality issues. The team members often use their own methods to manage tasks and resources, and there is no formal project management process. Project plans, if they exist, are created at the beginning of the project and are rarely updated. There is no defined process for tracking project progress.	1