



October 2010

## IT Passport Examination

Questions must be answered in accordance with the following:

Question Nos.	Q1 – Q100
Question Selection	All questions are compulsory.
Examination Time	9:30 – 12:15 (165 minutes)

### Instructions:

1. Use a pencil. If you need to change an answer, erase your previous answer completely and neatly. Wipe away any eraser debris.
2. Mark your examinee information and your answers in accordance with the instructions below. Your answer will not be graded if you do not mark properly. Do not mark nor write on the answer sheet outside of the prescribed places.
  - (1) **Examinee Number**  
Write your examinee number in the space provided, and mark the appropriate space below each digit.
  - (2) **Date of Birth**  
Write your date of birth (in numbers) exactly as it is printed on your examination admission card, and mark the appropriate space below each digit.
  - (3) **Answers**  
Select one answer (a through d) for each question.  
Mark your answers as shown in the following sample question.

[Sample Question]

**Q1.** In which month is the autumn IT Passport Examination conducted?

- a) September      b) October      c) November      d) December

Since the correct answer is “b)” (October), mark your answer sheet as follows:

[Sample Answer]

<b>Q1</b>	<input type="radio"/> (A)	<input checked="" type="radio"/>	<input type="radio"/> (C)	<input type="radio"/> (D)
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**Do not open the exam booklet until instructed to do so.  
Inquiries about the exam questions will not be answered.**

Company names and product names appearing in the examination questions are trademarks or registered trademarks of their respective companies. Note that the ® and ™ symbols are not used within.

- Q1.** Which of the following is the form of business organization in which an independent virtual company organization is established for each business segment within a corporation, in order to make quick decisions and clarify management responsibilities?
- a) In-house company system
  - b) Divisional organization
  - c) Project organization
  - d) Holding company
- Q2.** Among the costs incurred by data destruction or degraded system availability, which of the following is classified as a direct loss in terms of risk management?
- a) Costs incurred by substitute processes until the system recovers
  - b) Costs incurred to rebuild the trust lost because of data destruction
  - c) Costs incurred to build a duplicated database and a backup system
  - d) Costs incurred to review the feasibility of prevention against unauthorized access
- Q3.** Which of the following can be considered as a trade secret from a viewpoint of preventing unfair competition?
- a) Information about a personal scandal involving an executive officer
  - b) Information about technology under development, which is marked as “Strictly Confidential” and circulated throughout the company
  - c) Information about a production method that is not publicly known, which is marked as “Confidential” and stored in a locked cabinet
  - d) A commercially available book which describes how to sell the company’s products effectively

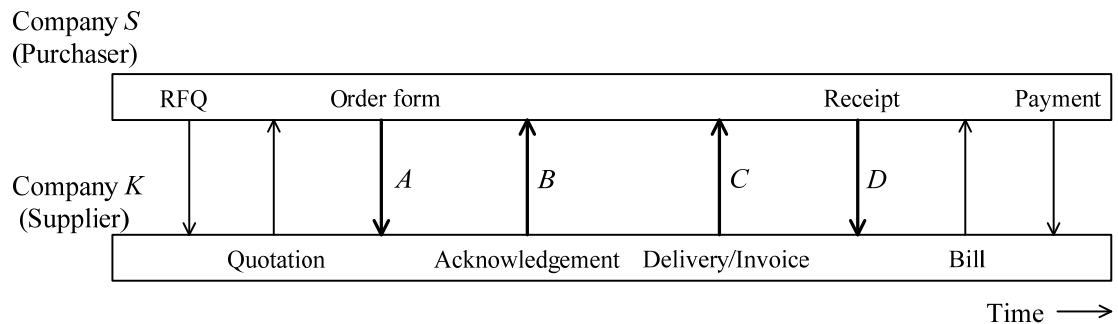
**Q4.** Which of the following is an explanation of free software?

- a) It can be installed on any number of computers without limitation in a predetermined location of use.
- b) It requires the users to pay predetermined charges to the developer if they continue to use it after a certain period of free trial.
- c) It is commercially available and permitted to be installed on more than one computer.
- d) It is provided without charge and can be modified, copied, and distributed without restriction under the license agreement.

**Q5.** Which of the following is an explanation of volume license agreement?

- a) It is an agreement in which a master copy is provided to customers, including companies, who purchase the software in high volume, and the number of permitted installations is defined in advance.
- b) It is an agreement in which the location of use is restricted to a specified facility, and the software can be used without limiting the number of computers or users in the facility.
- c) It is an agreement in which the use of software is permitted by accepting the terms and conditions of the contract displayed on the screen when the software is downloaded from the Internet.
- d) It is an agreement in which standard licensing conditions are defined and a license agreement is automatically considered to be concluded between the right holder and the purchaser when a certain amount of package is unwrapped.

- Q6.** Company *S* purchases equipment from Company *K* by using the procedure shown in the diagram below. In this transaction procedure, which of the following is the point at which the sales contract is concluded? Here, once the quotation is provided, the content of the transaction does not change throughout the procedure.



- a) *A*                      b) *B*                      c) *C*                      d) *D*
- Q7.** Which of the following can be considered as “personal information” from a viewpoint of the protection of personal information?
- a) Corporate name, telephone number, address, and other information that can be used to identify a specific company
  - b) A report summarizing only the responses from questionnaires returned in signed forms
  - c) A master file of customer’s information such as name, date of birth, and address
  - d) A table showing both the number of customers grouped by age bracket and the sales amount in each bracket
- Q8.** Which of the following is the coding scheme that can encode a large amount of information into a small area and has an error correction function that enables the code to be read out correctly even when the code cannot be partially read out?

- a) ISBN code                      b) ITF code
- c) QR code                      d) Unicode

**Q9.** Which of the following is an advantage provided by “supply chain management”?

- a) Sales information about commercial items in retail stores can be instantly obtained.
- b) Knowledge and findings can be organized into a database and used effectively in business.
- c) The sequence of processes from procurement to manufacturing, distribution, and sales can be improved, and the delivery time and cost can be optimized.
- d) Inquiries from customers via telephone, FAX, e-mail, and other methods can be responded instantly.

**Q10.** Which of the following is a form of farming out all or most of the information system development, operations, and maintenance work to an external specialized company for the purpose of reducing information system costs?

- a) Outsourcing
- b) System integration
- c) Housing
- d) Hosting

**Q11.** Which of the following is an explanation of compliance management?

- a) It is a business process of monitoring and checking whether the business management is adequate and appropriate, so as to maintain the legitimacy of the business activities towards the shareholders.
- b) It is a business process of holding accountability to the shareholders and other stakeholders for the operational activities and business performance.
- c) It is a business process of implementing rules, manuals, and check systems based on the business ethics, and performing business activities in accordance with legal requirements and social norms.
- d) It is a business process of providing investors and analysts with accurate management information necessary for making investment decisions, on a timely and continuous basis.

**Q12.** Which of the following means that product improvement, addition of new varieties, and product disposal are planned according to each stage of introduction, growth, maturity, and decline?

- a) Experience curve effect
- b) Business continuity plan
- c) Product portfolio management
- d) Product life cycle strategy

**Q13.** Which of the following is the method that uses information technology to collect and analyze customer information, so as to establish a favorable relationship with the customers, retain customer loyalty, and increase company profit from a long term perspective?

- a) BSC
- b) CRM
- c) ERP
- d) PPM

**Q14.** Which of the following is the most appropriate meaning of “de facto standard”?

- a) Standards for industrial products defined as national industry standards in each country
- b) Standards for industrial and scientific technologies defined by the International Organization for Standardization (ISO)
- c) Specifications which were originally adopted by a particular company or group and are currently in wide-spread use as practical industry standards
- d) Specifications applied anywhere in the world, rather than standards limited to a particular country, region, or company

**Q15.** Which of the following is an economic or social disparity caused by different skills or opportunities to use IT, such as a PC and the Internet?

- a) Accessibility
- b) Diversity
- c) Digital divide
- d) Digital democracy

**Q16.** A single unit of Product *A* is composed of three pieces of Part *B* and two pieces of Part *C*. In the production plan for a particular period, the demand for Product *A* is 10. Which of the following is the net requirement of Part *B*? Here, the quantity in stock is five for Part *B*, and there are no other pieces in stock, in process, on back order, or already allocated. The net requirement is calculated by subtracting the stock available for allocation from the gross requirement.

- a) 20                      b) 25                      c) 30                      d) 45

**Q17.** Which of the following can take advantage of the cell production system?

- a) A product which requires mass production to increase productivity  
b) A product whose specifications do not change over the long term  
c) A product which requires wide variation and flexible manufacturing  
d) A product which requires the division of labor based on a standardized, simplified, or specialized method

**Q18.** The table below shows the relationship between the standard number of staff and the number of days required to complete preparation activities *A* through *E* of an event. According to the table, the preparation activities started 35 days ago; however, only one staff member was assigned during the first 20 days. In order to complete the remaining activities to meet the original deadline, what is the minimum number of staff members that must be reserved per day? Here, the preparation activities can be performed in any sequence, any staff member can achieve the same productivity in each activity, and any number of staff members can be assigned to an activity at one time.

Preparation activity	Standard number of staff (persons)	Number of days required (days)
<i>A</i>	2	5
<i>B</i>	2	5
<i>C</i>	3	10
<i>D</i>	2	5
<i>E</i>	5	10

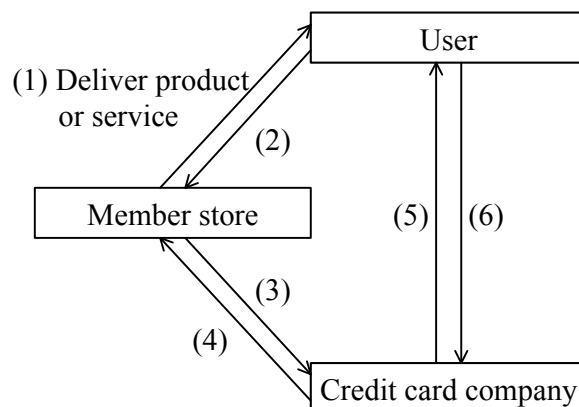
- a) 4                      b) 5                      c) 6                      d) 7



**Q19.** Which of the following is an appropriate description in comparison of how to safeguard IC cards and magnetic cards against forgery?

- a) An IC card is more robust against forgery than a magnetic card because the IC card provides the features of storing and encrypting information in the IC chip.
- b) An IC card is more robust against forgery than a magnetic card because the IC card uses a two-dimensional code for information recording.
- c) A magnetic card is more robust against forgery than an IC card because the magnetic card stores information on a magnetic stripe and has a more complicated data protection mechanism.
- d) A magnetic card is more robust against forgery than an IC card because the magnetic card uses a bar code for information recording.

**Q20.** The diagram below shows the flow for a credit card transaction. Which of the following actions corresponds to (5) in the diagram? Here, the numbers (1) through (6) indicate the sequence in which the transaction is processed.



- a) Charge the sales amount (send invoice or transmit sales data)
- b) Present credit card and sign invoice
- c) Make payment for amount used
- d) Charge the purchase amount (send credit card statement)

**Q21.** Which of the following is a cash card that can be used for withdrawing the transaction amount directly from the card-holder's bank account and making settlement on a real-time basis?

- a) Smart card
- b) Debit card
- c) Prepaid card
- d) Point card

**Q22.** Which of the following is an explanation of SFA (Sales Force Automation)?

- a) It is a method to improve sales efficiency and quality and to increase sales and profits by utilizing IT in sales activities.
- b) It is a method or a concept to improve business efficiency by planning and managing company-wide business resources effectively and comprehensively.
- c) It is a system to support the business activities of retail stores by increasing their sales and profits, thereby increasing their business transactions with wholesalers or manufacturers.
- d) It is to perform commercial transactions with consumers or between businesses by utilizing an electronic network such as the Internet.

**Q23.** Which of the following is an appropriate purpose of introducing groupware?

- a) To integrate groupware into equipment such as PCs and peripheral devices and provide basic hardware control functions
- b) To enhance the overall work efficiency of the organization by providing an environment for collaborative work
- c) To enhance the organization's Internet security by implementing a solution that combines both hardware and software into a single security product
- d) To shorten the period of system development and improve the efficiency of maintenance by installing a suite of packaged software

**Q24.** The production volume for the next month is calculated by the expression shown below.

“Projected sales volume for next month” – “Inventory volume at current month end”

When “projected sales volume for next month” is obtained from the moving average of the actual sales volume over the last three months including the current month, which of the following is the expression that can be used for calculating the production volume for September?

	May	June	July	August	September
Sales volume	<i>A</i>	<i>C</i>	<i>E</i>	<i>G</i>	<i>I</i>
Month-end inventory volume	<i>B</i>	<i>D</i>	<i>F</i>	<i>H</i>	<i>J</i>

a)  $\frac{C + E + G}{3} - \frac{D + F + H}{3}$

b)  $\frac{C + E + G}{3} - H$

c)  $\frac{E + G + I}{3} - \frac{F + H + J}{3}$

d)  $\frac{E + G + I}{3} - J$

**Q25.** Business strategies are developed, and one of them is to automate and integrate a variety of functions, commonly referred to as back office, including financials, human resources, and asset management, in order to allow the company to focus resources on its core business mission. Which of the following is the appropriate information system that implements this strategy?

a) MRP system

b) POS system

c) PLM system

d) ERP system

**Q26.** Which of the following is an appropriate description concerning the definition of operational requirements?

- a) In system development, the framework and resources necessary for development are defined.
- b) Based on a system strategy, the overall concept of the system is defined.
- c) The operations and processing of the software that makes up the required system are defined.
- d) In consideration of users' needs, the procedures for the operations to be computerized, as well as the responsibilities, authorities, and other matters in the related organizations, are defined.

**Q27.** Which of the following is a task to be completed in the requirements definition process?

- a) Preparing and approving computerization plan
- b) Implementing detailed system design
- c) Forecasting investment effect and computerization costs
- d) Organizing system users' needs

**Q28.** Which of the following is an appropriate explanation of ASP?

- a) Business operator that provides communication lines for connecting to the Internet, or form of this service
- b) Service on the Internet for creating a closed community that is accessible to users who are members of the community
- c) Business operator that provides users with application software on a server via the Internet, or form of this service
- d) Concept of constructing an information system from the viewpoint of a service employed by users, rather than from the viewpoint of a product such as hardware and software

**Q29.** A company has used an existing system for 10 years, during which time the company business has been changing. Therefore, the company plans to redevelop the entire system. When a developer analyzes system requirements and performs requirements definition, which of the following is an appropriate interrelationship between the developer and the system user departments?

- a) The developer should avoid interrelating with the system user departments so that target business operations can be analyzed objectively.
- b) The developer should review system requirements together with the system user departments.
- c) The developer should determine the system requirements, and the opinions of the system user departments should be used as reference information.
- d) The developer should determine necessary functions based on the operation manuals for the existing system created by the system user departments.

**Q30.** Which of the following is an activity performed during the external design phase of system development?

- a) Designing the screens and form layouts
- b) Finalizing the performance requirements
- c) Designing the physical data
- d) Designing the programs

**Q31.** Which of the following is the most appropriate design policy for an output form?

- a) The numeric items and the character items are classified into different groups, and each group is separately placed on the top and bottom or left and right of the form.
- b) In order to ensure consistency between forms, rules regarding the form design, such as title position and layout of data items, are predetermined.
- c) All data items, including both numeric and character items, are printed with right justification.
- d) The data items are arranged so that the program can be easily understood and maintained.

**Q32.** Which of the following is an appropriate description concerning program testing?

- a) A black box test and a white box test are used to test internal structures and external specifications respectively.
- b) The number of errors remaining in a program has no relationship to the number of errors already found.
- c) The objective of the test is to prove completeness of a program, so a test plan should be created on the assumption that all errors can be detected.
- d) When a program is tested, the program must be checked not only for correct behavior in normal cases, but also for intended behavior in the event of input errors.

**Q33.** A certain function in an existing system was modified, and the system was brought back into full operation after testing. However, an error occurred during the execution of functions that had been running successfully until then. Which of the following tests can be considered as having been insufficient?

- a) A test to check that the function to restore database values in the event of a system failure is normally executed
- b) A test to check that operations are not affected even if a quantitative load is applied to the system
- c) A test to check that system modifications do not adversely affect other parts of the system which were operating normally
- d) A test in which the end user operates and checks the system before bringing it back into full operation

**Q34.** Which of the following is the appropriate item to be checked when the ordered software is delivered?

- a) The details of the cost estimation submitted by the supplier are reasonable.
- b) The activity report indicates that there is no delay in making progress on activities.
- c) The functions described in the specifications are implemented.
- d) A quality management plan is provided.

**Q35.** Which of the following is an appropriate approach to performing maintenance work for hardware?

- a) Maintenance work should be performed only at the occurrence of a malfunction.
- b) Maintenance work should be performed on a planned basis even when there is no malfunction.
- c) Maintenance work should be suspended until the next periodical inspection even when a sensuous change such as “operation noise louder than usual” is detected.
- d) Maintenance work is required only for printers and storage devices that involve mechanical operations.

**Q36.** Which of the following is the term that is used to describe the process of modifying some of the functions of a software package, based on user environments and requirements?

- |                |                  |
|----------------|------------------|
| a) Add-on      | b) Customization |
| c) Refactoring | d) Localization  |

**Q37.** Which of the following is the most appropriate description concerning the role of the user department in large scale system development?

- a) The manager of the user department makes efforts to convince the development department to accept implementing the functions requested by the user department regardless of the investment effects on the installed system.
- b) The user department is the party which uses the system built by the development department, so the user department leaves all decisions regarding system development to the discretion of the development department.
- c) The user department checks the deliverables from the perspective of business operations but leaves the details of program design to the discretion of the development department.
- d) The user department needs to be actively involved in the system development project and to provide various suggestions, so staff with a good deal of computer knowledge should be preferentially involved even if they do not have sufficient knowledge of the business operations.

**Q38.** The table below shows the planned workload requirement and the current progress rate for each design specifications prepared during the design phase of a system. If each of the specifications should be completed as planned, which of the following is the approximate current progress rate (%) for the entire process? Here, the progress rate for the entire process reaches 100% when all three specifications are completed.

	Planned workload requirement (person-hours)	Current progress rate (%)
External design specifications	500	100
Internal design specifications	700	50
Program design specifications	900	30

- a) 40                      b) 47                      c) 53                      d) 60

**Q39.** A project charter is developed at project launch in order to comprehensively manage and arrange project activities. Which of the following is an appropriate content to be included in the project charter?

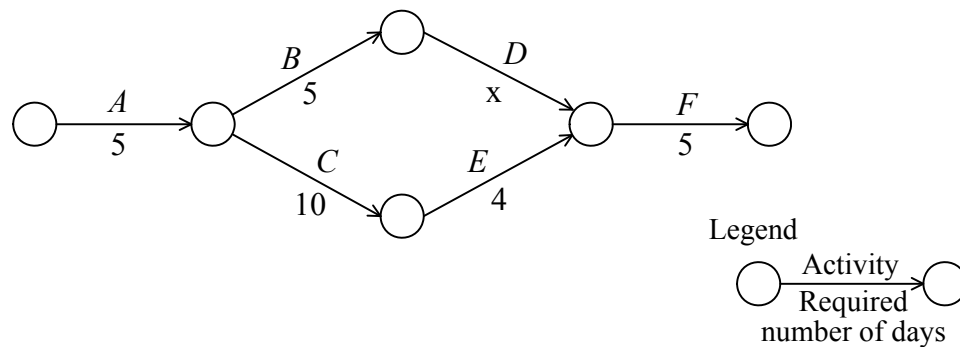
- a) Schedule                      b) Organizational framework  
c) Quality management plan                      d) Project objectives

**Q40.** Which of the following is an appropriate combination of restrictions that a project manager should consider in managing a project?

- a) Scope, delivery date, and budget                      b) Scope, delivery date, and risk  
c) Scope, budget, and risk                      d) Delivery date, budget, and risk



**Q41.** In the diagram shown below, a total of 24 days are required to complete all the activities. When the number of days required for the activity *C* is reduced by three days, the total number of days required for completion of all the activities can be reduced by one day. How many days are required for the activity *D*?



- a) 6                      b) 7                      c) 8                      d) 9

**Q42.** Which of the following is an explanation of how to shorten the project schedule?

- a) Changing from a waterfall-type system development model to a spiral-type model
- b) Changing the sequence of activities that are not on the critical path, in order to strictly keep to the project schedule on the critical path
- c) Changing the activities so that those planned to be executed sequentially can be executed concurrently
- d) Adjusting the workload of members so that it stays constant as much as possible over the entire project period

**Q43.** In a certain project, each of the six staff members needs to communicate on a one-to-one basis. What is the minimum number of paths needed to communicate in such a way?

- a) 6                      b) 9                      c) 15                      d) 30

**Q44.** Which of the following is an appropriate risk management practice for system development projects?

- a) Risk management begins at the point in time when the requirements definition is completed.
- b) The scope of risk management does not include factors dependent on individuals, such as a lack of skills.
- c) Measures are taken to prevent risk occurrence and to minimize damages caused by risk occurrence.
- d) Risks can be prevented by thoroughly taking proactive measures, in which case corrective actions become unnecessary.

**Q45.** Which of the following is an appropriate description concerning application maintenance?

- a) As soon as the test is completed, the program is registered in the production library and then the report is submitted to the maintenance approver.
- b) If the content of the change is considered to be simple, the production library is directly updated.
- c) The completion of maintenance is recorded in a log even if only to prevent work being left unfinished.
- d) Maintenance work is completed when the person in charge of maintenance finishes the testing.

**Q46.** Which of the following is the main task of a service desk?

- a) Investigating and analyzing system utilization to evaluate the IT service level
- b) Investigating the cause of bugs to improve the quality of application software
- c) Conducting interviews to collect computerization needs for future system planning
- d) Responding to inquiries, such as system failures, for enhanced user convenience

**Q47.** Which of the following is the most appropriate approach to countermeasures against failures of the system that is used for mission-critical business applications?

- a) In the event of a system failure, if the failure is judged to be recoverable within a short period of time, the event should be reported to the related parties after the recovery so as to avoid possible confusion.
- b) In the event of a system failure, the most important thing is to resume business operations in a short period of time. Therefore, the system should be restarted first to resume operations, and then the cause of the failure should be investigated.
- c) Since the appropriate way of handling a system failure depends on circumstances, the workarounds should specify that judgment on the spot takes precedence over predefined procedures.
- d) System failures are considered to be unavoidable, so countermeasures, where a partial failure neither causes the entire system to stop nor prevents business operations from restarting, should be taken.

**Q48.** A part of a program was changed to add a new function to a system in operation. Which of the following is the most appropriate environment that is used for testing the new program without affecting the system in operation, in order to determine whether or not the system can be brought into full operation?

- a) Programming environment
- b) Test environment for other systems
- c) Production environment
- d) Test environment equivalent to production

**Q49.** Which of the following is the term for the amount of time that a service is actually usable during the time period agreed upon in an IT service agreement?

- |                   |                    |
|-------------------|--------------------|
| a) Responsiveness | b) Availability    |
| c) Integrity      | d) Confidentiality |

**Q50.** Which of the following is an explanation of IT service management?

- a) Providing IT-related services effectively under the operational management of a service provider in order to satisfy customer requirements
- b) Verifying the possibility of whether new IT-related products, services, or systems can be implemented as business activity
- c) Providing efficient services through utilizing IT by organizing and managing knowledge derived from the past accumulated experiences in an organization and by sharing it among employees
- d) Depicting graphically the market share and industry growth rate of IT-related services offered by the company, and based on the positioning, developing a strategy with regard to the whole concept of services

**Q51.** Which of the following is an appropriate explanation concerning proactive countermeasures against various threats that hinder stable operation of information systems?

- a) If unauthorized intrusion from the outside can be prevented completely, that is sufficient as a proactive countermeasure against unauthorized access.
- b) It is difficult to predict natural disasters, so proactive countermeasures should focus on human-caused disasters.
- c) If all data is backed up, no other proactive countermeasures are required.
- d) Necessary proactive countermeasures should be taken, in consideration of the trade-off between anticipated losses and costs of countermeasures.

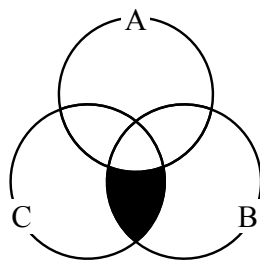
**Q52.** Which of the following is the role of a system auditor?

- a) Undertaking the operations, monitoring, and maintenance of the information systems owned by a company
- b) Proposing and implementing a computerization strategy in a company in accordance with the management principles
- c) Undertaking collectively the implementation and installation of information systems
- d) Verifying or assessing the information system of an organization from an independent and professional standpoint

**Q53.** Which of the following is an appropriate description concerning internal control?

- a) An internal auditor has supervisory responsibility for the implementation and operations of internal control performed by corporate management.
- b) The risk associated with internal control is evaluated on the degree of its impact on financial information, rather than its frequency of occurrence.
- c) Independent monitoring is one of the evaluation methods of internal control, in which the business operations department uses a checklist to evaluate whether its own procedures are performed in accordance with the rules.
- d) Internal control is a management process for corporate management to obtain rational assurance of achievement of organizational objectives.

**Q54.** Which of the following is a search condition for the black area of the Venn diagram shown below?



- a) (not A) and B and C
- b) (not A) and (B or C)
- c) (not A) or (B and C)
- d) (not A) or (B or C)

**Q55.** Which of the following is the appropriate combination of compression technology standards for still images, moving images, and audio?

	Still image	Moving image	Audio
a)	MP3	JPEG	GIF
b)	GIF	MPEG	MP3
c)	MPEG	GIF	MP3
d)	JPEG	MP3	GIF

**Q56.** Which of the following is an explanation of EUC?

- a) A development environment that offers a single interface for the integrated use of editor, compiler, debugger, and other tools necessary for programming
- b) A method by which new programs are developed under the Web environment by building a simple GUI, creating a program skeleton with a wizard, and utilizing ASP (Active Server Pages)
- c) A system development method that uses a simple GUI building tool to create the user interface screens at an early stage of the development process, and then to develop the system through an iterative review of the functions and operability
- d) An approach in which the users themselves build and operate the system required for their jobs, by using spreadsheet software, simple database software, and other means

**Q57.** There is a series of numbered boxes stacked as shown in the figure below. The operations described in the table below are performed in the sequence of operations 1 through 4. When the operation 4 is completed, which of the following shows the status of the stacked boxes?

**Table**

Operation	Description
Operation 1	Take two boxes from the top, add the numbers on the boxes, write the sum on a new box, and then put it on the top.
Operation 2	Write the number 3 on a new box, and then put it on the top.
Operation 3	Take three boxes from the top, calculate the average, write the average value on a new box, and then put it on the top.
Operation 4	Take two boxes from the top, calculate the absolute value of the difference between the numbers on the boxes, write the absolute value on a new box, and then put it on the top.

**Fig.**

4
3
2
2
1

a)

0
---

b)

2
1

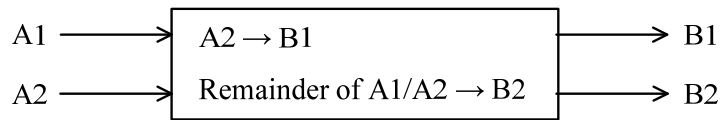
c)

4
2
1

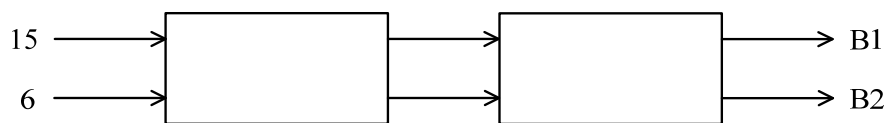
d)

1
2
2
1

**Q58.** As shown in Fig. 1, there is a box which reads two positive values A1 and A2, and writes two values B1 and B2. B1 is equal to A2, and B2 is the remainder of A1 divided by A2. As shown in Fig. 2, two boxes with the same function as the above are serially connected. When A1=15 and A2=6 are given to the left-hand box in Fig.2, what is the value of B1 for the right-hand box?



**Fig. 1**



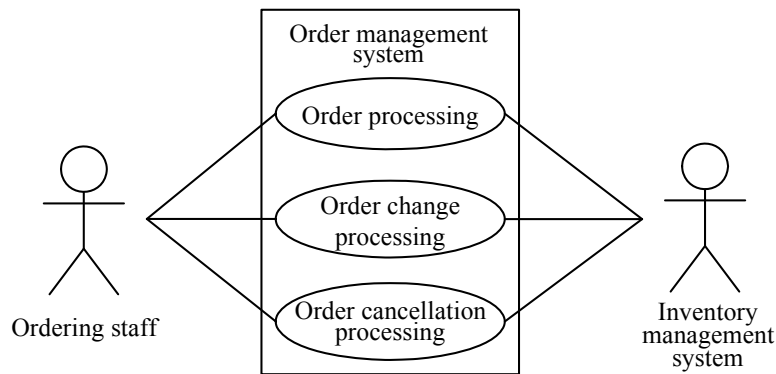
**Fig. 2**

- a) 0                      b) 3                      c) 6                      d) 15

**Q59.** Which of the following is an appropriate description concerning an applet?

- a) A document file that is transmitted from a Web site when the Web browser accesses the Web site, and saved onto the user's PC
- b) A language used for creating a Web page
- c) A program that is downloaded from a server, embedded into a client Web browser, and then executed on the browser
- d) A language for database manipulation such as data addition, modification, deletion, and search

**Q60.** Which of the following is an explanation of the use case diagram shown below?



- a) The ordering staff is the only actor, because the inventory management system is not a person.
- b) The scope of system development includes both the order management system and the inventory management system.
- c) The order management system is inside the system boundary, while the ordering staff and the inventory management system are outside the system boundary.
- d) There are four use cases, and the names of those use cases are order management system, order processing, order change processing, and order cancellation processing.

**Q61.** Which of the following is a DVD medium in which users can write data, but not rewrite data?

- a) DVD-R                      b) DVD-RAM                      c) DVD-ROM                      d) DVD-RW



**Q62.** Which of the following is an appropriate explanation of the characteristics and usage of an optical disk?

- a) It provides relatively high-speed data access and transmission, and is capable of realizing virtual memory, so it is used in a wide range of equipment from mainframes to PCs.
- b) It requires refresh operation at regular intervals in order to retain memory contents.
- c) It has three types—read-only, write-once, and rewritable—and is used for storing a large amount of data such as image information.
- d) It is not capable of random access but is used for the backup of hard disks because it provides very large storage capacity.

**Q63.** Which of the following is an interface standard that connects a number of peripherals into a tree-like structure using a hub?

- a) SATA
- b) RS-232C
- c) SCSI
- d) USB

**Q64.** Which of the following is the software that is provided for each peripheral to work as an intermediary between an OS and its peripherals so that the application software can use the peripherals connected to the PC?

- a) Installer
- b) Device driver
- c) Device manager
- d) Formatter

**Q65.** Which of the following is an appropriate characteristic of a distributed processing system in comparison with a centralized processing system?

- a) A failure of some part of the unit often causes the entire system to stop.
- b) It is difficult to expand the system to support functional extension and business growth.
- c) It is easy to ensure confidentiality and security.
- d) Operations management for efficient operations of the entire system often becomes complicated.

**Q66.** When a certain system is operated for 5,000 hours, the number of failures is 20, and the total downtime is 2,000 hours. Which of the following is the appropriate combination of the approximate values for MTBF, MTTR, and availability of this system?

	MTBF (hours)	MTTR (hours)	Availability (%)
a)	100	150	40
b)	100	150	60
c)	150	100	40
d)	150	100	60

**Q67.** According to the analysis of the turnaround time for a certain job, two-thirds of 1,350 seconds is CPU time and the remainder is I/O time. The amount of data to be processed is expected to increase in the next year. CPU time is expected to be shortened to 80% in comparison to this year because of performance improvement, and I/O time is expected to increase to 120% in comparison to this year. What is the expected turnaround time (in seconds) of the job for the next year under the above condition? Here, other conditions such as waiting time and overhead can be ignored.

- a) 1,095                      b) 1,260                      c) 1,500                      d) 1,665

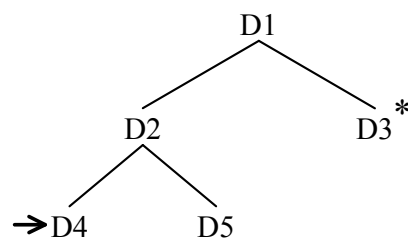
**Q68.** An increase in the response time is observed, and as a result of the cause analysis, it is found that an increase in the I/O time of the hard disk is identified as the cause. In order to improve this situation, it is planned to install a utility program that reduces seek operations and thereby enables efficient access. In this case, which of the following is an appropriate action to be taken by the utility? Here, only one hard disk is used.

- a) Storing large files in the same directory (or folder)  
b) Distributing each file across multiple areas of the hard disk  
c) Storing frequently accessed files in continuous areas of the hard disk  
d) Storing frequently accessed files in the same directory (or folder)

**Q69.** The diagram below shows the directory structure for a part of a certain file system. Which of the following is the reference from the current directory D3 (indicated with an asterisk “\*”) to the file “a” under the directory D4 (indicated with an arrow)? Here, files are specified as follows:

[Methods to specify files]

- (1) A file is referenced as “directory name\...\directory name\file name”, where the directory names on the path are listed and separated with “\” (backslash) in sequence, followed by “\” and the file name.
- (2) The current directory is represented by “.” (one period).
- (3) The directory one level above is represented by “..” (two periods).
- (4) When a reference begins with “\”, it is assumed that the root directory is omitted from the beginning of the reference.
- (5) When a reference does not start with “\”, “.”, or “..”, it is assumed that “.\”, which means that the reference is under the current directory, is omitted from the beginning of the reference.



- |                 |              |
|-----------------|--------------|
| a) ..\..\D2\D4\ | b) ..\D2\D4\ |
| c) D1\D2\D4\    | d) D2\D4\    |

**Q70.** Which of the following is an appropriate description concerning the file system that can be represented in a hierarchical tree structure, such as the Linux file system?

- a) Two or more directories with an identical name can be created if each hierarchy level is different.
- b) The current directory is always at the top level of the hierarchy.
- c) A file cannot be created by specifying a relative path.
- d) A directory containing no files cannot be created.

**Q71.** Which of the following is the most appropriate purpose of adopting a business application software package instead of self-developed application software?

- a) To enhance the development environment
- b) To reduce the development cost
- c) To acquire the knowledge of software development methods
- d) To enhance software development skills

**Q72.** A certain company holds briefing sessions six times a month to attract customers. To manage the attendees in January by using spreadsheet software, a table is created as shown in cells A1 through D8. Then, to manage the attendees in February, cells A2 through D8 are copied to cells F2 through I8, and cell I3 is corrected. Which of the following is the appropriate expression to be entered into cell I3? Here, when the table for February is copied to the table for March, cells should be filled so that the expressions in cells do not have to be changed.

	A	B	C	D	E	F	G	H	I
1	Management of attendees in January					Management of attendees in February			
2	Briefing session	Number of attendees	Month-to-date total	Year-to-date total					
3	1st		B3	B3					
4	2nd		C3+B4	D3+B4					
5	3rd		C4+B5	D4+B5					
6	4th		C5+B6	D5+B6					
7	5th		C6+B7	D6+B7					
8	6th		C7+B8	D7+B8					

- a) C8+D8
- b) C8+H3
- c) D8+G3
- d) D8+G8+H3

**Q73.** Which of the following is an appropriate description concerning open source software?

- a) The user is free to use the software for a certain trial period, but must pay to continue using it.
- b) The user is free to obtain and modify the source code released to the public.
- c) The copyright for the software is waived.
- d) Fee-based support services cannot be received.

**Q74.** When image data captured by a digital camera is stored on a removable media device, which of the following is the appropriate semiconductor memory used for the media?

- a) DRAM
- b) SDRAM
- c) SRAM
- d) Flash memory

**Q75.** A GUI screen contains a candidate list from which a user can select an item. Which of the following is an appropriate case to adopt this data entry method?

- a) Candidates consist of only a few predetermined values.
- b) Candidates consist of many different values.
- c) Input data needs to be edited.
- d) Data, like a sentence, that does not have a constant value needs to be entered.

**Q76.** Which of the following is the most appropriate explanation of virtual reality?

- a) Improving the GUI not by displaying an image gradually from top to bottom, but by first displaying a coarse mosaic-like image, and then by gradually increasing the sharpness of the image
- b) Enabling computer-simulated objects and spaces to be perceived like the real world by using computer graphics or other techniques
- c) Conducting computer simulations instead of, among others, the wind-tunnel test used for the design of cars and airplanes
- d) Combining images of separately shot scenery and people to create an image that is different from the real world

**Q77.** A program in operation detected that the sales data exceeded the upper limit. As a result of checking the input form, it was found that sales quantity exceeded the upper limit by two digits. Which of the following is the appropriate action for the operations department to take toward this data?

- a) Correcting the data at the operations department upon the department head approval
- b) Consulting the system development department
- c) Discarding such data
- d) Asking the department which issued the input form to check it

**Q78.** Which of the following is an appropriate description of DNS?

- a) It is a system used for searching a wide variety of information on the Internet.
- b) It is a system used for mapping between host names and IP addresses of devices connected to the Internet.
- c) It is a personal authentication system used for providing a safe and secure online shopping environment.
- d) It is a system used for managing personal e-mail addresses for e-mail delivery.

**Q79.** Which of the following is the mechanism installed between the Internet and the internal network in order to prevent unauthorized access via the Internet?

- a) Gateway
- b) WAN
- c) Firewall
- d) Switching hub

**Q80.** Which of the following is an appropriate description concerning a router used in an IP network?

- a) It maps domain names to IP addresses.
- b) It selects the path for transmitting packets based on IP addresses.
- c) It converts analog signals to digital signals and vice versa.
- d) It executes processes and provides data upon requests from other computers.

**Q81.** Which of the following is an appropriate description concerning the selection of communication protocols used between a PC and a mail server when e-mails are sent and received between PCs?

- a) PCs use POP for sending e-mails and SMTP for receiving them.
- b) PCs use SMTP for sending e-mails and POP for receiving them.
- c) PCs use POP for both sending and receiving e-mails.
- d) PCs use SMTP for both sending and receiving e-mails.

**Q82.** Which of the following is an appropriate explanation of MIME used on the Internet?

- a) It is a description language for hypertext on the Web.
- b) It is a hypertext transmission protocol between client and server on the Internet.
- c) It is a method of address notation for uniquely identifying a resource on the Internet.
- d) It is a standard that enables e-mail to support multimedia information such as audio and images.

**Q83.** Which of the following is an appropriate description concerning information security policy?

- a) According to ISO/IEC 27001, corporate security policy must be approved at a general shareholders' meeting.
- b) Corporate security policy must be defined for each system to be implemented.
- c) The company must externally disclose the vulnerability of the information system, which is a contributing factor of establishing the security policy.
- d) In order to achieve the target security level, it is necessary to clarify the way of thinking behind both actions to be followed and judgment.

**Q84.** In online electronic commerce, retail stores and customers are vulnerable to threats such as falsification, spoofing, and repudiation during order processing. Which of the following is a security technology applicable to prevent these three threats?

- a) Virus check
- b) Junk mail filtering
- c) Digital signature
- d) Packet filtering

**Q85.** Which of the following is an appropriate method to manage user IDs for a company's in-house system?

- a) Shared IDs are recommended rather than personal IDs in order to reduce consumption of system resources.
- b) IDs for retired employees should be kept until removal is requested by them.
- c) Registered IDs and user privileges should be regularly inspected.
- d) When users are transferred, new access privileges should be granted in addition to the previously vested access privileges.

**Q86.** Which of the following describes how to use a virus definition file as a countermeasure against computer viruses?

- a) It is a file that is included in antivirus software, and is used to repair files infected with viruses.
- b) It is a file, containing signature codes of known viruses, which is used by antivirus software to detect viruses.
- c) It is a file, containing program codes of known viruses, which is used to reactivate the viruses and to determine the damage.
- d) It is a file that is required for recovery, and is used when data files are destroyed by viruses.

**Q87.** Which of the following is the main purpose of a penetration test?

- a) To confirm the strength of the in-use encryption method
- b) To confirm that the outputs resulting from various inputs to the target program are identical with the outputs defined in the specifications
- c) To confirm the number of sessions that the firewall can process per unit time
- d) To confirm that there is neither a security hole nor a setup error on the firewall and public servers



**Q88.** A document was received via e-mail as an attachment while at work. When the document was opened by using a word processing program, it was abnormally terminated. When the received e-mail or attached document is possibly contaminated with a computer virus, which of the following is an appropriate action to be taken?

- a) Disconnecting the PC from the network, and then reinstalling the OS
- b) Disconnecting the PC from the network, and immediately reporting to the person in charge of the system management department
- c) Checking whether the problem is reproducible, if necessary, by reinstalling the word processing program
- d) Sending an e-mail to all employees, and alerting them to the virus infection

Answer Questions A through C, each of which has four questions.
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### **Question A**

Read the following description concerning sales management operations, and then answer **Q89** through **Q92**.

The sales management operations of Company *S* consist of order receipt, shipping, and billing processes. The company uses a sales management system to improve operational efficiency.

Each outline of the sales management operations and the sales management system is described below.

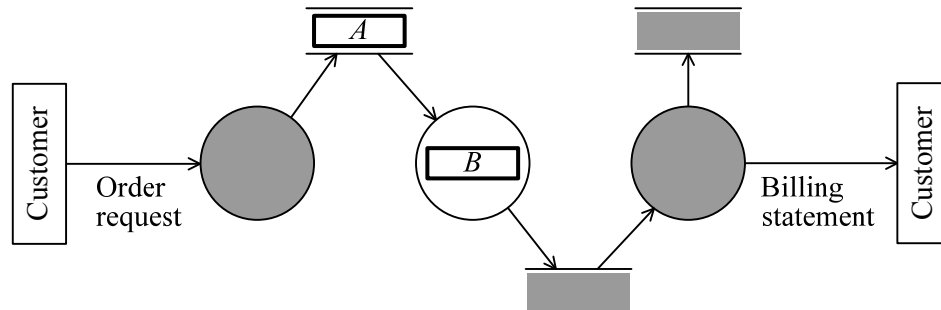
#### [Outline of sales management operations]

- (1) In the order receipt process, when a sales representative receives an order from a customer, the order data is recorded in the sales management system. There are two types of orders: standard order and priority order.
- (2) In the shipping process, inventory is reserved for orders based on the order data. Up to 70% of the inventory can be reserved for standard orders, and all of the inventory can be reserved for priority orders. The person in charge of the warehouse prepares an invoice for the reserved inventory and handles the shipping process. When the inventory is insufficient for the order, only the reserved amount (or a part of the order) is shipped first and then the shipping process of the remaining part is delayed until further inventory becomes available.
- (3) In the billing process, the cutoff date for processing invoices is on the 20th of each month. On the following day, the person in charge of the accounting prepares and sends a bill statement for each customer, based on orders already shipped.

#### [Outline of sales management system]

In the sales management system, the results of the order receipt, shipping, and billing processes are respectively recorded on the order receipt management file, the shipping management file, and the billing management file.

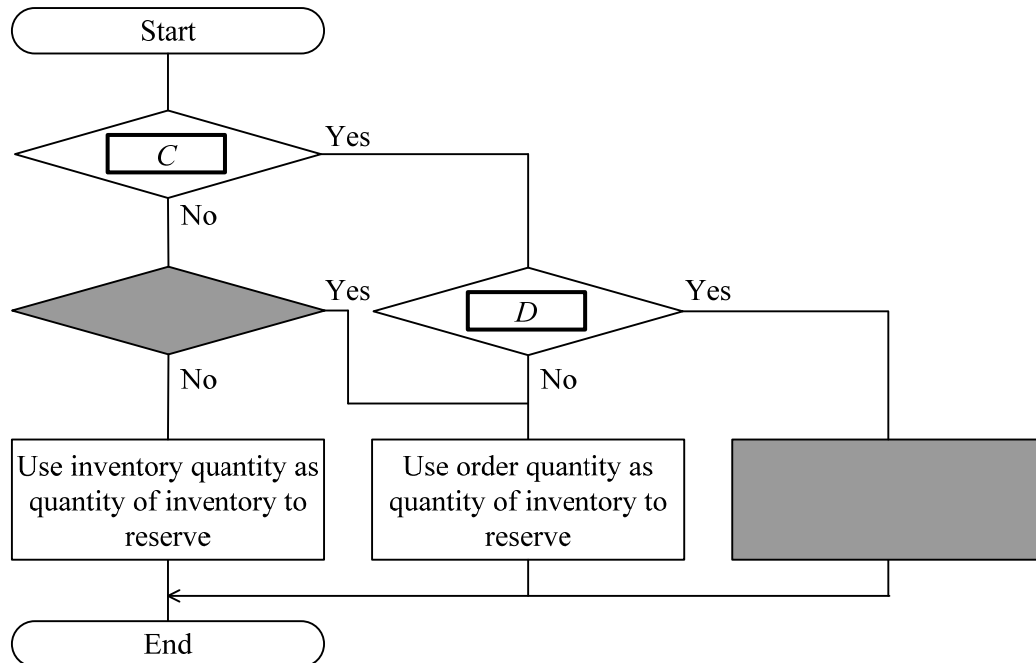
**Q89.** When the sales management operations of Company *S* are represented in DFD below, which of the following is the appropriate combination of the phrases to be inserted in the boxes *A* and *B*?



NOTE: The shaded areas are intentionally left blank.

	<i>A</i>	<i>B</i>
a)	Sales representative	Order receipt process
b)	Shipping management file	Person in charge of warehouse
c)	Order receipt management file	Shipping process
d)	Order receipt process	Order receipt management file

**Q90.** In the shipping process, the method of calculating the quantity of inventory to reserve is represented in the flowchart below. Which of the following is the appropriate combination of the phrases to be inserted in the boxes *C* and *D*?



NOTE: The shaded areas are intentionally left blank.

	<i>C</i>	<i>D</i>
a)	Standard order?	Order quantity $\leq$ 70% of inventory quantity
b)	Standard order?	Order quantity $>$ 70% of inventory quantity
c)	Priority order?	Order quantity $\leq$ 70% of inventory quantity
d)	Priority order?	Order quantity $>$ 70% of inventory quantity

- Q91.** The table below shows the order status of Product *T* on a certain day. Which of the following is the inventory quantity that can be reserved for the order at 11:00? Here, there is no new stock on this day, and the inventory quantity at the close of business on the previous day is 100.

Time of order	Order type	Order quantity
10:00	Standard order	80
10:30	Priority order	10
11:00	Standard order	40

- a) 7                      b) 10                      c) 14                      d) 20

- Q92.** The table below shows the transactions with Customer *P*. Which of the following is the billing amount to be inserted in the box *E*?

Date	Type	Amount (dollars)
October 18	Order	200
October 21	Billing	2,500
October 30	Shipping	200
November 3	Order	300
November 5	Order	400
November 6	Shipping	300
November 10	Order	350
November 15	Shipping	400
November 20	Order	500
November 21	Billing	<span style="border: 1px solid black; padding: 2px;"><i>E</i></span>
November 25	Shipping	350

- a) 700                      b) 900                      c) 1,050                      d) 1,550

**Question B**

Read the following description concerning product sales data analysis, and then answer **Q93** through **Q96**.

The sales department of Company *N* is developing a sales strategy for this fiscal year by analyzing product sales records of the previous fiscal year from the perspective of gross profit margin, inventory turnover, and sales composition. Here, inventory turnover is calculated by dividing the sales amount for a certain period of time by the average inventory quantity.

For this analysis, spreadsheet software is used to create the worksheet below, based on sales records of the previous year. Here, the range of cells A2 through H11 are sorted based on column B as a key in descending order, and then the expressions of columns I and J are entered.

	A	B	C	D	E	F	G	H	I	J
1	Product name	Amount of sales (dollars)	Cost of sales (dollars)	Gross profit (dollars)	Gross profit margin (%)	Average inventory amount (dollars)	Inventory turnover (times)	Sales composition (%)	Cumulative sales composition (%)	Rank
2	Product <i>A</i>	1,730			30.8	120	14.4	14.8		
3	Product <i>B</i>	410			23.4	50	8.2	3.5		
4	Product <i>C</i>	2,630			22.7	220	12.0	22.5		
5	Product <i>D</i>	3,360			30.7	364	9.2	28.8		
6	Product <i>E</i>	310			25.2	29	10.7	2.7		
7	Product <i>F</i>	210			21.0	30	7.0	1.8		
8	Product <i>G</i>	860			28.6	97	8.9	7.4		
9	Product <i>H</i>	610			28.2	40	15.3	5.2		
10	Product <i>I</i>	300			18.7	35	8.6	2.6		
11	Product <i>J</i>	1,260			22.1	90	14.0	10.8		
12	Total	11,680								

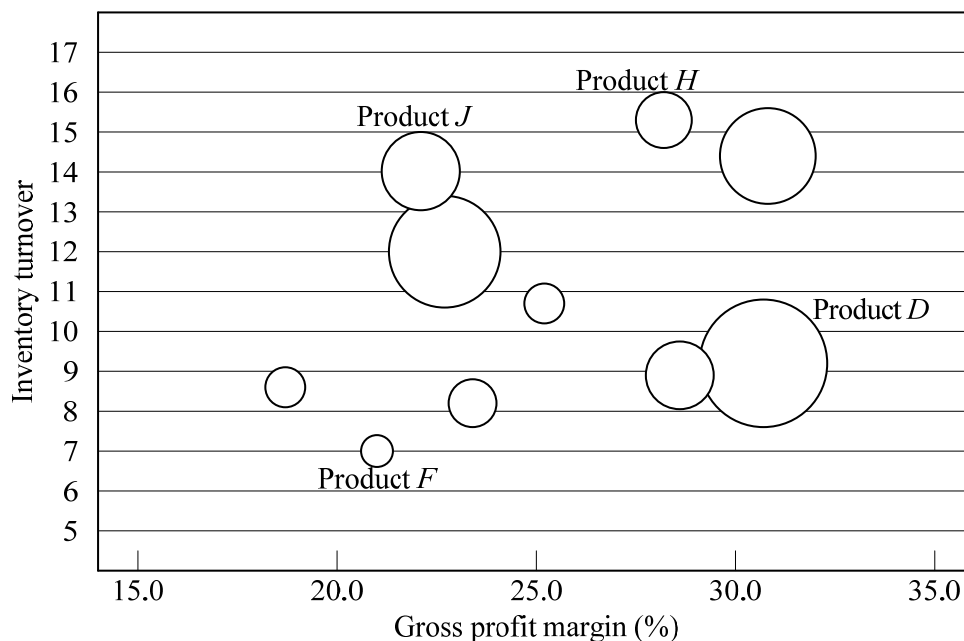
NOTE: The shaded cells are intentionally left blank.

**Fig. Worksheet of sales analysis by product**

**Q93.** Which of the following is the appropriate expression to be inserted into cell E2? Here, the expression does not perform the percentile operation and rounding, and the display of percentage is controlled by the display format of the cell.

- a)  $C2/B2$
- b)  $D2/B2$
- c)  $D12/B12*B2$
- d)  $D2/D12$

**Q94.** When sales are analyzed, a product with both high gross profit margin and high inventory turnover is regarded as an excellent product with high sales efficiency and high profitability. In order to visualize the sales efficiency indicator and sales amount, the bubble chart below can be created to show the relationship between sales amount, gross profit margin, and inventory turnover of each product. Which of the following is an appropriate description of the analysis results based on the chart?



- a) “Product D” is a low-margin high-turnover product. In order to maintain profit, careful product management is required so as not to run out of inventory.
- b) “Product F” exhibits a small sales amount and the highest sales efficiency. No special action is required for this product.
- c) “Product H” exhibits moderate sales amount, less excess inventory, and large profits. If proper actions to increase sales are taken, growth in profit can be expected.
- d) “Product J” is a luxury product that exhibits small sales quantity and high price. It plays an important role to maintain a broad customer base.

**Q95.** In Company *N*, the products are ranked based on the sales composition. The company makes purchases and prioritizes sales management according to product rank. When a rank is assigned to each product by using the “worksheet of sales analysis by product” shown in the figure above, based on the conditions shown below, which of the following is the expression to be inserted in cell J2?

[Conditions]

- (1) Sort the range of cells A2 through H11 based on column B as a key in descending order.
- (2) Enter an expression into cell I2 that copies the value of cell H2 to cell I2.
- (3) Enter the expression “I2+H3” into cell I3, and then copy it to cells I4 through I11.
- (4) The ranking criteria are shown in the table below.

Rank	Classification based on cumulative sales composition
<i>A</i>	A product within the top 70%
<i>B</i>	A product not ranked as <i>A</i> , but within the top 90%
<i>C</i>	A product neither ranked as <i>A</i> nor <i>B</i>

- a)  $\text{IF}(\text{I2} \leq 0.7, 'A', \text{IF}(\text{I2} \leq 0.9, 'B', 'C'))$
- b)  $\text{IF}(\text{I2} \leq 0.9, 'C', \text{IF}(\text{I2} \leq 0.7, 'A', 'B'))$
- c)  $\text{IF}(\text{I2} \geq 0.7, 'A', \text{IF}(\text{I2} \geq 0.9, 'B', 'C'))$
- d)  $\text{IF}(\text{I2} \geq 0.9, 'C', \text{IF}(\text{I2} \geq 0.7, 'A', 'B'))$

**Q96.** In developing a sales strategy for this fiscal year, the company is to extract products for which cumulative sales composition summed up from the top selling product downwards is less or equal to 70%, and for which inventory turnover is less than 10 times. These products are designated as high-priority target products to improve inventory turnover. How many target products are extracted?

- a) 1
- b) 2
- c) 3
- d) 4



### Question C

Read the following description concerning sales management of PC-related equipment, and then answer **Q97** through **Q100**.

Company *I* is engaged in the PC-related equipment sales business for corporate customers and manages its sales management information by using databases. The company issues billing statements (shown in Fig. 2) at the time of sales by using the database (shown in Fig. 1) and the print function of the database management system.

When the unit price of each product is changed as required, the corresponding record in the unit price table is overwritten with the new prices and the timestamp of update. Each corporate customer (hereinafter called customer) designates one contact person as a rule, or sometimes one person per department. However, one customer code is assigned to each of the customers, not to each of the contact persons.

Product table

Product_code	Product_name	Classification_code	Manufacturer_code	Supplier_code
--------------	--------------	---------------------	-------------------	---------------

Unit price table

Product_code	Unit_price	Update_timestamp
--------------	------------	------------------

Customer table

Customer_code	Customer_name
---------------	---------------

Contact person table

Customer_code	Dept_name	Location	Name	Title	Phone_number
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NOTE: "Dept\_name" means department name.

**Fig. 1 Database structure for sales management operations**

Billing statement				
[Customer_name] [Dept_name]				YYYY-MM-DD
[Title] Mr./Ms. [Name]				
[Location] [Phone_number]				
We kindly request the following payment:				<i>I</i> Corporation Neighborhood RD, Kingston, NY 12401
				Statement number: XXXXXXXXXXXX
Product code	Product name	Quantity	Unit price	Amount
	Total	Before tax	Sales tax	Total amount

**Fig. 2 Example of billing statement**

**Q97.** Company *I* performs data backup of the tables in Fig. 1 at month end. When the contact person table has the structure described below, which of the following is the minimum size of the storage in kilobytes to be reserved for table backup? Here, the backup data is not compressed, and 1 kilobyte is  $10^3$  bytes.

[Structure of contact person table]

- Number of records: 10,000
- Customer code and telephone number: 10 digits each in single-byte code
- Dept name: 20 characters in double-byte code
- Location: 40 characters in double-byte code
- Name and title: 10 characters each in double-byte code

- a) 1,000                      b) 1,500                      c) 1,800                      d) 2,000

**Q98.** Which of the following is appropriate as a primary key or a set of primary keys in order to uniquely identify records in the contact person table in Fig. 1?

- a) Customer\_code                      b) Customer\_code, Name  
c) Customer\_code, Dept\_name                      d) Name, Title

**Q99.** The four tables in Fig. 1 must be referenced in order to issue a billing statement in Fig. 2. When one copy of the billing statement is issued, which of the following shows the comparison of the number of times that each of the four kinds of records is referenced? Here, customer code, name, department name, and product code and quantity of the purchased product are known at the time of issue of the billing statement, so each table is referenced based on these values. At the time of referencing, the operation to retrieve one record by using the primary key (or the set of primary keys) is counted as one time. In addition, “product table > unit price table” means that the number of times of referencing the product table is greater than that for the unit price table.

- a) Unit price table = Product table = Contact person table = Customer table  
b) Unit price table = Product table  $\geq$  Contact person table = Customer table  
c) Unit price table  $\geq$  Product table  $\geq$  Contact person table = Customer table  
d) Unit price table  $\geq$  Product table  $\geq$  Contact person table  $\geq$  Customer table

**Q100.** The billing statement in Fig. 2 is to be recorded as a table. When the billing statement table records seven items—Slip\_number, Date, Customer\_code, Dept\_name, Product\_code, Quantity, and Unit\_price—in a normalized form, which of the following is the appropriate table structure?

a) 

Slip_number	Date	Customer_code	Dept_name	Product_code	Quantity	Unit_price
-------------	------	---------------	-----------	--------------	----------	------------

b) 

Slip_number	Date	Customer_code	Dept_name
Product_code	Quantity	Unit_price	

c) 

Slip_number	Date	Customer_code	Dept_name
Slip_number	Product_code	Quantity	Unit_price

d)

Slip_number	Date	
Customer_code	Dept_name	
Product_code	Quantity	Unit_price

## Spreadsheet Software Functions and Terminology

The following defines the basic functions and terminologies of spreadsheet software.

### 1. Worksheets

Worksheet is the work area within spreadsheet software. A worksheet has 256 columns (columns A through Z, followed by AA through AZ, then BA through BZ, up to column IV) and 10,000 rows (row 1 through row 10,000).

### 2. Cells

- (1) An intersection of a column (vertical) and a row (horizontal) on a worksheet is called a cell. The cell at Column A and Row 1 is represented as A1.
- (2) A group of cells that form a rectangular shape can be selected as a range. A range is represented, for example, as "A1:B3".
- (3) A name can be assigned to any range. A name is assigned to a range by using [ ] (square brackets), for example, "the range of cells 'A1:B3' is named [Price]."
- (4) A cell that contains no data is called a blank cell.

### 3. Cell data entry

- (1) Numeric values, character strings, and expressions can be entered to a cell.
- (2) Cells can be protected to prevent data entry. When cell protection is turned off, data entry is allowed again.
- (3) The entry of a numeric value 5 into cell A1 is represented as "Enter 5 into cell A1."
- (4) The entry of a character string ABC into cell B2 is represented as "Enter 'ABC' into cell B2."
- (5) The entry of an expression for the sum of cell A1 and cell B2 into cell C3 is represented as "Enter the expression 'A1+B2' into cell C3."

### 4. Cell display format

- (1) A numeric value in a cell is displayed right justified.
- (2) A character string in a cell is displayed left justified.
- (3) An expression in a cell is displayed left justified if the result is numeric, and right justified if the result is a character string.
- (4) The display format for each cell can be changed to left justified, centered, or right justified.

### 5. Calculating formula

- (1) Mathematical expressions can be used in calculating formula.
- (2) Arithmetic operators available for use in a calculating formula include "+" (addition), "-" (subtraction), "\*" (multiplication), "/" (division), and "^" (exponentiation).
- (3) The arithmetic operators are processed according to the standard order of mathematical precedence.

### 6. Recalculation

- (1) When a calculating formula is entered into a cell, the calculation result is displayed immediately.

- (2) When the value of a cell changes, values of other cells that refer to that cell will be automatically recalculated. This recalculation is performed only once, in the sequence A1, A2, A3, ..., B1, B2, B3, ..., and so on.

## 7. Functions

- (1) The functions defined in the table below are available for use in a calculating formula.

Function name and example	Description
SUM (A1:A5)	Calculates the sum of the values in cells A1 through A5.
AVERAGE (B2:F2)	Calculates the average of the values in cells B2 through F2.
SQUAREROOT (I6)	Calculates the positive square root of the value in cell I6 (which must be a positive value).
STANDARDDEVATION (D5:D19)	Calculates the standard deviation of the values in cells D5 through D19.
MAX (C3:E7)	Returns the largest value from the values in cells C3 through E7.
MIN ([Score])	Returns the smallest value from the values within the range called [Score].
IF (B3>A4, 'Chicago', 'Washington')	Returns the second argument if the logical expression specified in the first argument is TRUE (valid), or the third argument if FALSE (invalid). In the example on the left, if the value in cell B3 is greater than the value in cell A4, the character string 'Chicago' is returned. Otherwise, 'Washington' is returned. In logical expressions, comparison operators =, ≠, >, <, ≤, ≥ can be used. "IF" functions can be specified as the second or the third arguments to construct a nested "IF" function.
COUNT (G1:G5)	Counts the number of non-blank cells in cells G1 through G5.
COUNTIF (H5:H9, '>25')	Counts the number of cells within the range specified in the first argument that meet the condition specified in the second argument. In the example on the left, in cells H5 through H9, the number of cells that contain a value greater than 25 is returned.
INTEGER (A3)	Calculates the maximum integer that does not exceed the number in cell A3 (must be a numeric number). Example: INTEGER (3.9) = 3 INTEGER (-3.9) = -4

MODULO (C4, D4)	Calculates the remainder after the value in cell C4 (dividend) is divided by the value in cell D4 (divisor). The result will always have the same sign as the divisor. MODULO and INTEGER functions satisfy the following relationship: $\text{MODULO}(x, y) = x - y * \text{INTEGER}(x/y)$
AND (Logical expression 1, Logical expression 2, ...)	Returns TRUE if all the logical expressions specified as arguments evaluate to TRUE. Returns FALSE if any one arguments is FALSE. Any number of logical expressions can be specified as arguments.
OR (Logical expression 1, Logical expression 2, ...)	Returns FALSE if all logical expressions specified as arguments evaluate to FALSE. Returns TRUE if any one of the logical expressions is TRUE. Any number of logical expressions can be specified as arguments.
NOT (Logical expression)	Returns TRUE if the logical expression specified as the argument evaluates to FALSE, and returns FALSE if the argument evaluates to TRUE.
<b>Note:</b> SUM, AVERAGE, STANDARDDEVIATION, MAX, and MIN functions ignore cells that are within the specified range but do not contain a numeric value.	

- (2) An argument of a function can be specified using a calculation formula that uses cells, a range, a range name, or a logical expression.

## 8. Copying of cells

- (1) A numeric value, character string, or expression entered into a cell can be copied into other cells.
- (2) If an expression referring to another cell is copied, the copied expression will be changed automatically based on relative reference. For example, when the function SUM (A1:A5) in cell A6 is copied to cell B7, cell B7 will contain the expression SUM (B2:B6).

## 9. Absolute references

- (1) A reference that is not changed even when an expression is copied into another cell is called absolute reference, and is represented using the \$ (dollar) symbol, as in \$A\$1. For example, when an expression \$A\$1+5 in cell B1 is copied into cell C4, the expression in cell C4 will remain as \$A\$1+5.
- (2) A mixed reference is also possible, where either the column or the row is an absolute reference, as in \$A1 and A\$1. For example, when the expression \$C1-3 in cell D2 is copied into cell E3, cell E3 contains the expression \$C2-3. Likewise, when the expression F\$2-3 in cell G3 is copied into cell H4, cell H4 contains the expression G\$2-3.

## 10. Macros

- (1) Macros can be stored within a spreadsheet. Macros are represented as Macro *P*, Macro *Q*, and so on.
- (2) Some examples of instructions concerning macros are as follows: “Run Macro *P* to save the spreadsheet,” “Register the procedure for sorting cells A1 through A10 in ascending order as

Macro *Q*,” “Macro *R*: enter numeric values,” and “Extract records for which the data in Column C is less than the specified value.”

#### 11. Others

The spreadsheet software shall be equipped with the same functions as most commercially-available spreadsheet software, including the grid line and graph/chart functions in addition to “Save”, “Read”, and “Print”.