CERTIFIED PUBLIC ACCOUNTANT

FOUNDATION LEVEL 2 EXAMINATIONS

F2.3: INFORMATION SYSTEMS

DATE: XX, MAY 2024

MODEL ANSWERS & MARKING GUIDE

QUESTION ONE

Marking Guide

Sub question	Criteria	Marks
a	Award 1 mark for a correct definition of operating system Award 1 mark for each correctly listed operation it controls (1 * 3 = 3 marks)	3
b	Award 1 mark for correctly identifying Microsoft Windows Award 2 marks for a correct description of why Linux is becoming the preferred choice for businesses	3
c	Award 1 mark for correctly identifying each of the two types of application software = 2 maximum marks Award 1 mark for a correct description of each of the two types of application software = 2 maximum marks	4
d	Award 1 mark for each correct benefit of wireless applications for Customer Relationship Management to professionals = 4 maximum marks Consider alternative correct answers provided by candidates but not in the model answer.	4
e	Award 1 mark for correctly identifying each type of primary external source of software = 3 marks Award 2 marks for a correct description of each type of primary external source of software = 3 marks	6
TOTAL		**20**

Model Answer

Required:

a) Define an operating system and list THREE operations it controls.

An operating system is the software that interacts with the hardware of the computer in order to manage and direct the computer's resources.

Operating systems operations are such as:

- Logging on,
- File management, and
- Network connectivity

b) Identify the most globally used operating system and describe why Linux is becoming the preferred choice for businesses.

The most prolific operating system is Microsoft Windows. Windows is also the operating system used by some non-traditional computing devices such as hand-held devices and cell phones.

Linux open-source software is becoming the operating system of choice for organizations looking to save money. Businesses and governments across the globe are adopting the Linux platform as a way to reduce IT spending and license costs.

c) Identify and briefly describe TWO types of application software that a company can use.

i. Application Specific Software: Application Specific Software packages support end users in business and other fields. For example, application specific software packages support business uses such as Transaction Processing, decision support, accounting, sales management etc.
ii. General Purpose Application Programs: software is a type of software that can be used for a variety of tasks. It is not limited to one particular function. Application programs available including: word-processing and spreadsheet packages.

d) State FOUR benefits of wireless applications for Customer Relationship Management to professionals.

Wireless CRM enables sales and field service professionals to:

i. Access customer account records and information at any time or location.
ii. Update customer accounts and deal information to update customer database instantaneously.
iii. Receive alerts to important events.
iv. Enter, perform and update transactions and product information.

e) Discuss THREE primary external sources of software.

i. Software Packages from Software Vendor: A software package is a prewritten commercially available set of software programs that eliminates the need for the business to write its own software for certain functions such as payroll processing and order handling.
ii. Software as a Service (SaaS) is a model of software deployment whereby a provider licenses an application to customers for use as a service on demand.
iii. Application Service Provider (ASP): An ASP is a business that delivers and manages applications and computer services from remote computer centers to multiple users using the Internet or private network.

QUESTION TWO

Marking Guide

Sub question	Criteria	Marks
a	Award 1 mark for a correct definition of Information System	2
b	Award 1 mark for each correct primary strategic business objectives of investing in information systems Consider other correct answers provided by candidates	4
c	Award 1 mark for correctly identifying each of the main enterprise applications = 4 marks Award 1 mark for a correct explanation of each of the main enterprise applications = 4 marks	8
d	Award 2 marks for each correctly discussed objective of an IT audit Award 1 mark if the discussion is not appropriate, poor, or short. Consider other correct answers provided by candidates	8
TOTAL		**20**

Model answer

a) Describe what is an Information System.

An information system is a set of interrelated parts that collect, process, store, and distribute information to support decision-making and control in an organization. Information systems can also be used to analyze problems and create new products and services.

b) i) Outline 3 different benefits of information systems.

- Operational excellence: Efficiency, productivity, and improved changes in business practices and management behavior.
- New products, services, and business models: A business model describes how a company produces, delivers, and sells a product or service to generate profit. Information systems and technologies create opportunities for products, services, and new ways to engage in business.
- Customer and supplier intimacy: Improved communication and enhanced services to customers will help raise revenues. Closer relationships with suppliers will lead to lower costs of supplies.

- Improved decision making: Accurate and timely information is essential if business managers are to make the best possible decisions.
- Competitive advantage: Implementing effective and efficient information systems can allow a company to charge less than competitors for quality products, leading to higher sales and profits.
- Survival: Information systems can also be a necessity for doing business. A necessity may be driven by industry-level changes, such as the widespread adoption by many airlines of online booking of flights and check-in. A necessity may also be driven by governmental regulations, such as one requiring a business to retain data and report specific information for some time.
- Low-cost leadership

c) Identify and explain FOUR main enterprise applications.

i. Enterprise Systems: Enterprise systems, or enterprise resource planning (ERP) systems, model and automate many business processes, for instance filling an order or scheduling a shipment, with the objective of integrating information throughout the company and eradicating complex, costly links between computer systems in different areas of the business. Information that was in the past split between different systems can now effortlessly flow throughout the company, allowing it to be shared by business processes in manufacturing, accounting, human resources and other areas of the organisation. Distinct business processes from sales, production, finance and logistics can be integrated into company-wide business processes that flow across organisational levels and functions.

ii. Supply Chain Management Systems: Supply chain management (SCM) systems facilitate businesses with managing relationships with their suppliers. These systems help suppliers, purchasing firms, distributors and logistics companies share information about orders, production, inventory levels, and delivery of products and services so that they can source, produce and deliver goods and services more efficiently.

iii. Customer Relationship Management Systems: Customer relationship management (CRM) systems focus on coordinating the business processes regarding a firm's interactions with its customers in sales, marketing and service, to fully optimise profits, customer satisfaction and customer retention. They merge customer data from numerous sources and communication channels to enable firms to identify profitable customers, acquire new customers, improve service and support and target products and services more accurately to particular customers' preferences.

iv. Knowledge Management Systems: The value of a firm's products and services is based not only on its physical resources but also on intangible knowledge assets. Some firms perform better than others because they have superior knowledge regarding the creation, production, and delivery of products and services. Knowledge management systems

support processes for discovering, codifying, sharing, and distributing knowledge, as well as processes for generating new knowledge and integrating external sources of knowledge.

d) Discuss THREE objectives of an IT audit.

The objectives of IT audit include assessment and evaluation of processes that ensure:

• Asset safeguarding –'assets' which include the following five types of assets:

• Data objects in their widest sense, (i.e., external and internal, structured and non-structured, graphics, sound, system documentation etc).

• . Application system is understood to be the sum of manual and programmed procedures.

• Technology covers hardware, operating systems, database management systems, networking, multimedia, etc.

• Resources to house and support information systems, supplies etc. • Staff skills, awareness and productivity to plan, organize, acquire, deliver, support and monitor information systems and services.

• Ensures that the following seven attributes of data or information are maintained:

• Effectiveness - deals with information being relevant and pertinent to the business process as well as being delivered in a timely, correct, consistent and usable manner.

• Efficiency - concerns the provision of information through the optimal (most productive and economical) usage of resources.

• Confidentiality - concerns protection of sensitive information from unauthorized disclosure. 4. Integrity - relates to the accuracy and completeness of information as well as to its validity in accordance with the business' set of values and expectations.

• Availability - relates to information being available when required by the business process, and hence also concerns the safeguarding of resources.

• Compliance - deals with complying with those laws, regulations and contractual arrangements to which the business process is subject; i.e., externally imposed business criteria. This essentially means that systems need to operate within the ambit of rules, regulations and/or conditions of the organization.

• Reliability of information

QUESTION THREE

Marking Guide

Sub question	Criteria	Marks
a	Award 1 for each correctly identified main type of network topologies and 1 mark for a correct description Star topology = 1 mark for a correct name and 1 mark for a correct description = 2 marks Bus topology = 1 mark for a correct name and 1 mark for a correct description = 2 marks Ring topology = 1 mark for a correct name and 1 mark for a correct description = 2 marks	6
b	Award 1 mark for each correct primary strategic business objectives of investing in information systems Consider other correct answers provided by candidates	4
c	Award 2 marks for each correctly discussed major component found in a simple company network A maximum of 4 components is required and the order does not matter = 2 * 4 = 8 marks Consider alternative explanations	8
d	Award 1 marks for each correctly listed capability of a Database Management System (DBMS). Consider other correct answers provided by candidates	6
TOTAL		**20**

Model answer

a) Identify and briefly describe THREE main types of network topologies.

i. In a star topology, all devices on the network connect to a single hub and all network traffic flows through the hub.
ii. In a bus topology, one station transmits signals, which travel in both directions along a single transmission segment. All of the signals are broadcast in both directions to the entire network, with special software to identify which device should receive each message.

iii. A ring topology connects network devices in a closed loop. Messages pass from computer to computer in only one direction around the loop and only one station at a time.

b) State SEVEN major components found in a simple company network.

i. Computers (PCs), network interfaces, a connection medium network operating system software, and either a hub or a switch.
ii. Each computer on the network contains a network interface device (NIC) that the network is connected to.
iii. Connection medium for linking network components can be a copper wire, coaxial cable, fiber optic cable, or radio signal in the case of wireless networks.
iv. Network operating systems manage the communications on the network between the different network elements.
v. Most networks contain a hub Switch acting as a connection device between the computers or other devices on the network.
vi. To communicate with another network, the network would use a router which is a special communications device used to route packets of data through different networks.
vii. Network switches and routers have proprietary software built into their hardware for directing the movement of data on the network. This can create network bottlenecks and makes the process of configuring a network more complicated and time-consuming. Software-defined networking (SDN) is a networking approach in which many of these control functions are managed by one central program, which can run on inexpensive commodity servers that are separate from the network devices themselves.

c) List SIX capabilities of a Database Management System (DBMS).

i. Controlling redundancy of persistent data
ii. Providing efficient ways to access a large amount of data
iii. Supporting a logical data model
iv. Supporting high-level languages to define the structure of data, access data, and manipulate data
v. Enabling concurrent access to data by multiple users
vi. Maintaining the integrity of the data
vii. Protecting the data from unauthorized access and malicious use
viii. Recovering from failures without losing data
ix. Being able to represent complex relationships among data
x. Enforcing integrity constraints
xi. Providing persistent storage for program objects and data structures

QUESTION FOUR

Marking Guide

Sub question	Criteria	Marks
a	Award 1 for each correctly identified stage of the decision-making process and 1 mark for a correct discussion Intelligence = 1 mark for a correct name and 1 mark for a correct description = 2 marks Design = 1 mark for a correct name and 1 mark for a correct description = 2 marks Choice = 1 mark for a correct name and 1 mark for a correct description = 2 marks Implementation = 1 mark for a correct name and 1 mark for a correct description = 2 marks	8
b	Award 1 mark for each correct main type of systems that support the different levels and types of decisions	4
c	Award 2 marks for a correct definition of Decision Support Systems (DSS)	2
d	Award 2 marks for a correct definition of Executive Support Systems (ESSs) Award 1 mark for each correct ESSs capability = 1 * 4 = 4 marks Consider other correct answers provided by candidates	6
TOTAL		**20**

Model answer

a) Discuss FOUR stages of the decision-making process and how each can be supported by information systems.

- **Intelligence:** This stage involves identifying and understanding the problems that are present in the organization and their root cause and effect. MIS systems that provide a wide range of detailed reports and information can help in identifying problems. MISs that provide exception reports are particularly useful for identifying problems.
- **Design:** This stage involves identifying and investigating a number of possible approaches and solutions to the problem. DSSs are ideal in this stage for exploring alternatives because they include tools for analyzing and modeling data, thus enabling users to explore various options quickly.

- **Choice:** This stage involves choosing from alternative solutions. DSSs can support managers in choosing the optimal solution. These DSSs can use complex analytic models to look at the various potential outcomes.
- **Implementation:** This stage involves implementing the chosen solution and monitoring to establish if the solution works. An MIS can be used to provide managers with routine reports on the progress of the solution.

b) Outline FOUR main types of systems that support the different levels and decisions.

i. Management Information systems (MIS)
ii. Decision Support Systems (DSS)
iii. Executive Support Systems (ESS)
iv. Group Decision Support Systems (GDSS)

c) Define Decision Support Systems (DSS).

A DSS is a computer system that supports managers in decision-making tasks. DSSs are particularly suited to non-routine decision-making.

d) Define Executive Support Systems (ESSs) and state FOUR ESSs capabilities.

Executive Support Systems (ESSs); also referred to as Executive Information Systems (EIS) are computerised systems designed specifically to meet the information need of senior executive.

The following is a summary of the capabilities of ESSs:

- ESSs are specifically tailored to the needs of the senior executive.
- ESSs provide access data on specific issues and problems of interest to the executive as well as general reports.
- ESSs provide a range of on-line analysis tools including trend analysis, exception reporting and "drilldown" capacity.
- ESSs access a range of internal and external data.

QUESTION FIVE

Marking Guide

Sub question	**Criteria**	**Marks**
a	Award 2 marks for a correctly explained capital budgeting technique used in assessing long-term capital investments in information systems = 2 techniques * 4 marks = 8 maximum marks	8

	Award 1 mark for a poorly explained answer Consider alternative benefits not in the model answer	
b	Award 2 marks for a correctly discussed kind of organisational change that can be enabled by information technology = 2 * 4 = 8 marks Award 1 mark for a poorly discussed answer	8
c (i)	Award 2 marks for a correct description of Joint Application Development (JAD)	2
c (ii)	Award 2 marks for a correct description of Rapid Application Development (RAD)	2
TOTAL		**20**

Model answer

a) Explain FOUR capital budgeting techniques used in assessing long-term capital investments in information systems.

i. Payback method: The payback method measures the time required to pay back the initial investment in the project. This method is good for high-risk projects where useful life is difficult to know. However, it ignores the time value of money, the cash flow after the payback period, the disposal value and the profitability of the investment.
ii. Accounting rate of return on investment: The accounting rate of return on investment (ROI) calculates the return from an investment by adjusting the project inflows produced by the investment for depreciation. The rate of return must equal or exceed the cost of capital in the marketplace. This model approximates the accounting income that would be earned by the project.
iii. Cost-benefit ratio: The cost-benefit ratio is a method for calculating the returns from a capital expenditure by dividing total benefits by total costs. Any value above 1.0 is a positive ratio. The method can be used to rank several projects for comparison. The ratio can be calculated using present values to account for the time value of money.
iv. Net present value: Net present value is the amount of money an investment is worth, taking into account its cost, earnings and the time value of money. By subtracting the cost of the project from the net present value of its benefits, one can determine one measure of profitability.
v. Profitability index: The profitability index is calculated by dividing the present value of the total cash inflow by the initial cost of the investment. The result is a profitability measure that, unlike the net present value, can be used to compare with alternative investments.
vi. Internal rate of return: The internal rate of return is defined as the rate of return or profit an investment is expected to earn taking into account the time value of money.

b) Discuss FOUR kinds of organisational change that can be enabled by information technology.

Information technology can enable the following four kinds of organisational change;

i. Automation: this involves using computers to speed up the performance of existing tasks by eliminating the need for manual activity. This approach to organisational change may release staff to other jobs, reduce the number of employees needed, or enable the organisation to process more transactions.
ii. Rationalisation of procedures refers to the streamlining of standard operating procedures and eliminating some tasks in a process removing any blockages.
iii. Business process reengineering refers to the radical redesign of business processes. It can involve combining tasks in a process to cut waste and eliminating repetitive, labourintensive tasks in order to improve cost and quality and to maximise the benefits of information technology.
iv. A paradigm shift is a radical change in the business and the organisation. The strategy of the business can be changed and sometimes even the business the company is in.

c) Briefly describe the following contemporary approaches to application development:

i. Joint Application Development (JAD)

This is an alternative approach to identifying and specifying requirements. The JAD approach is a collaborative method that involves bringing together key users, managers and systems analysts for group sessions. Requirements are collected from a number of key people, at the same time allowing the analyst to see areas where there is agreement around requirements and areas of difference. JAD sessions are usually conducted away from where people normally work in specially designed conference rooms that are suitably equipped.

ii. Rapid Application Development (RAD)

Rapid Application Development (RAD) is an iterative approach to application development similar to prototyping. Capturing requirements, analysis, design and the building of system itself are developed in a sequence of refinements. The developers enhance and extend the initial version through multiple iterations until it is suitable for operational use. Unlike prototyping, RAD produces functional components of a final system rather than a limited scale version.

QUESTION SIX

Marking Guide

Sub question	Criteria	Marks
a	Award 1 mark for each correctly stated components of an Expert System = 6 * 1 = 6 maximum marks Award 0.5 marks is for a correct name of component with no short description	6
b (i)	Award 2 marks for a correct definition	2
b (ii)	Award 2 marks for a correct definition	2
b (iii)	Award 2 marks for a correct definition	2
b (iv)	Award 2 marks for a correct definition	2
b (v)	Award 2 marks for a correct definition	2
c	Award 1 mark for each correct electronic payment system = 1 * 4 = 4 marks Consider alternative benefits not in the model answer	4
TOTAL		**20**

Model answer

a) State SIX components of an Expert System.

An expert system will generally contain the following components:

i. Knowledge base: The knowledge base contains the knowledge of humans experts based on their experiences and knowledge built up over many years. The knowledge base also requires a set of rules that direct the use of the knowledge to solve specific problems in a particular domain.
ii. Inference engine: The inference engine is a computer that draws inferences from the results of applying the user supplied facts to the rules in the knowledge base. It then proceeds to the next fact-rule combination. The inference engine is considered the "brain" of the system.
iii. User interface: The user interface allows the user to communicate with the system. The system communicates with the user using a question and answer format. This communication drives the inference engine to match the symptoms of the problem with the knowledge in the base so that a conclusion is drawn and a recommendation is made to solve the problem.
iv. Explanation facility: This feature of the expert system gives it the ability to explain its recommendation.

v. Current Data storage: This is a storage area set aside for input data related to the current problem.
vi. Knowledge engineer: The person who pulls the data from the human expert and fits it into the expert system is called the knowledge engineer.

b) Define the following terms as used in IT security and risk mitigation:

i. Encryption

Encryption is the coding and scrambling of messages to prevent their access by unauthorised individuals. Encryption offers protection by keeping messages or packets hidden from the view of unauthorised readers.

ii. An acceptable use policy

It defines what is considered to be acceptable uses of the firm's information resources. These resources would typically include computers, telephones, e-mail and the Internet. The policy should set out the company policy regarding privacy, user responsibility and personal use of company equipment.

iii. Mirroring

Mirroring involves the use of a backup server that duplicates all the processes and transactions of the primary server. If for any reason the primary server fails, the backup server can take its place without any interruption to service.

iv. Antivirus Software

Antivirus software checks the computer systems and hard drives for the presence of computer viruses. The software detects and removes the virus from the infected area.

v. Packet filtering

It examines selected fields in the headers of data packets flowing back and forth between the trusted network and the Internet, examining individual packets in isolation. This filtering technology can miss many types of attacks.

c) List FOUR electronic payment systems developed to pay for goods electronically on the Internet.

Electronic payment systems for the Internet include:

i. Systems for credit card payments,
ii. Digital cash,
iii. Digital wallets,
iv. Accumulated balance payment systems,

v. Stored value payment systems,
vi. Peer-to-peer payment systems,
vii. Electronic checks, and
viii. Electronic billing presentment and payment systems

QUESTION SEVEN

Marking Guide

Sub question	Criteria	Marks
a (i)	Award 2 marks for each correctly discussed Moral Dimensions of the Information Age = 5 * 2 = 10 marks 1 mark is for a correct name of moral dimension and 1 mark is for a correct short discussion	10
a (ii)	Award 1 mark for each correct step managers can use to use to analyze ethical issues and dilemmas in the information society = 5 * 1 = 5 marks Consider other correct answers provided by candidates but not in the model answers	5
b	Award 2 marks for any correct definition of Money Laundering = 2 marks Award 1 mark for each correctly provided measure to stop Money Laundering using information technology = 1 * 2 = 2 marks Consider alternative measures provided by candidates but not in the model answers	4
c	Award 1 marks for a correct definition of cookies	1
TOTAL		**20**

Model answer

a) In relation to your line manager's comments regarding Ethical, Social, and Political Issues:

i) Identify and briefly discuss FIVE Moral Dimensions of the Information Age.

(i) Information Rights: What information rights do individuals and organizations have with respect to information about themselves? There are also moral obligations for those dealing with this information.

(ii) Property Rights: How will intellectual property rights be protected in a digital society, where traditional measures that protect property are no longer applicable?
(iii) Accountability and Control: Who can be held responsible for damage caused to individual information and property?
(iv) System Quality: Data quality and system errors - No software program is perfect, errors will be made, even if the errors have a low probability of occurring
(v) Quality of Life: What values should be retained in an information society? Which cultural values and practices are supported by the new information technology?

ii) Outline FIVE steps managers can use to use to analyze ethical issues and dilemmas in the information society.

If faced with a situation that poses ethical issues and dilemmas, the following five-step analysis can be applied:

(i) Identify and explain the facts clearly
(ii) Define the conflict or ethical dilemma posed and recognize the higher-order values concerned
(iii) Identify the stakeholders
(iv) Assess the options that can be reasonably taken
(v) Identify the possible consequences of these options.

b) Define Money Laundering and propose TWO measure to stop it using information technology.

Money laundering is the illegal process of making large amounts of money generated by criminal activity, such as drug trafficking or terrorist funding, appear to have come from a legitimate source.

To stop Money Laundering, governments and financial institutions set out certain procedures to combat this illegal activity. Sanctions such as fines are imposed on institutions that fail to comply with these procedures. Anti-Money Laundering (AML) refers to a set of procedures, regulations, and laws that prevent "laundering of money from illegal activities such as illegal drug sales. **From a technological aspect, Artificial Intelligence** reduces all these problems. Today, Compliance Software minimizes the risk of errors while keeping track of the compliance process of companies. Artificial intelligence scans all sanction lists instantly. So you don't have to check the sanction lists manually. You can integrate this software into your system with API support. So you can control your customers' sanctions instantly.

c) Define the term ‘cookies’ as used in information technology.

Cookies are small files sent by a Web site to the user's browser, which are subsequently used to identify the visitors Web browser and track visits to the Web site. In this way the site can customise its content to the interests of each particular visitor.

End of marking guide and model answers