October 2012

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 autumn Fundamental IT Engineer 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]

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
	Three-state buffer (or 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. Computer A uses the single precision of "IEEE Standard for Binary Floating-Point Arithmetic" (IEEE 754) as shown below.

0	1 E (8 bits) 8	9 F (23 bits) 31
S	E (8 bits)	F (23 bits)
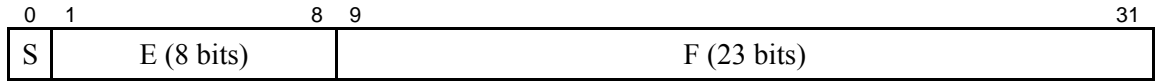
On the other hand, computer B can represent 32-bit floating-point numbers as shown below.

S	E (7 bits)	F (24 bits)
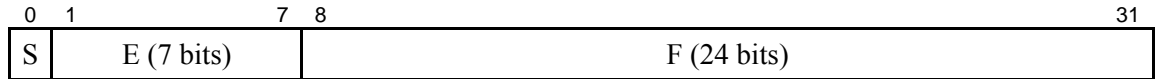
Which of the following is the appropriate description concerning the comparison of range and precision of floating-point values represented by computers A and B?   Here, "S" is a sign bit, "E" is an exponent field, and "F" is a fraction field.

a)   The range and precision of computer A are greater than those of computer B.

b)   The range and precision of computer A are smaller than those of computer B.

c)   The range of computer A is greater than that of computer B, but the precision is smaller.

d)   The range of computer A is smaller than that of computer B, but the precision is greater.

**Q2.**   When two 2-bit binary numbers "$x_1 x_0$" and "$y_1 y_0$" are added and the resulting bimary number "$z_2 z_1 z_0$" is obtained, the two binary digits z_0 and z_2 can be represented as shown below.

$$z_0 = x_0 \oplus y_0$$
$$z_2 = ((x_0 \cdot y_0) \cdot (x_1 + y_1)) + (x_1 \cdot y_1)$$

Which of the following represents the remaining bit z_1?   Here, "$+$", "$\cdot$", and "$\oplus$" denote the logical OR, logical AND, and exclusive OR operations respectively.

a) $z_1 = ((x_0 \cdot y_0) \oplus x_1) \oplus y_1$

b) $z_1 = ((x_0 + y_0) \oplus x_1) \oplus y_1$

c) $z_1 = ((x_0 \cdot y_0) \oplus x_1 \oplus y_0$

d) $z_1 = ((x_0 \cdot y_0) \oplus x_1) + y_1$

Q3. When the decimal integer "−24" is represented in 8-bit binary by using one's complement and two's complement, which of the following is the correct combination?

	One's complement	Two's complement
a)	00011001	00011010
b)	00011010	00011001
c)	11100111	11101000
d)	11101000	11100111

Q4. A k-string is defined as a string of length k. An m-substring is an ordered sequence of m consecutive elements of the original string. How many m-substrings are contained in a k-string? Here, when two or more m-substrings have the same sequence of elements, they are all counted separately as different substrings.

a) $k+m-1$ b) $k-m$ c) $k-m+1$ d) $k-m-1$

Q5. In postfix notation, also known as reverse Polish notation, which of the following is equivalent to the arithmetic expression "$-a+b\times c\div d-e$"? Here, a, b, c, d, and e are all variables.

a) $a-bc\times d\div+e-$ b) $a-b+c\times d\div e-$

c) $bc\times a-+d\div e-$ d) $-abc\times d\div+e-$

Q6. Which of the following can be accepted as <root> that is defined using the BNF notation below? Here, the symbol "ε" represents an empty string.

    <root> ::= <node>
    <node> ::= 0 <node> 0 | 1 <node> 1 | 0 | 1 | ε

a) 0011011100   b) 01110110

c) 1001001   d) 110101111

Q7. When characters *A* through *E* are encoded, their bit patterns and probabilities of occurrence are shown in the table below. What is the average number of bits per character?

Character	Bit pattern	Probability of occurrence (%)
A	0	50
B	10	30
C	110	10
D	1110	5
E	1111	5

a) 1.6   b) 1.8   c) 2.5   d) 2.8

Q8. When a two-dimensional array $A(5,5)$ is mapped onto computer memory (i.e. one-dimensional array) in row-major (row-directional) order or column-major (column-directional) order, how many elements occupy the same memory addresses in both cases? Here, the first element $A(1,1)$ is mapped onto the same starting memory address in either case.

a) 2   b) 3   c) 4   d) 5

Q9. What is the tree below called?
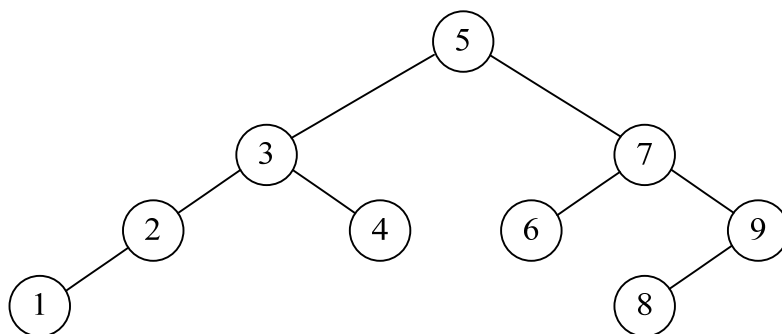
a) Balanced tree   b) Binary search tree
c) Max heap   d) Min heap

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Q10. When the series of stack operations below is performed on an empty stack, which of the following is the data that is read out by the last READ operation? Here, "PUSH x" is the operation to put data x in the stack, "POP" is used to retrieve data from the stack, and "READ" is used to read data from the top of the stack without removing the original data.

PUSH 2 → READ → PUSH 3 → PUSH 6 → POP → READ → PUSH 4
→READ → PUSH 7 → PUSH 5→ POP → POP → READ

a) 2 b) 3 c) 4 d) 6

Q11. The function $f(n)$ is recursively defined as an operation on the set of natural numbers (including 0) as shown below.

$$f(n) = \begin{cases} 0 & (n = 0) \\ f(n-1) + n & (n \geq 1) \end{cases}$$

What is the value of $f(100)$?

a) 4950 b) 5049 c) 5050 d) 5051

Q12. Which of the following is a program attribute of software that can be repeatedly called and executed without reloading after completion of the execution but cannot be called and executed by multiple programs at the same time?

a) Recursive b) Reentrant c) Relocatable d) Reusable

Q13. "LOAD GR, *B*, *AD*" is an instruction whereby an effective address is calculated by adding the content of base register *B* to the immediate address value indicated by *AD* and then the data stored in the main memory indicated by the effective address is loaded into general register GR.

When the instruction "LOAD GR, 1, 200" is executed in the figure shown below, which of the following is the data loaded into general register GR?

Address

Main memory 100	1100
101	1101
⋮	⋮
200	1200
201	1201
⋮	⋮
300	1300
301	1301
⋮	⋮
1200	2200
1201	2201
⋮	⋮
1300	2300
1301	2301

Base register 1   100

a) 1201   b) 1300   c) 2200   d) 2300

Q14. Which of the following is an event that generates an external interrupt?

a) Access to main memory that causes a page fault
b) An attempt to divide by zero
c) Completion of an I/O operation by peripheral I/O devices
d) Execution of a system call instruction

Q15. Which of the following is the addressing scheme where data in main memory is referenced as shown in the figure below?
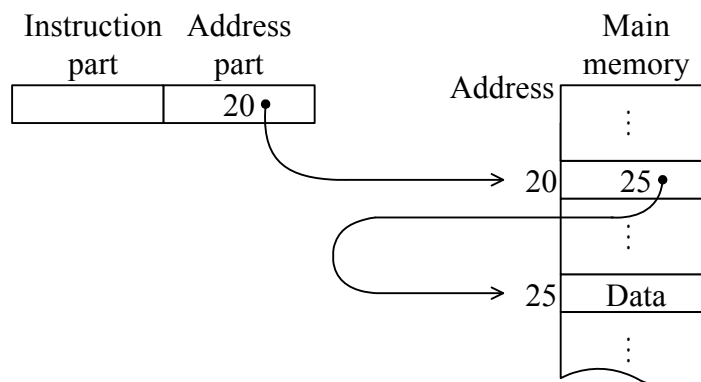
a) Direct addressing

b) Index addressing

c) Indirect addressing

d) Relative addressing

Q16. Among the descriptions of computer system architecture, which of the following is an explanation of a tightly coupled multiprocessor system?

a) Multiple processors share the same hard disk, and each processor is controlled by its own independent OS.   The throughput is increased by distributing the load on a per job basis.

b) Multiple processors share the same main memory and are controlled by a single OS. In principle, a task in the system can be executed on any of the processors, so the throughput is increased by distributing the load in small pieces.

c) One processor is normally on standby.   When there is a problem with the primary processor that is in full operation, processing continues by switching over to the standby processor.

d) Two processors connected in parallel perform the same process simultaneously, and their results are cross-checked.   If one processor fails, that processor is disconnected and processing continues on the other processor.

Q17. Which of the following is an explanation of memory interleaving?

a) It accelerates hard disk access by using semiconductor memory as a data buffer between the CPU and the hard disk drive.

b) It accelerates main memory access by dividing the main memory into multiple independent groups which are accessed concurrently.

c) It accelerates main memory access by proceeding to the next memory access request after completing the access request, data read/write process, and post-processing.

d) It accelerates memory access by copying some of the data on the main memory to a cache memory and thereby narrowing the gap in access speed between the CPU and the main memory.

Q18. Which of the following is an advantage of using mask ROM as program memory in an embedded system?

a) It can be used as an auxiliary memory when the main memory runs out during operation.

b) It enables the prevention of unauthorized rewriting of programs after shipment.

c) It enables the writing of data for the identification of an individual unit, such as a serial number, after the mass production of a product.

d) Memory components can be reused after the content is erased using ultraviolet radiation.

Q19. Which of the following is an appropriate description of a capacitive touch panel?

a) An electric field is formed on the surface of the touch panel, and the touched position is detected by capturing the change in the surface charge.

b) Electrode switches are arranged in a matrix, and the touched position is detected by sensing the pressed electrode switch.

c) The touched position is detected by capturing the change in infrared reflection when the panel is touched and an infrared beam is interrupted.

d) Voltage is applied to a resistance film, and the touched position is detected by capturing the change in the resistance value.

Q20. Which of the following is an appropriate description concerning a hot site prepared as a backup system?

    a) A reserved site is prepared in advance, and the necessary hardware and the media storing backup data and programs are delivered to the site so as to resume business operations in the event of a failure.

    b) A shared site is prepared, and the media storing backup data and programs are delivered to the site so as to restore the system and resume business operations in the event of a failure.

    c) A site is put into operation as a standby site, and its data and programs are constantly updated via the network so as to resume business operations quickly in the event of a failure.

    d) Hardware is prepared in a reserved site, and the media containing backup data and programs are periodically sent to the site for storage so as to restore the system and resume business operations by using these backup media in the event of a failure.

Q21. Among the descriptions of the reliability design of a system, which of the following is an appropriate example that uses a foolproof approach rather than a fail-safe approach?

    a) A design of a dual redundant system that makes it possible to continue system operations by disconnecting a failed unit if it is either of the duplicated units

    b) A design of an operational system that incorporates scheduled maintenance of equipment in order to prevent the occurrence of a fault

    c) A design that checks to ensure proper operation in order to prevent an operator from making a mistake because of improper use

    d) A design that reduces or minimizes the effect of a malfunction or failure that occurs in any part of the system

Q22. Which of the following is an appropriate characteristic of a thin client system?

a) A business system mainly for data usage can be easily implemented such that the necessary application is automatically started by simply inserting a USB memory stick which stores the business data.

b) It can reduce the risk of exposure to threats, such as viruses, by protecting the server in a system where the client has no external storage device.

c) It improves the scalability of a system; for example, it allows the latest peripheral devices to be connected to the client anytime by using the client that is equipped with only USB interface for peripherals.

d) It is a system in which a cell phone equipped with GPS is used as a terminal, and can be used for detecting the user's location as well as for data entry and display.

Q23. When the MTBF and MTTR values for devices A and B are as shown in the table below, what is the availability of a system where A and B are connected in series?

Unit: hour

Device	MTBF	MTTR
A	80	20
B	180	20

a) 0.72 b) 0.80 c) 0.85 d) 0.90

Q24. Which of the following is the characteristic of a dynamically relocatable program?

a) The program currently in the computer memory can be moved to other locations of the memory during execution time.

b) The program has the capability to run simultaneously and concurrently in response to requests from multiple tasks.

c) The program is called by a program and then called again by another program at any time after completion of the execution.

d) The program is divided into small fixed-length segments beforehand in order to execute them in sequence with small main memory.

Q25. In a page-based virtual memory system, which of the following is the appropriate combination of page replacement algorithms that have less page faults for two page strings R1 and R2 shown below? Here, three page frames are allocated to main memory, and no page exists in main memory in the initial state.

R1: 1, 2, 3, 2, 4, 2, 5, 2, 3, 4
R2: 1, 2, 3, 4, 2, 5, 3, 1, 2, 5

	Paging algorithm for R1	Paging algorithm for R2
a)	FIFO	FIFO
b)	FIFO	LRU
c)	LRU	FIFO
d)	LRU	LRU

Q26. A byte-code program written in Java can be executed in two methods: one method for executing it by an interpreter and the other method for executing it after compilation by a compiler. When these methods are compared under the conditions below, approximately how many byte-code lines are required for the program to be executed by the compiler method (including compile time) faster than by the interpreter method?

[Conditions]
(1) Execution time is proportional to the lines of code in the program.
(2) When a program of 100 lines of byte-code is executed by an interpreter, it takes 0.2 seconds, whereas when the same program is executed after it is compiled, it takes 0.003 seconds.
(3) 0.1 seconds per 100 lines of code are required to compile.
(4) In the compiler method, 0.15 seconds of overhead are always required for file I/O, launching the compiler, and other tasks, regardless of the lines of code in the program.
(5) The time required to download the program files and other processes can be ignored.

a) 50   b) 75   c) 125   d) 155

Q27. Which of the following is categorized as a function of a static testing tool?

   a) It analyzes source code and detects errors in the program.
   b) It calculates the test coverage from the paths that are executed by the test.
   c) It generates the data for testing the specific path in a program.
   d) It generates the drivers or stubs necessary for a module to be tested.

Q28. Which of the following is an appropriate explanation of optimization in a compiler?

   a) Generating intermediate codes for an interpreter instead of generating object codes
   b) Generating object codes that display the sub-program names called during execution time or the content of variables at a certain point in time
   c) Generating object codes that enhance run-time performance through the analysis of program codes
   d) Generating object codes that run on a computer with an architecture different from the computer used to compile programs

Q29. Which of the following is the logic gate that is equivalent to the logic circuit shown below?

   a) AND   b) NAND   c) NOR   d) OR

Q30. Which of the following is a logical expression that is equivalent to the logic circuit shown below? Here, "+" is the logical sum, "$\cdot$" is the logical product, and $\overline{X}$ is the negation of X.

a) $X = A \cdot \overline{B}$

b) $X = \overline{A + B \cdot C}$

c) $X = \overline{(A + B \cdot C)} \cdot (A \cdot \overline{B})$

d) $X = (A + B \cdot C) \cdot (A \cdot \overline{B})$

Q31. When the order data shown below is entered into the order entry system, which of the following is a check that is performed to see if the order date is on or before the business day on which the data is entered?

Order data

Slip number (characters)	Order date (characters)	Product code (characters)	Quantity (numeric value)	Customer code (characters)

a) Duplication check

b) Format check

c) Logical check

d) Sequence check

Q32. Which of the following is the image processing technique that is used for smoothing the jagged edges of curved or diagonal lines caused by poor resolution on a display screen?

a) Anti-aliasing

b) Morphing

c) Ray tracing

d) Texture mapping

Q33. A university offers many disciplines. Many students graduate in these disciplines after clearing various courses assigned to each discipline. A student can graduate in only one discipline. Some courses are common to certain disciplines. The university maintains the details of courses, disciplines, and students in a relational database. Which of the following describes an appropriate relationship between discipline, course, and student on the database?

a) The relationship between course and discipline is one-to-many.
b) The relationship between course and student is many-to-many.
c) The relationship between course and student is one-to-many.
d) The relationship between discipline and student is one-to-one.

Q34. When data in the "Product" table is as shown below, which of the following is an update process that reduces the number of rows in the "Profitable_product" view created using "View definition" below?

Product

Product_code	Item_name	Model	Sales_price	Purchase_price
S001	T	T2003	150,000	100,000
S003	S	S2003	200,000	170,000
S005	R	R2003	140,000	80,000

[View definition]
```
  CREATE VIEW Profitable_product
    AS SELECT * FROM Product
        WHERE Sales_price - Purchase_price >= 40000
```

a) Changing the Purchase_price of the product with a Product_code of S003 to 90,000
b) Changing the Purchase_price of the product with a Product_code of S005 to 90,000
c) Changing the Sales_price of the product with a Product_code of S001 to 130,000
d) Changing the Sales_price of the product with a Product_code of S005 to 130,000

Q35. Each time a student is absent from school, the date is recorded in the relational database table A as shown below. Which of the following is an appropriate SQL statement that can be used to create table B containing all of the students who have been absent from school for two consecutive days? Here, the DateDiff function calculates time periods between two dates. For example, DateDiff('2012-04-11','2012-04-10') returns "1".

A

StudentID	AbsenceDate
…	…
S01	2012-04-10
S10	2012-04-10
S11	2012-04-10
S10	2012-04-11
S12	2012-04-11
S12	2012-04-12
…	…

B

StudentID
…
S10
S12
…

a) SELECT DISTINCT A.StudentID
   FROM A
   WHERE DateDiff(A.AbsenceDate, A.AbsenceDate)=1

b) SELECT DISTINCT A.StudentID
   FROM A, A AS A1
   WHERE DateDiff(A.AbsenceDate, A1.AbsenceDate)=1

c) SELECT DISTINCT A.StudentID
   FROM A, A AS A1
   WHERE A.StudentID = A1.StudentID AND
         DateDiff(A.AbsenceDate, A1.AbsenceDate)=1

d) SELECT DISTINCT A.StudentID
   FROM A, A AS A1
   WHERE A.StudentID = A1.StudentID OR
         DateDiff(A.AbsenceDate, A1.AbsenceDate)=1

Q36. Which of the following is an appropriate purpose of using a locking mechanism in a relational database system?

a) To commit or roll back the database updates automatically
b) To move transaction log records to the database journal files
c) To support concurrency control of the simultaneous execution of transactions
d) To write the data periodically from the checkpoint file into the database

Q37. Which of the following is an appropriate explanation of data mining?

a) A technique for accessing and searching a large amount of data in parallel at very high speed
b) A technique for accumulating and storing a large amount of time-series data such as sales performance and manufacturing performance
c) A technique for analyzing a large amount of data statistically and mathematically to discover patterns or rules
d) A technique for creating separate databases for each department in accordance with the intended use

Q38. Time Division Multiplexing (TDM) is a type of digital multiplexing where two or more bit streams (or signals) are transferred apparently simultaneously as multiple channels or time slots in one physical communication line, but are physically taking turns on the channel.   The time domain is divided into several recurrent time slots of fixed length, one for each channel.   One TDM frame consists of one time slot per channel and its related overhead such as synchronization and error correction.   Approximately how long in seconds does it take to transmit 4 Kbytes of data over one channel of a 512 Kbps communication line using TDM with 8 channels?   Here, any overhead for synchronization or other purposes can be ignored.

a) 0.06   b) 0.5   c) 8   d) 64

Q39. In a TCP/IP network, when an IP packet of 2000 bytes is sent to the link that has an MTU (Maximum Transmission Unit) of 200 bytes, how many fragments are generated?   Here, each packet has a 20-byte IP header.

a) 9　　　　　　　b) 10　　　　　　　c) 11　　　　　　　d) 12

Q40. When a repeater hub (or simply referred to as a hub), a router, and an L2 switch (or simply referred to as a switch) are used as network devices in order to interconnect LANs based on the OSI basic reference model, which of the following is an appropriate combination that matches each device to its corresponding OSI layer?

	Physical layer	Data link layer	Network layer
a)	Hub	Router	Switch
b)	Hub	Switch	Router
c)	Router	Hub	Switch
d)	Switch	Router	Hub

Q41. Which of the following is the IP address range that is reserved for Class B in traditional IPv4 addresses?

a) 127.0.0.1 through 127.255.255.255
b) 128.0.0.0 through 191.255.255.255
c) 172.16.0.1 through 172.31.255.255
d) 192.168.0.1 through 192.168.255.255

Q42. Which of the following is the most appropriate description concerning the usage of NTP (Network Time Protocol)?

a) It checks the last time stamp for a shared file stored on a file server to determine if it is the latest version.
b) It compares the time that each e-mail is received on a mail server, and then forwards unread e-mails.
c) It measures the response time of business programs accurately in a client/server system.
d) It works with clients connecting to a time server in order to synchronize the time of every client that is distributed on the network.

Q43. From a viewpoint of security measures, which of the following is an appropriate purpose of confirming the destination address with the sender at the time of sending e-mail?

a) To prevent any delay or wrong relay of e-mail
b) To prevent e-mail from being sent to a wrong recipient
c) To prevent spam e-mail by using OP25B (Outbound Port 25 Blocking)
d) To prevent spam e-mail by using SPF (Sender Policy Framework)

Q44. Which of the following is the public key cryptography algorithm that is named after the initials of its three researchers and is based on the difficulty of factorizing extremely large numbers into prime factors?

a) AES   b) DES   c) DSA   d) RSA

Q45. Which of the following is the most appropriate tool that is used to emulate a real hacker by looking for security holes and other weaknesses from the outside of an organization's network?

a) Malware scanner   b) Network stumbler
c) Port scanner   d) Vulnerability scanner

Q46. Which of the following is an explanation of the pattern matching technique for antivirus software?

a) Viruses are detected by collating data with the checksum of a file.
b) Viruses are detected by comparing data with a collection of known virus signatures.
c) Viruses are detected by comparing files before and after infection to check whether there is any change.
d) Viruses are detected by monitoring the malfunction of a system that is caused by them.

Q47. Which of the following is the most appropriate mechanism that allows a Web server to temporarily store user information in a PC browser so that the Web server can check whether the PC (and probably its user) has visited the Web site before and thereby can provide certain personalized services?

a) Applet   b) Cookie   c) Plug-in   d) Servlet

Q48. Which of the following provides a standard set of graphical notations or diagrams for specifying, visualizing, designing, and documenting object-oriented systems?

a) DFD   b) DML   c) UML   d) XML

Q49. Which of the following can be represented in an E-R diagram?

a) The relationship between data and processes
b) The relationship between entities
c) The relationship between entity types and instances
d) The relationship between processes

Q50. Which of the following is a type of software test that is performed in order to ensure that changes made for software maintenance do not affect any other unintended parts of the software?

a) Integration test

b) Operational test

c) Regression test

d) System test

Q51. In a UML class diagram, which of the following is a relationship in which objects from the "whole" class control the lifetime of objects from the "part" class and which is graphically represented as a solid line with a filled diamond next to the class playing the "whole" role?

a) Aggregation

b) Composition

c) Inheritance

d) Realization

Q52. When software components written in a low-level programming language are used to perform time-critical arithmetic operations on a very large amount of data, which of the following is expected to be improved among the eight software product quality characteristics defined in the ISO/IEC 25000 series of standards?

a) Functional suitability

b) Operability

c) Performance efficiency

d) Reliability

Q53. Which of the following is a characteristic of object orientation?

a) Encapsulation can increase interdependency between objects.

b) Inheritance can localize the changes necessary to expand or modify a model.

c) Operations on an object for abstraction must be specified in advance.

d) When a class is changed, all higher-level classes must also be changed.

Q54. In software development, which of the following is the method that is used to test the functions of modules in accordance with specifications without respect to their internal structures?

a) Black box test   b) Regression test
c) Top-down test   d) White box test

Q55. The fast-tracking technique is used to shorten a project schedule.   The original plan is shown in Figure 1 below.   When activity *E* is divided into activities *E1*, *E2*, and *E3* as shown in the revised plan in Figure 2, by how many days is the overall schedule from the beginning to the end of the project shortened?
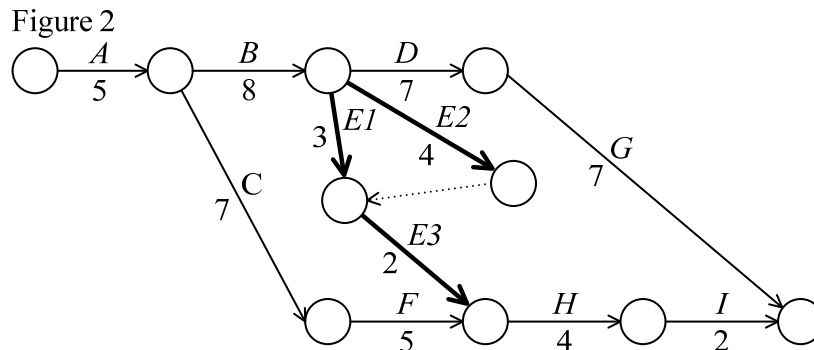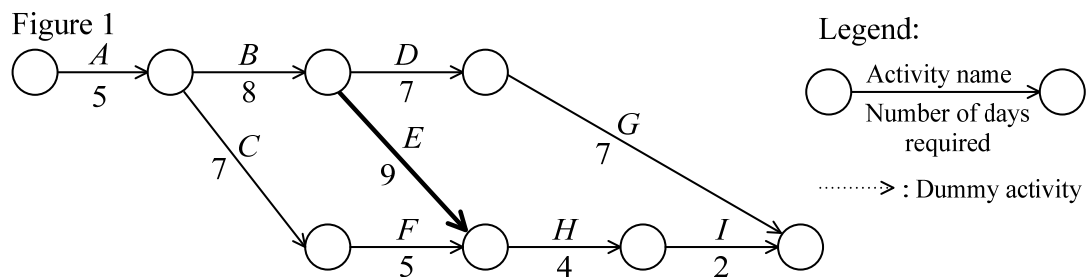
a) 1   b) 2   c) 3   d) 4

Q56. Which of the following is the most appropriate indicator used for the progress management of a program test?

a) The amount of correction made to the program
b) The amount of test data created
c) The number of test items completed
d) The number of times that the program is restarted

Q57. In a system development project, EVM (Earned Value Management) is used for managing its performance.   Which of the following is the most appropriate status that is indicated by the fact that the value "EV−AC" is positive?   Here, "AC" is the total costs actually incurred for project tasks at any point in time, and "EV" is the estimated cost of the project tasks that have been done up to that point.

a) Ahead of schedule
b) Behind schedule
c) Over budget
d) Under budget

Q58. In software development that uses the waterfall model, which of the following is an appropriate description concerning the cost of fixing errors detected during an operational test?

a) Coding errors affect the work scope for all succeeding phases, so those errors cost more to fix than the requirements definition errors.
b) External design errors affect not only the program but also manuals and other documents, so those errors cost more to fix than coding errors.
c) Internal design errors can usually be detected during the design review, so those errors cost less to fix than coding errors.
d) Test case errors require more work than only the correction and re-execution of the test cases, so those errors cost more to fix than external design errors.

Q59. Which of the following is a chart or a diagram that shows the quality of a product in order of time and is used for determining whether or not the production process is in a stable state within the control limits?

a) Cause and effect diagram
b) Control chart
c) Pareto chart
d) Scatter diagram

Q60. When a declining metered rate method is applied to the total charge for usage of a computer system, the charge per unit of usage decreases as the system usage increases. Which of the following is a graph that shows this method?

a)

b)

c)

d)
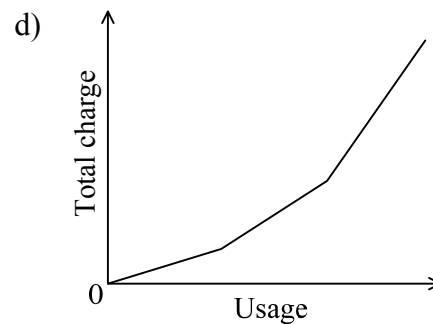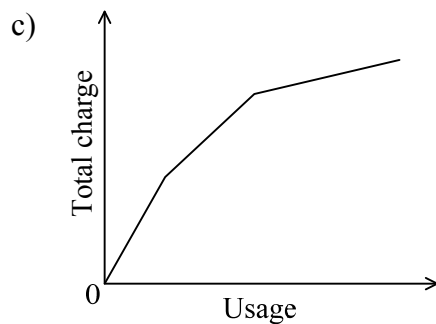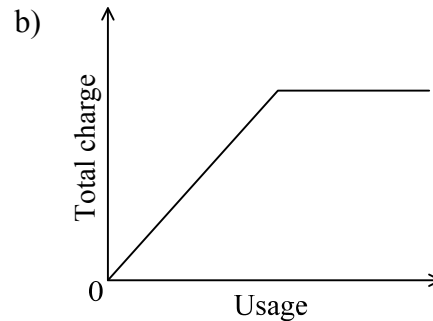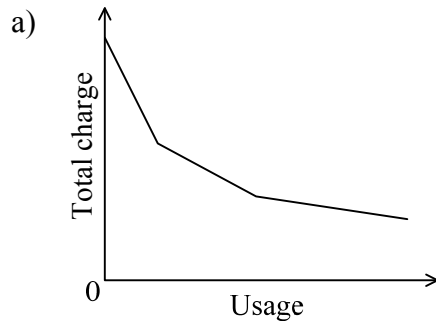
Q61. Which of the following is an appropriate description concerning application maintenance?

a) The completion of maintenance is recorded in order to prevent maintenance activities from being left unfinished.

b) The maintenance activity is completed when the test is finished by the maintenance engineer in charge.

c) The production library is directly updated when the change can be considered to be simple.

d) The program after the successful completion of the test is promptly registered in the production library, and then its completion is reported to the maintenance approver.

Q62. Among the characteristics of the structure of a service desk organization, which of the following is a characteristic of the local service desk?

a) By consolidating the service desks at a single site or a few locations, service staff members can be deployed effectively, and as a result, a large number of calls can be handled.

b) By performing centralized and integrated management of all employees including the service staff members at the dispersed locations, well-controlled services can be provided.

c) By placing the service desk close to users, intensive services are provided for users who have different languages and cultures or for VIPs by specialized service staff members.

d) By using communication technology, services can be provided like a single service desk even if the service staff members are dispersed across several regions and departments.

Q63. In the stage of system design, when an audit is performed on the control for reducing the risk that user requirements are not met, which of the following is a point to be checked?

a) Checking if programming is performed in accordance with the specified conventions and standards

b) Checking if the program specifications are created based on the system design documents

c) Checking if the test plan is created based on the system test requirements, and the manager's approval of the system operations department is obtained

d) Checking if the user department participates in the review of the system design documents

Q64. When IT control is classified into preventive control and detective control, which of the following is applicable to detective control?

a) A data entry manual is created, and the persons in charge of data entry are trained.

b) A data entry screen is designed so that operation errors are unlikely to occur.

c) Access rights are assigned only to the person in charge of data entry.

d) An output list resulting from data entry is cross-checked with the input form.

Q65. Which of the following is a deliverable of data architecture that is one of the four architectures contained in Enterprise Architecture?

a) E-R diagram
b) Information system relationship diagram
c) Software configuration diagram
d) Work flow diagram

Q66. Which of the following enables users to connect to the system of a service provider via the Internet and make online use of the necessary functions of the applications that are offered by the service provider as needed?

a) BPO (Business Process Outsourcing)
b) SaaS (Software as a Service)
c) SOA (Service Oriented Architecture)
d) VPS (Virtual Private Server)

Q67. When a computerization plan is made, which of the following is an item to be considered?

a) Clarifying the cost and investment effect of development, maintenance, and operations
b) Describing the test plan, operation manuals, and measures against failures in a specific and concrete way
c) Installing an equivalent system used by other companies in the same industry in order to avoid failures
d) Proceeding with planning on the assumption that the system is developed by a company's own staff in consideration of system operations

Q68. Which of the following is an item to be performed in the requirements definition process of system development?

a) Analyzing the business environment, such as legal restrictions and economic circumstances, and setting business goals and operational objectives

b) Clarifying the procedures and rules of new business operations together with the constraints, and obtaining agreement between stakeholders

c) Evaluating the investment effect and effectiveness of business operations actually resulting from the new system

d) Performing the test for the software and database in order to check to see if the requirements are met

Q69. Which of the following is an appropriate explanation of the benchmarking used for corporate management?

a) Focusing the management resources on unique and proprietary skills and technologies that can generate profit and that are superior to those of other companies

b) Improving the efficiency of management by effectively and comprehensively planning and managing the distribution of the management resources of the entire company

c) Reforming the quality and structure of the company by redesigning business processes from the viewpoint of the customer, and by taking full advantage of information technology

d) Understanding products, services, and operations of the company qualitatively and quantitatively in comparison with those of the strongest competitor or a leading company

Q70. Which of the following is an explanation of marketing mix?

a) A company's products are effectively sold by combining product strategy, price strategy, channel strategy, promotion strategy, and others appropriately.

b) An appropriate policy is adopted in consideration of the relationship with marketplaces and competitive products in each stage of introduction, growth, maturity, and decline.

c) Customer markets are divided into segments based on a certain standard, and the market segment in which the most competitive advantage is gained is selected.

d) The positioning of each business is clarified based on a combination of the market growth rate and the relative market share of the company, and the future policy for each business is reviewed.

Q71. Which of the following is an appropriate explanation of demographic segment that is one of the market segments?

a) A group of a population segmented based on actual consumers' knowledge, their uses of products, and their responses to certain products

b) A group of a population segmented based on social class, lifestyle, or personality characteristics

c) A group of a population segmented by factors such as age, gender, family size, income, occupation, education, religion, race, generation, and nationality

d) A group of a population segmented by factors such as nations, states, regions, counties, cities, or neighborhoods

Q72. Which of the following is an appropriate explanation of product innovation in the management of technology?

a) Developing new products or products differentiated from other companies
b) Making an operating profit through the results of technology development
c) Making progressive reforms in the business process
d) Managing strategic business that revolves around technology

Q73. Which of the following is the situation where an improvement can be expected by installing an MRP (Material Requirements Planning) system?

a) Drawing information is managed on both electronic files and hard copies, so the history of design changes cannot be accurately traced.
b) High-mix, low-volume production is adopted, so the cost of installing production equipment is increasing.
c) Information about materials and quantities necessary for production is complicated, so a miscalculation of order quantity or an interruption of production often occurs.
d) There are too many design changes, so production efficiency does not improve.

Q74. When production is planned based on the calculation formula and table shown below, what is the value for production plan C? Here, the carry-over inventory on April 1 is equal to 400 pieces of the actual inventory on March 31.

[Calculation formula]
Production plan = Sales plan + Inventory plan − Carry-over inventory

Unit: pcs

	Production plan	Sales plan	Inventory plan
April 1	A	5,000	300
April 2	B	4,500	250
April 3	C	4,800	300
April 4	D	4,600	250

a) 4,450   b) 4,550   c) 4,850   d) 4,900

Q75. Which of the following is an explanation of BCP (Business Continuity Plan)?

a) In order to achieve the corporate goal, the details and flow of business operations are visualized, and the business process is continuously improved in a regular cycle.

b) In order to achieve the corporate strategy, a strategy is reviewed from the viewpoint of finance, customers, internal business processes, and learning and growth.

c) In order to avoid risks of business interruptions or recover promptly from damages, a policy or an activity procedure is prepared in advance.

d) In order to improve business efficiency and reduce business costs, business processes are outsourced.

Q76. Which of the following is an organization that is formed for a certain limited period of time to solve a problem and is disbanded when the problem is solved?

a) Divisional organization

b) Functional organization

c) Matrix organization

d) Project organization

Q77. Which of the following is a two-layered chart that is composed of a bar chart showing control items arranged in descending order of frequency and a line chart showing the cumulative percentage of each item?

a) Control chart

b) Gantt chart

c) Pareto chart

d) Radar chart

Q78. Which of the following is a method which can be used to calculate a predicted value based on actual values of the previous time period and in which each of the actual values is equally weighted?

a) Exponential smoothing method

b) Least-squares method

c) Linear programming method

d) Moving average method

Q79. Which of the following is a financial statement that represents the assets, liabilities, and net assets of a company at a certain point in time and indicates the financial condition of the company?

a) Balance sheet

b) Cash flow statement

c) Income statement

d) Statements of shareholders' equity

Q80. When a publisher's lead editor omits a section of an author's manuscript without obtaining the consent of the author, which of the following is infringed according to the international treaty called the Berne Convention for the Protection of Literary and Artistic Works?

a) Design rights

b) Moral rights

c) Patent rights

d) Trademark rights