April 2010

Fundamental IT Engineer Examination (Morning)

Questions must be answered in accordance with the following:

Question Nos.	Q1 - Q80
Question Selection	All questions are compulsory
Examination Time	9:30 - 12:00 (150 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 spring Fundamental IT Engineer Examination conducted?

   a) March   b) April   c) May   d) June

   Since the correct answer is "b)" (April), mark your answer sheet as follows:

   [Sample Answer]

Q1	Ⓐ	●	Ⓒ	Ⓓ

   Do not open the exam booklet until instructed to do so.

   Inquiries about the exam questions will not be answered.

Symbols commonly used in questions

Unless otherwise noted in each question, the logic gate symbols are applied as shown in the table below.

Graphic symbol	Explanation
	AND gate
	NAND gate
	OR gate
	NOR gate
	Exclusive OR (XOR) gate
	Exclusive NOR gate
	Buffer
	NOT gate
	Tri-state buffer

Note: The small circle or "bubble" on either the input or output terminal shows inversion or negation of the logic state.

Q1. When the equation "$100_n - 34_n = 44_n$" holds, which of the following represents 26_n? Here, each number is written in radix notation; that is, each subscript "n" indicates the radix. In addition, when there is no subscript, the radix 10 is implied.

   a) 18   b) 20   c) 22   d) 38

Q2. In the truth table shown below, which of the following is the correct combination of output values x_1, x_2, and x_3? Here, "·" stands for the logical product, "+" for the logical sum, "$\oplus$" for the exclusive OR, and "$\overline{X}$" for the logical negation of "X".

Input				Output
A	B	C	D	$(\overline{A} \cdot B) + (C \oplus \overline{D})$
0	1	0	1	x_1
1	1	1	0	x_2
1	1	0	0	x_3

	x_1	x_2	x_3
a)	0	0	1
b)	1	0	0
c)	1	0	1
d)	1	1	0

Q3. Which of the following expressions can be used to calculate the quarter number (for example, "1" for January through March) for the n-th month of the year? Here, "n" ranges from "1" for January to "12" for December, and each fractional part of the resulting values is truncated.

   a) $\dfrac{n-1}{3}$ b) $\dfrac{n-1}{3}+1$

   c) $\dfrac{n}{3}$ d) $\dfrac{n}{3}+1$

Q4. When the resulting value of the expression "$13 \times 16^3 + 11 \times 16^2 + 9 \times 16 + 3$" is represented in binary, how many "1" bits are included in the binary value?

a) 6   b) 10   c) 13   d) 16

Q5. When the simultaneous equations shown below hold for the Boolean variables w, x, y, and z, which of the following is the correct solution? Here, "+" stands for the logical sum operation, and "·" for the logical product operation.

$x \cdot y = 0$

$x \cdot z + w = 1$

$x \cdot y + w = 0$

	w	x	y	z
a)	0	0	1	0
b)	0	1	0	0
c)	0	1	0	1
d)	1	1	0	1

Q6. Tic-tac-toe, also known as noughts and crosses, is a popular game for two players, O and X, who take turns marking the spaces in a 3×3 grid.   The player who succeeds in placing three respective marks in a horizontal, vertical, or diagonal row wins the game. For example, the player O wins on the tic-tac-toe board shown below.

O	X	X
X	O	O
X	O	O

How many possible combinations of moves are there to fill all of the nine spaces, regardless of wins and losses?

a) 2^9 b) $2^9 - 1$ c) 9!   d) $9! - 1$

Q7. When three cards are randomly selected at a time from a standard deck of 52 playing cards, what is the probability that all of these three cards are in the same suit (heart, diamond, spade, or club)?

a) $\dfrac{11}{850}$ b) $\dfrac{11}{425}$ c) $\dfrac{22}{425}$ d) $\dfrac{44}{425}$

Q8. When a linked list is used for queue implementation, which of the following structures provides the most efficient and effective way to perform both "insert" and "delete" operations?　Here, the number of queue elements is variable, and the arrows shown in the figures represent link pointers.

a)

Head pointer

b)

Head pointer

c)

Head pointer

Tail pointer

d)

Head pointer

Tail pointer
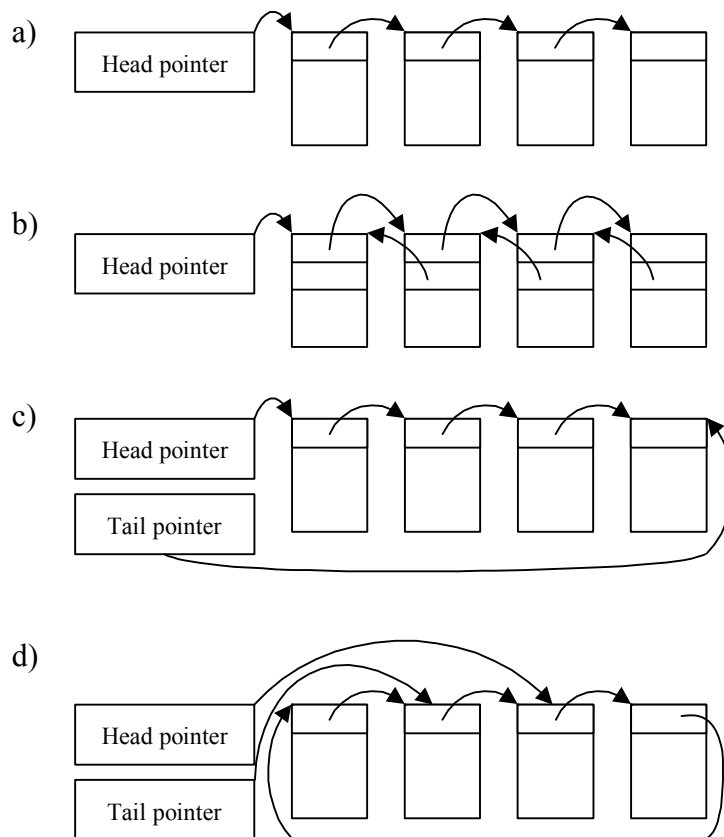
Q9. Which of the following is an appropriate description concerning a binary search tree whose node values are 17, 6, 19, 3, 22, and 32?

a) Any binary tree containing these values has a maximum depth of three (3).
b) No matter which value is placed at the root node, "3" cannot have a left child.
c) No matter which value is placed at the root node, "3" is always at the deepest level.
d) The root node value cannot be "32".

Q10. In a binary tree,
- any node that has two null children is called a leaf node, and
- the other nodes except leaf nodes have one or two non-null children.

When the number of nodes including leaf nodes is n, how many null children are included in the binary tree?

a) $2n$ b) n c) $n-1$ d) $n+1$

Q11. Which of the following data structures can be referred to as a "last-in first-out" operation?
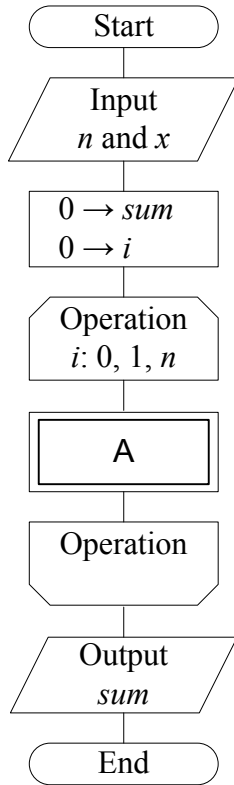
a) Binary tree   b) List   c) Queue   d) Stack

Q12. When the binary search algorithm is applied to the list of data sorted in ascending order as shown below, how many comparisons are needed to find the fact that "104" is not in the list?

5 7 20 33 44 46 48 99 101 102 105

a) 3   b) 4   c) 5   d) 6

Q13. When the expression $1 - \dfrac{1}{x} + \dfrac{1}{x^2} - \dfrac{1}{x^3} + \dfrac{1}{x^4} - \cdots \dfrac{1}{x^n}$ is calculated, which of the following should be inserted in the process box $\boxed{\quad A \quad}$ in the flowchart shown below?

```
            ( Start )
               |
         /  Input   /
         / n and x /
               |
         | 0 → sum |
         | 0 → i   |
               |
         / Operation \          At the start of the loop, repetition
         \ i: 0, 1, n /          conditions indicate "variable name:
               |                 initial vale, increment, final value."
         |  A  |
               |
         / Operation \
         \          /
               |
         /  Output /
         /  sum   /
               |
            ( End )
```

a) $sum + ((-1)^i \times x^i) \rightarrow sum$ b) $sum + ((-1)^i \times x^{-i}) \rightarrow sum$

c) $sum + ((-1)^{i+1} \times x^i) \rightarrow sum$ d) $sum + ((-1)^{i+1} \times x^{-i}) \rightarrow sum$

Q14. Which of the following stands for the processor architecture in which a single stream of instructions can operate on multiple pieces of data in parallel?

a) MIMD   b) MISD   c) SIMD   d) SISD

Q15. Which of the following is classified as an internal interrupt?

    a) Interrupt by divide-by-zero
    b) Interrupt by I/O completion
    c) Interrupt by power failures such as a momentary blackout of commercial power
    d) Interrupt by the occurrence of a memory parity error

Q16. When a memory chip has 8 data lines and 9 address lines, what is the maximum number of bytes that can be stored in the chip? Here, chip select signals are implemented independent of those address lines, and no parity bit is considered.

    a) 128   b) 256   c) 512   d) 1024

Q17. Which of the following is an optical disc that uses organic dye for the recording layer of the storage media and makes the traces of burning by laser light called pits to record the data?

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

Q18. Which of the following is an appropriate explanation of memory-mapped I/O?

    a) It is a technology for assigning the registers of I/O devices to the specifically dedicated I/O address space in main memory.
    b) It is a technology in which the whole processing time is decreased by partially overlapping the execution stage of multiple instructions and simultaneously performing them.
    c) It is a technology where a dedicated control circuit enables an I/O device to transfer information directly to or from memory.
    d) It is a transmission technology in which the CPU passes data between hard disk drives and main memory.

Q19. Which of the following is the most appropriate explanation of grid computing?

  a) By connecting multiple computers via a network, a high-performance system can be configured.
 b) It can be used by users wherever they are without being aware of the existence of a computer.
  c) Multiple computers are interconnected as a single system.　When a failure occurs in some computers in the system, the other computers take over the processing of the failed computers.
  d) Required calculation resources including processing capability and storage capacity in a computer can be purchased only when required.

Q20. As shown in the figure, this configuration consists of two systems.　One performs on-line processing as an active system, and the other prepares for failure of the active system as a standby system.　The standby system usually performs batch processing. What is this system configuration called?
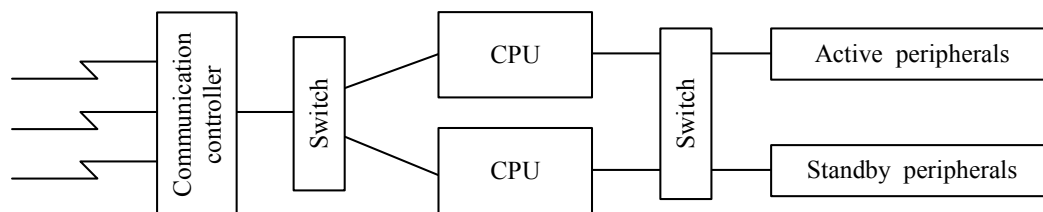
  a) Dual system
  c) Parallel processor system

  b) Duplex system
  d) Simplex system

Q21. As shown in the figure, one server, three clients, and two printers are connected to the LAN. This system transfers the data on the server to a printer based on instructions from a client. When the availability of each device is as shown in the table, which of the following is the formula indicating the availability of this system? Here, the operation is considered normal if at least one of the three clients and one of the two printers are operating.
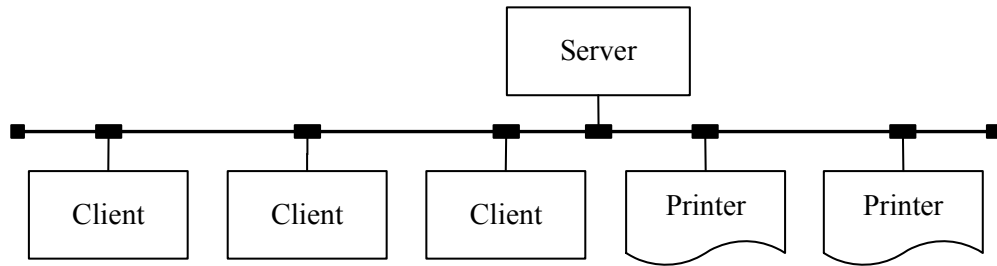
Device	Availability
Server	a
Client	b
Printer	c
LAN	1

a) ab^3c^2

b) $a(1-b^3)(1-c^2)$

c) $a(1-b)^3(1-c)^2$

d) $a(1-(1-b)^3)(1-(1-c)^2)$

Q22. The system operations model is shown in the figure.   Which of the following is the appropriate combination of the expressions indicating MTBF and MTTR in this system? Here, "t_i" represents the system operation time, and "r_i" represents the system repair time ($i = 1, 2, ..., n$).
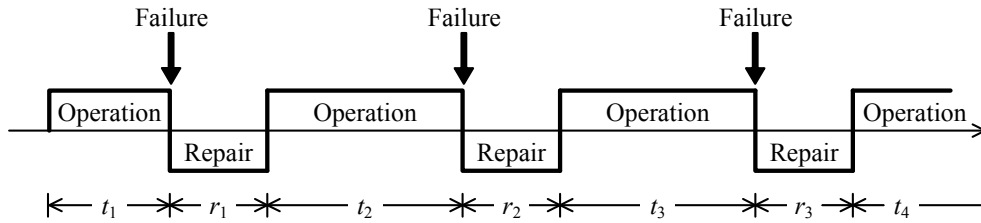
	MTBF	MTTR
a)	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} r_i$	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} t_i$
b)	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} t_i$	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} r_i$
c)	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} t_i$	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} (t_i + r_i)$
d)	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} (t_i + r_i)$	$\dfrac{1}{n}\displaystyle\sum_{i=1}^{n} r_i$

Q23. A certain computer system runs in a multi-programming environment using a non-preemptive "shortest job first" algorithm.   In this system, four processes *A*, *B*, *C*, and *D* arrive sequentially in the process queue every 1 millisecond.   The table shown below includes estimated execution time for each process; for example, process *A* uses CPU, I/O, and then CPU sequentially for 4, 5, and 4 milliseconds respectively.   Which of the following is the third completed process?   Here, the multi-processing overhead of OS can be ignored, and both CPU and I/O operations can be executed concurrently.

Unit: millisecond

Process name	Execution time		
	CPU	I/O	CPU
A	4	5	4
B	3	4	2
C	2	4	3
D	4	3	2

a) *A*   b) *B*   c) *C*   d) *D*

Q24. In a certain file server system, it takes 15 ms to process one transaction if the target data is available in the disk cache.   If the target data is stored in the hard disk in lieu of the disk cache, additional 75 ms for disk access is required to process it.   When two-thirds of the number of transactions can be processed by using the disk cache data only, how many transactions per second on average can be consecutively handled in this system?   Here, no parallel operation of disk access and data processing is performed.   Overhead, such as communication and OS, can be ignored.

a) 15   b) 18   c) 25   d) 28

Q25. There is a virtual memory system in which the FIFO or LRU page replacement algorithm can be used as a page replacement algorithm. There are 4 page frames available in real memory, and a process makes the list of page references as follows: $2 \to 3 \to 6 \to 4 \to 6 \to 3 \to 1 \to 2 \to 4 \to 6$. How many page faults occur during execution of this process using the FIFO and LRU page replacement algorithms separately? Here, all page frames are empty at the beginning of the process.

	FIFO	LRU
a)	2	4
b)	4	2
c)	6	8
d)	8	6

Q26. Which of the following appropriately describes the role of task management?

a) It controls I/O devices and operates them properly and efficiently.
b) It controls multiprogramming and uses the CPU effectively.
c) It provides access methods to various types of auxiliary storage devices in the way that does not depend on those devices, and reduces the workload in creating application programs.
d) It provides virtual memory space and uses real memory effectively.

Q27. Which of the following is the appropriate explanation of the hash method?

a) Access method that calculates the storing address of a record from its key value using a function
b) Access method that uses a conversion table of the key values and the storing addresses of records
c) Access method that uses the storing address of the next record stored in each record
d) Direct access method that uses the key value of a record as its storing address
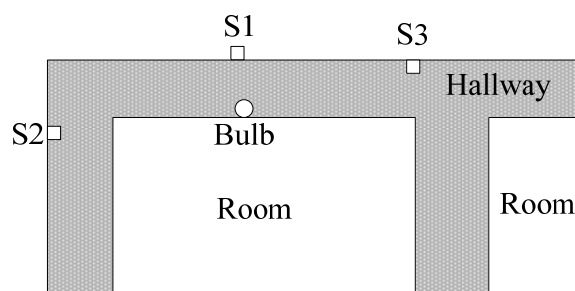
Q28. Which of the following groups of CASE tools is used only in a particular stage of the software development life cycle and is designed to work cooperatively with other CASE tools in an integrated and consolidated environment?

a) Component CASE tools   b) Integrated CASE tools

c) Lower CASE tools   d) Upper CASE tools

Q29. Which of the following is the appropriate explanation of DRAM?

a) Data can be written with dedicated equipment. It can be erased with ultraviolet irradiation.

   b) Data is written when it is manufactured. It is used as memory for storing microprograms.

c) It can represent one bit, depending on whether the capacitor is electrically charged or not. It is often used as main memory.

d) It consists of flip-flops. Although the access speed is fast, the manufacturing cost is high. It is used for cache memory.

Q30. As shown in the floor layout below, there are three sensors S1, S2, and S3 that control a light bulb in the middle of a hallway. The sensor S1 is a light sensor that generates the output signal "0" only when sunlight (or some other external light source) is detected. In case of no light, the output signal of S1 is "1". The two sensors S2 and S3 are infrared sensors that generate the output signal "0" only when either S2 or S3 detects the movement of a thermal target in its effective range. If no movement is detected, the output signal is "1". Which of the following logic circuits can be used to control a switch of the light bulb? Here, the bulb is turned on only when the output signal "Bulb" of the given logic circuit is "1". Sunlight streams in the hallway through the windows, and the light bulb in the hallway does not affect the sensor S1.

a) S1 — [NOT] ──┐
                 [AND] ── Bulb
    S2 ──┐   │
         [OR]────┘
    S3 — [NOT]

b) S1 ──────────┐
                 [AND] ── Bulb
    S2 ──┐   │
         [XNOR]──┘
    S3 ──┘

c) S1 ──────────┐
                 [OR] ── Bulb
    S2 ──┐   │
         [XNOR]──┘
    S3 ──┘

d) S1 ──────────┐
                 [NAND] ── Bulb
    S2 ──┐   │
         [NAND]──┘
    S3 ──┘

– 15 –

Q31. The half adder in the diagram below adds one-digit binary numbers x and y, and produces z (the first digit of the sum) and c (carry) as output.   Which of the following is the appropriate combination of elements A and B?
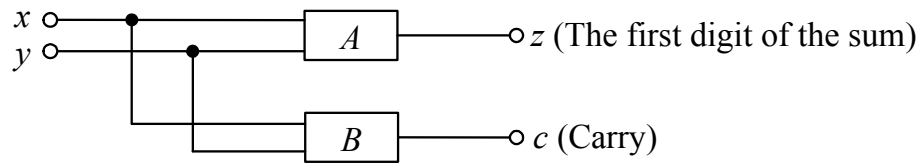
	A	B
a)	Exclusive logical sum	Logical product
b)	Logical product	Logical sum
c)	Negative logical product	Negative logical sum
d)	Negative logical sum	Exclusive logical sum

Q32. Which of the following is an appropriate usage of a radio button that is a GUI component?

a) For each of several options, it is used to specify whether or not to select the option.
b) It is used to select one option from among a list of options which are displayed when a specific item is selected.
c) It is used to select one option from among a set of mutually exclusive options.
d) When one option is selected from several options, it is used to enter an option not found into a text box.

Q33. Which of the following is a human interface design that is intended to improve the consistency of operations?

a) Designing operation buttons so that they have a common display location and shape on all screens
b) Displaying the progress status of a user's operation
c) Providing an "undo" (or cancel) function to restore the operating condition to the previous state
d) Providing shortcut keys for operations

Q34. Which of the following SQL statements corresponds to the "projection" operation of the relational algebra that can extract only the column "Continent" from the table "Country" and eliminate duplicates from the records returned?

Country

Name	Continent
Canada	North America
Malaysia	Asia
Malawi	Africa
Brazil	South America
Germany	Europe
China	Asia

a) `SELECT * FROM Country`
b) `SELECT * FROM Country GROUP BY Continent`
c) `SELECT Continent FROM Country`
d) `SELECT DISTINCT Continent FROM Country`

Q35. Among the ACID (Atomicity, Consistency, Isolation, Durability) properties of transactions, which of the following is the appropriate description concerning "atomicity"?

a) A transaction is a basic unit of processing; it must be performed in its entirety, or else it must be cancelled.
b) Every transaction must preserve the integrity constraints of the database.   There is no contradiction at all in the database.
c) Multiple simultaneous transactions cannot interfere with one another.   Intermediate results within a transaction are not visible to other transactions.
d) Once a transaction changes the database and the changes are committed, these changes must never be lost because of subsequent failures.

Q36. When a database on a client/server system is accessed, which of the following is the function that can reduce the network load by preparing the instruction groups beforehand that are frequently used on the server?

a) Group commitment function
b) Multithread function of a server process
c) Stored procedure function
d) Two-phase commitment function

Q37. Which of the following is the appropriate description concerning exclusive control in a database?

a) When a shared lock is applied to a resource by a transaction, an exclusive lock can be applied to it by another transaction.
b) When a shared lock is applied to a resource by a transaction, another shared lock can be applied to it by another transaction.
c) When an exclusive lock is applied to a resource by a transaction, a shared lock can be applied to it by another transaction.
d) When an exclusive lock is applied to a resource by a transaction, another exclusive lock can be applied to it by another transaction.

Q38. Which of the following appropriately describes a characteristic of distributed database systems in comparison to centralized database systems?

a) A failure at a single site makes the whole system unavailable to all users.
b) Acquisition and maintenance costs of the entire system are lower because of distributed nature.
c) Expansion of the system, such as adding more data, increasing database sizes, and adding more processors, is much more difficult.
d) Local queries and transactions accessing data at a single site have better performance because of the smaller local databases.

Q39. Which of the following protocols can be used to temporarily assign an IP address leased from the pool to the host that asks for an address or to repeatedly assign the same IP address to the host according to the MAC address of the host?

a) ARP   b) DHCP   c) SIP   d) SNMP

Q40. Which of the following can be used to interconnect multiple LANs on the network layer (layer 3) of the OSI basic reference model and to relay packets of data?

a) Bridge   b) Gateway   c) Repeater   d) Router

Q41. When the subnet mask 255.255.255.240 is used for a server, which of the following is a valid IP address of the server?

a) 193.144.134.31   b) 194.123.178.16

c) 195.206.108.25   d) 196.168.206.47

Q42. Which of the following is the signaling protocol that is widely used to initiate, manage, and terminate multimedia communication sessions, such as voice and video calls over the Internet?

a) RTP   b) SIP   c) SMTP   d) SNMP

Q43. Which of the following is a security feature that can allow network administrators to specify exactly which stations should have access to the wireless network?

a) IP address filtering   b) MAC address filtering

c) Packet filtering   c) URL filtering

Q44. Which of the following can be achieved by receiving mail text and its hash value from the sender and comparing the hash value with the one calculated from the mail text by the receiver?   Here, the hash value from the sender is protected.

a) Confirmation of e-mail delivery
b) Detection of presence or absence of falsification
c) Prevention of spoofing
d) Prevention of tapping

Q45. When the judgment threshold is changed in a biometric authentication system, which of the following shows the relationship between FRR (False Rejection Rate) and FAR (False Acceptance Rate)?

a) As FRR decreases, FAR decreases.
b) As FRR decreases, FAR increases.
c) As FRR increases, FAR increases.
d) FRR and FAR are independent.

Q46. As shown in the figure, an application on a client has access to the database on a server via a pair of database connection programs.   Which of the following is the appropriate measure for preventing the data transmitted and received between the database connection programs from being wiretapped on a communication line?
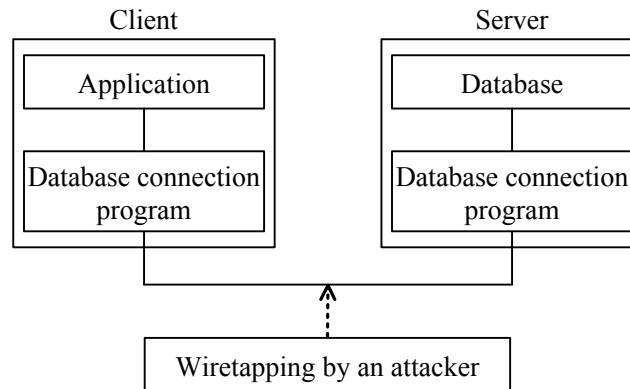
a) Changing the default port number provided by the database management system to another number, which is used for communication by the database connection programs

b) Encrypting the communication between the database connection programs on the client and server sides

c) Restricting the IP addresses of the clients that have access to the database connection program on the server side to only those required

d) Setting a password that is required to start and stop the database connection program on the server side

Q47. Which of the following sends a program incorporating fraudulent functions, such as destruction and falsification of data, for installation and execution?

a) Buffer overflow attack   b) Dictionary attack

c) DoS attack   d) Trojan horse

Q48. A Web server was invaded from the outside, and its contents were falsified.   Which of the following is the appropriate sequence of subsequent activities?

(1)	Analyze each log on the server, IDS (Intrusion Detection System), and the firewall to identify the method used to gain unauthorized access, the extent of the impact, and the path of the invasion.
(2)	Reconstruct the system, and apply the latest patches and security setting information.
(3)	Disconnect the server from the network.
(4)	Monitor for a while after connecting the server to the network.

a) (1) → (2) → (3) → (4)   b) (1) → (3) → (2) → (4)
c) (2) → (3) → (1) → (4)   d) (3) → (1) → (2) → (4)

Q49. Which of the following systems is the most suitable for a design using a state transition diagram?

a) A greenhouse control system, which keeps the optimum environment in a greenhouse based on the information of the installed sensors
b) A water bill accounting system, which calculates charges from the data of water meters
c) An inventory-taking system, which counts the inventory assets at the end of each month and at book closing
d) An operations measurement system for system resources, which measures the operational status of the system resources, and generates a report

Q50. Which of the following appropriately describes "efficiency" that is one of six software quality characteristics defined in ISO/IEC 9126-1?

a) The capability of the software product to be modified: Modifications may include corrections, improvements, or adaptation of the software to changes in environment, and in requirements and functional specifications.

b) The capability of the software product to be transferred from one environment to another

c) The capability of the software product to be understood, learned, used, and attractive to the user, when used under specified conditions

d) The capability of the software product to provide appropriate performance, relative to the amount of resources used, under stated conditions

Q51. Which of the following is an example of the relationship between the base class and the subclass in object orientation?

a) "Car" and "engine"   b) "Company" and "employee"
c) "Figure" and "triangle"   d) "Human" and "head"

Q52. Which of the following is the appropriate purpose of regression test?

a) To verify and assess the acceptability of the system performance under varying workloads

b) To verify that the system can work with the actual data and operational procedures in actual environments

c) To verify that the system operates in a stable manner for a long period of unscheduled maintenance, repair, or adjustment

d) To verify the functionality of the upgraded system against a baseline system to ensure that any existing system capabilities have not been adversely impacted

Q53. Which of the following is the appropriate description concerning standardization in programming?

a) Defining programming conventions is effective for preventing errors that programmers tend to make.
b) It is effective for clarifying the standard execution time of a program to promote the creation of efficient programs.
c) Its original purpose is not to limit an individual programming style, but to easily achieve the effect of optimization provided by a compiler.
d) Its purpose is to define rules about common items that are independent of programming languages.

Q54. The test data about the part of a program shown in the flowchart is specified by "decision condition coverage" (branch coverage). If this test data is specified by "multiple condition coverage," which of the following is the appropriate data to add? Here, the part enclosed in parentheses indicates the pair of test data elements.
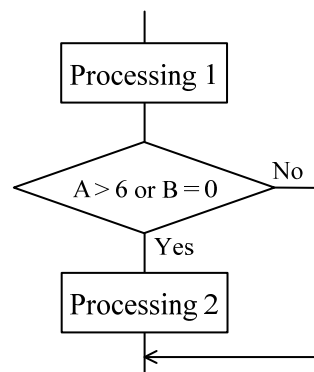
The test data used by "decision condition coverage" (branch coverage):
  (A=4, B=1), (A=5, B=0)

a) (A=3, B=0), (A=7, B=2)
b) (A=3, B=2), (A=8, B=0)
c) (A=4, B=0), (A=8, B=0)
d) (A=7, B=0), (A=8, B=2)

Q55. The number of remaining bugs in software is estimated by bug-embedding method. The number of captured bugs by testing is 48.   The number of bugs found by testing is 16 out of 22 embedded bugs.   How many bugs are estimated to be still hidden?   Here, the number of the embedded bugs found in the test is proportional to the number of the bugs found in the software.

a) 6 b) 10 c) 18 d) 22

Q56. Which of the following is the model that can be used to guide process improvement and to assess the capability level and the maturity level of a project, a division, or an entire organization?

a) CMMI b) MBNQA c) SLA d) SLCP

Q57. The table below shows the series of activities for a certain project.   The numbers in the table indicate the cost of each activity and how long (in weeks) it takes to complete each activity.   Prior to starting each activity, the previous activities shown in the table must be completed.   When the weekly cost of the project is minimized without delay of the project, what is the highest weekly cost in dollars during this project?   Here, the weekly cost remains stable and unchanged during each activity.

Activity	Time (in weeks)	Cost ($)	Previous activities
A	3	900	—
B	2	400	—
C	1	250	—
D	7	4200	A
E	6	900	B
F	2	350	C
G	4	1800	D, E
(Completed)	—	—	G

a) 600 b) 700 c) 750 d) 800

Q58. The execution plan for the system development project is prepared, and the critical path is obtained.   Which of the following is the activity that can be understood by means of the critical path?

a)   The activity that requires the greatest cost
b)   The activity that requires the most attention in securing the quality of the system
c)   The activity whose delay directly leads to the delay of the whole project
d)   The activity whose execution sequence can be changed

Q59. Which of the following appropriately describes the purpose of using WBS (Work Breakdown Structure) in software development?

a)   To divide development work into small tasks in a top-down manner, thereby facilitating work management
b)   To estimate development cost and place the full weight of cost management
c)   To find the critical path at an early stage and focus on such a path
d)   To make a work schedule in consideration of available resources

Q60. Which of the following is an appropriate characteristic of a Gantt chart used in progress control?

a)   It can clarify critical paths which are key points for progress control.
b)   It can clarify the impact of a delay of one activity on other activities.
c)   It can clearly show the order relation between activities.
d)   It can compare the planned schedule and actual results.

Q61. When the four roles, change control administrator, configuration administrator, maintenance administrator, and maintenance staff are defined in software maintenance organizations, which of the following persons should be primarily responsible for providing mechanisms for identifying, controlling, and tracking versions of software components?

a)   Change control administrator   b)   Configuration administrator
c)   Maintenance administrator   d)   Maintenance staff

Q62. The membership registration process in company *A* issues IDs in the format defined below. The table shows the transition of the number of issued IDs at the end of each fiscal year. On the assumption that this tendency continues in years to come, when are the IDs in this format expected to be exhausted? Here, the IDs withdrawn from membership are treated as missing numbers and are not be reused.

[ID format]
  XXNNN (e.g. AZ059)
  • "X" represents one of the uppercase alphabets (26 characters of A to Z).
  • "N" represents one of the numbers (10 characters of 0 to 9).

[Transition of the number of issued IDs at the end of each fiscal year]

Fiscal year	2006	2007	2008	2009
Number of issued IDs (accumulated)	317,000	383,000	447,000	512,000

a) Fiscal year 2010   b) Fiscal year 2011
c) Fiscal year 2012   d) Fiscal year 2013

Q63. Which of the following is the primary objective of conducting a system migration test?

   a) To confirm interface compatibility between existing programs and newly developed programs
   b) To confirm that a new system can provide sufficient performance, by using a copy of the current system's database
   c) To confirm that a new system satisfies all of the required functions
   d) To confirm the procedures for switching from an existing system to a new system as well as problems accompanied with this switching, from the viewpoints of security and efficiency

Q64. Among the functions provided by client management tools, which of the following is the most effective function for confirming that no software unrelated to the business operations is installed?

   a) Inventory collection
   b) Life cycle management
   c) Remote operation
   d) Software delivery

Q65. Which of the following is the purpose of periodically reorganizing a database in operation?

   a) Additions, updates, and deletions performed repeatedly on a database generate storage areas that cannot be reused, and therefore the database volume increases and the processing speed decreases. For this reason, such areas are reorganized to prevent performance degradation.
   b) It may become necessary to change a part of the database definitions, such as addition of data items, in the process of the database operations. In such a case, the database is reorganized so that it can be changed and reused.
   c) New records are created each time the records in the database are updated; thus, the database volume increases and the processing speed decreases. For this reason, multiple updated records are combined into one record to improve the processing speed.
   d) Once a record is deleted after it is registered as a key, it cannot be registered again. Since it is inconvenient, the keys are reorganized so that the deleted keys can be used again.

Q66. Which of the following is an appropriate description concerning the role of a system auditor?

a) It is to assure the full preparation and operations regarding the control of the information system or to give advice on them, from a professional standpoint independent from the audit target.

b) It is to evaluate the performance of the information system and to issue an audit working paper to the system users.

c) It is to instruct the testing staff to improve defects found during the comprehensive test for the information system.

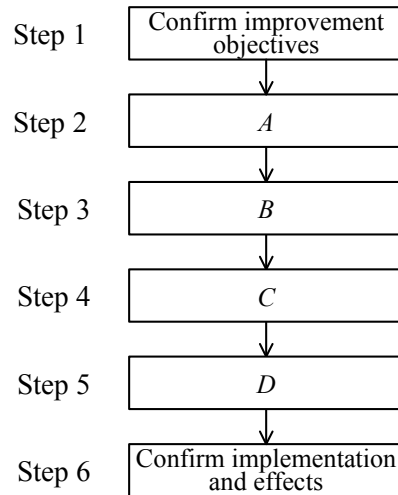d) It is to test if processes are performed according to the plan and then to approve the release.

Q67. When IT controls are classified into the two categories of preventive control and detective control, which of the following falls into the category of detective control for discovering data entry errors or unauthorized actions?

a) Designing a data entry screen so that users are unlikely to make operational errors

b) Limiting the number of data entry staff and granting them access permission

c) Matching the output list of data entry results with the data entry sheets

d) Preparing a data entry manual and providing training for data entry staff

Q68. Which of the following is an explanation of EA (Enterprise Architecture)?

a) It is a technique for system analysis and design using model diagrams such as a class diagram, which unifies and standardizes various methods for assisting object oriented design.

b) It is a technique to abstract and represent company's business processes by means of four basic elements—data flow, process, file, and data source/sink.

c) It is a technique to clearly define the relationship between data structure and data item by representing a conceptual data model using entities and their relationships.

d) It is a technique to review respective business operations and information systems from the perspective of overall optimization through analysis of four key architectures—business, data, application, and technology.

Q69. The diagram below shows the procedure for business improvement in six steps. When activities "a)" through "d)" are to be inserted into the blank boxes *A* through *D*, which of the following is the activity inserted in the blank box *C*?

Step 1 — Confirm improvement objectives

Step 2 — *A*

Step 3 — *B*

Step 4 — *C*

Step 5 — *D*

Step 6 — Confirm implementation and effects

a) Develop improvement plan   b) Evaluate improvement plan
c) Set improvement goals   d) Understand problems

Q70. A scoring model is a method for quantifying qualitative evaluation items. Based on the four-level scoring model and evaluation items shown in the table below, which of the following indicates the goal achievement level of the entire system in percentage?

Evaluation item	Weight	Description
Labor saving	5	Improved as planned
Time saving	8	No change
Information integration	12	Partially improved

Four-level score   3: Improved as planned
2: Almost as planned
1: Partially improved
0: No change

a) 27   b) 36   c) 43   d) 52

Q71. Which of the following is a document that asks to provide the information necessary for the preparation of a document that asks for proposals?

    a) IFB   b) RFI   c) RFP   d) RFQ

Q72. Which of the following is an advantage of M&A?

a) A company can accumulate knowledge and experience by functional specialization and achieve scale economy.

b) A company can clarify profit responsibility by dividing its business operations according to product or market and adopting a self-supporting accounting system.

c) A company can establish a new business in a short period of time by acquiring skills and know-how that it does not have.

d) A company can exert a high level of psychological energy through a sense of autonomy and minimize the influence of the existing business.

Q73. Which of the following describes the characteristics of niche strategy in the context of competitive strategy?

a) Acquiring new demand while maintaining its market shares by expanding the entire market size

b) Deploying a differentiation strategy aiming at improving its standing in the market and seizing top market shares

c) Reducing costs incurred during product development by observing the leader's behavior and promptly imitating it

d) Specializing in a market segment where other companies cannot enter easily to achieve higher profitability

Q74. Which of the following is **not** an appropriate usage for embedded systems?

a) A host system for managing train ticket reservations
b) A system for controlling audio/video equipment
c) A system for controlling FA equipment or medical devices
d) ATM terminal system for a bank

Q75. Which of the following is "B to C" in electronic commerce?

a) CALS b) Virtual company
c) Virtual mall d) Web-EDI

Q76. In an arrow diagram shown below, at least how many days are needed to complete all the activities *A* through *J*? Here, in the diagram, each number shown beside the arrow indicates the number of days required for the activity.
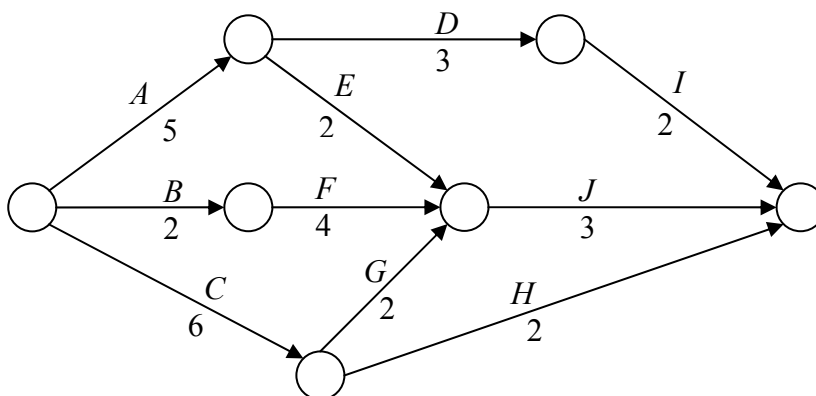
a) 8 b) 9 c) 10 d) 11

Q77. When the fixed order quantity model can be used for controlling inventory under the following conditions, what is the Economic Order Quantity (EOQ)? Here, EOQ is the optimal order quantity that theoretically minimizes the total of the cost of ordering and holding inventory. The demand is constant, and does not vary over time.

[Conditions]
Annual demand: 10,000 units
Ordering cost per order: $10
Annual holding cost per unit: $0.2

a) 250 b) 500 c) 1,000 d) 2,000

Q78. The sales staff at Company *A* wants to depart from Company *A*, visit customer companies *B*, *C*, and *D* once, respectively, and return to Company *A*.   The table shows time required to move from one company to another.   How long is the shortest time (in minutes) required for the visit?

Unit: minute

To / From	Company *A*	Company *B*	Company *C*	Company *D*
Company *A*	–	20	35	40
Company *B*	20	–	50	25
Company *C*	35	50	–	30
Company *D*	40	25	30	–

a) 95   b) 110   c) 140   d) 150

Q79. Which of the following appropriately explains "patent right" according to the WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)?

a) It is a right of an author of a literary, scientific, artistic, or musical work to exclusively control this work and to receive benefits from it.

b) It is a right to exclusively utilize a new invention suitable for industrial use, which is granted upon application to and examination by the competent authority.

c) It is a right to exclusively utilize an indication which enables a company to distinguish its own products from those of other companies.

d) It is a right to exclusively utilize an ornamental innovation that is applied to the shape, color, pattern, or layout of a new art, craft, or industrial product.

Q80. Which of the following is the appropriate description concerning the CSV data format?

a) It can contain not only character and numeric value data but also formulas and format information.   It uses tabs to separate data.

b) It can contain not only character data but also images, Java applets, etc.   A command called a tag is inserted to separate data.

c) It only records the information of character data, numeric data, and some control characters such as line feeds.   It uses spaces, colons, and semicolons to delimit data.

d) It separates character and numeric data by a comma and data records by line feeds. Character data may be enclosed in quotation marks.