April, 2007

Software Design and Development 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 test answers in accordance with the instructions below. Your test will not be graded if you do not mark properly. Do not mark or 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]

   In which month is the Software Design and Development 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 Reply]

No.	a	b	c	d
Q 1	○	●	○	○

Do not open the exam booklet until instructed to do so.
Inquiries about the exam questions will not be answered.

Q1. A register represents numbers in binary**.** Select the correct method for multiplying the positive integer x, which is stored in this register, by 10. Here, shifting does not result in overflow.

a) Add the value obtained by shifting x three bits to the left and the value obtained by shifting x two bits to the left.
b) Shift x three bits to the left, add x to the value, and then further shift this result one bit to the left.
c) Shift x two bits to the left, add x to the value, and then further shift this result one bit to the left.
d) Shift x two bits to the left, add x to the value, and then further shift this result two bits to the left.

Q2. Function $f(x)$ has a parameter and a return value that are both real. Consider a procedure that consists of steps 1 through 5 shown below. After a sufficient number of cycles through this procedure, the value of y shown in step 3 no longer changes. Which of the following relational expressions holds when this occurs?

step 1 $x \leftarrow a$
step 2 $y \leftarrow f(x)$
step 3 Display value of y.
step 4 $x \leftarrow y$
step 5 Return to step 2.

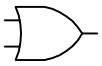
a) $f(a) = y$ b) $f(y) = 0$ c) $f(y) = a$ d) $f(y) = y$

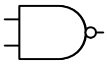
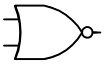
Q3. A is said to be a complementary operation of B (or B is a complementary operation of A) when the result of Boolean operation A on an arbitrary operand and the result of Boolean operation B on the same operand negate each other. Which of the following is the complementary operation of exclusive OR?

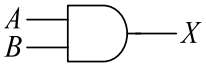
a) AND operation ()
b) EQUIVALENCE operation ()
c) NOR operation ()
d) OR operation ()

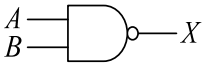
Q4. Which of the following is equivalent to the difference set $S-T$? Here, $\cup$ represents a sum set operation, $\cap$ a product set operation, and $\overline{X}$ represents a complementary set operation of X.

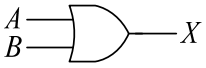
a) $S \cup (S \cap T)$ b) $S \cup \overline{T}$ c) $S \cap (S \cup T)$ d) $S \cap \overline{T}$

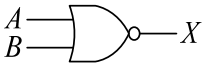
Q5. Select the logic circuit that provides the same results as those of the logic formula $X = \overline{A} \bullet \overline{B} + \overline{A} \bullet B + A \bullet \overline{B} + \overline{A} \bullet \overline{B}$. Here,  represents AND, 

represents OR,  represents NAND, and  represents NOR.

a) 

b) 

c) 

d) 

Q6. Select the conclusion that can be logically drawn from the following conditions.

[Conditions]
A student preparing for an exam always drinks either tea or coffee every morning, but never both. The student always eats a sandwich when drinking tea, and always eats toast when drinking coffee.

a) The student does not eat a sandwich when eating toast in the morning.
b) The student drinks coffee when not eating a sandwich in the morning.
c) The student drinks tea when eating a sandwich in the morning.
d) The student eats a sandwich or toast in the morning, but never both.

Q7. The table below shows the state transitions of a finite automaton with the input symbol set {0, 1} and the state set { x_1, x_2, x_3, x_4 }. Which of the following should be the "accepting state" in order to accept an arbitrary bit string with a length of 3 or more that ends in 110, when loaded in order from the left (from the upper bits).

	0	1
x_1	x_1	x_2
x_2	x_3	x_4
x_3	x_1	x_2
x_4	x_3	x_4

a) x_1 b) x_2 c) x_3 d) x_4

Q8. Which of the following correctly represents the formula $a + b \times c$ in reverse Polish notation?

a) $+ \times c\ b\ a$ b) $\times + a\ b\ c$ c) $a\ b\ c \times +$ d) $c\ b\ a + \times$

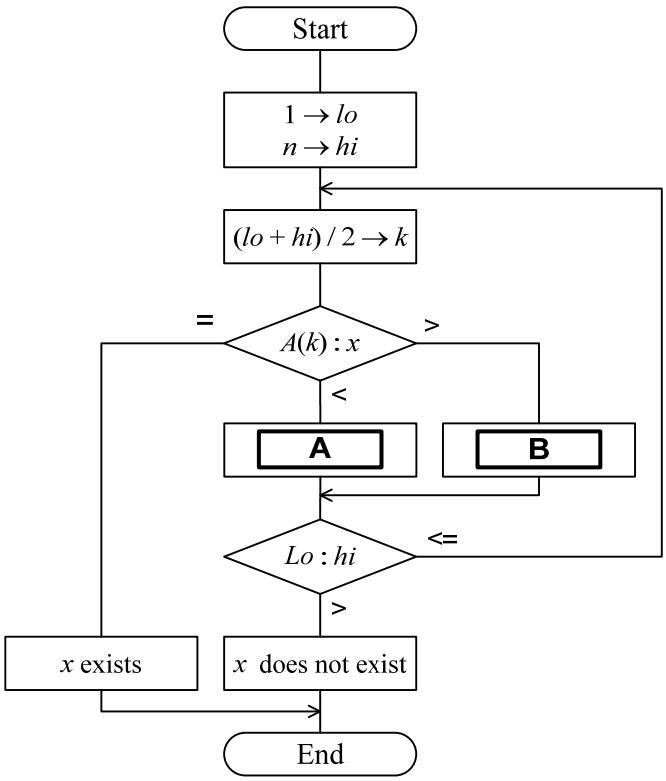
Q9. Consider a tree in which each non-leaf node has two children, and all the depths from the root to the leaves are the same. Which of the following is an appropriate statement in regard to this tree? Here, the depth represents the number of branches from the root to each leaf.

a) If the depth of the tree is n, the number of leaves is 2^{n-1}.
b) If the number of branches is n, the number of nodes is also n.
c) If the number of leaves is n, the number of nodes other than leaves is $n-1$.
d) If the number of nodes is n, the depth is $\log_2 n$.

Q10. Which of the following appropriately describes the heap sort method?

a) Adjacent elements are repeatedly compared, and the elements are swapped whenever they are not in order of size.
b) An intermediate reference value is determined and all the elements are divided into two groups: one with values larger than the reference value and the other with values smaller than that. This same process is then repeated progressively within each group.
c) An ordered tree is constructed from the unsorted portion, and the minimum value is extracted from this ordered tree and moved to the sorted portion. These operations are then repeated to gradually shrink the unsorted portion.
d) Partial strings comprised of elements extracted at fixed intervals are respectively sorted, then the intervals are further reduced and the same operation is performed again. This is repeated until the interval becomes 1.

Q11. Array A contains n number of data sorted in ascending order. The flowchart below shows the process for finding data x from array A using the binary search method. Select the correct combination of operations to be inserted in the boxes **A** and **B** in the flowchart. Here, any fractional part is truncated after division.



	A	B
a)	$k+1 \rightarrow hi$	$k-1 \rightarrow lo$
b)	$k-1 \rightarrow hi$	$k+1 \rightarrow lo$
c)	$k+1 \rightarrow lo$	$k-1 \rightarrow hi$
d)	$k-1 \rightarrow lo$	$k+1 \rightarrow hi$

Q12. Data whose keys are two integers X and Y is stored in a single dimensional array of 256 elements using the hash function h (X, Y). X runs uniformly from 1 through 256, and Y runs uniformly from 1 through 16. Select the **most inappropriate** hash function. Here, $N = 256$, and **"**A mod B**"** represents the remainder of A / B.

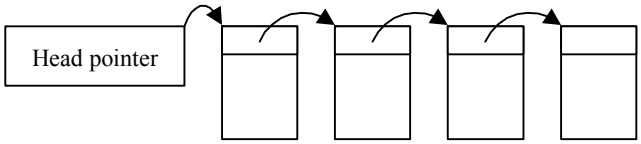
a) $X \bmod N$
b) $Y \bmod N$
c) $(X + Y) \bmod N$
d) $(X \times Y) \bmod N$

Q13. A table contains n number of differing data sorted in ascending order. The table is divided into blocks containing m number of data. The block containing the target data can be found by performing a linear search only on the last data of each block, and then the target data can be found by performing a linear search within the block that contains the target data. What is the average number of necessary searches in this case? Here, $m < n$, and the target data is assumed to always exist within the table.

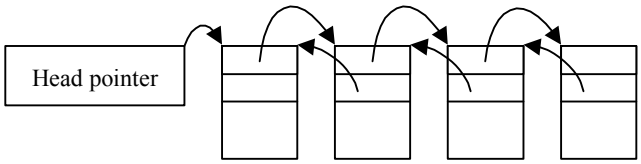
a) $\frac{n}{m}$
b) $\frac{n}{2m}$
c) $m + \frac{n}{m}$
d) $\frac{m}{2} + \frac{n}{2m}$

Q14. Which of the queue implementations requires the least effort in performing queue insertions and retrievals? Here, assume that the number of queue elements is variable and note that the arrows shown in the figure denote pointer references.

a)



b)



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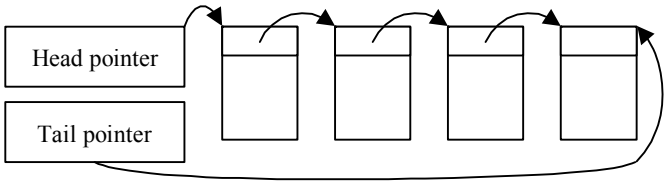
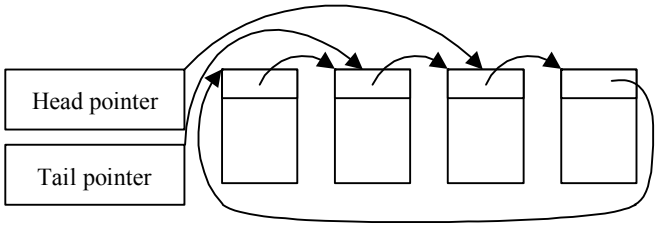
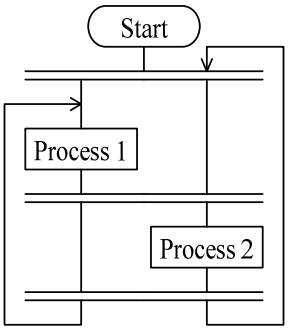


d)

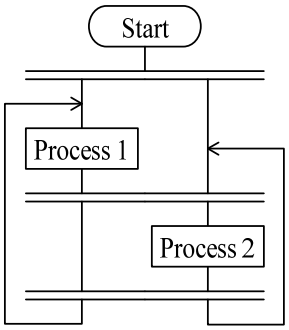


Q15. Select the flowchart in which process 1 and process 2 are executed alternately and repeatedly. Here, double lines indicate the synchronization of parallel processes.

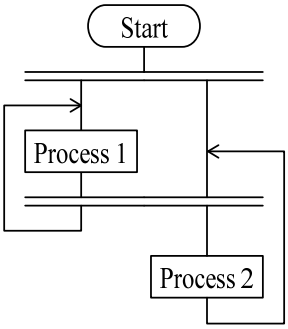
a)



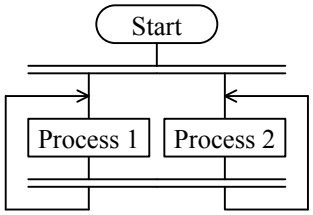
b)



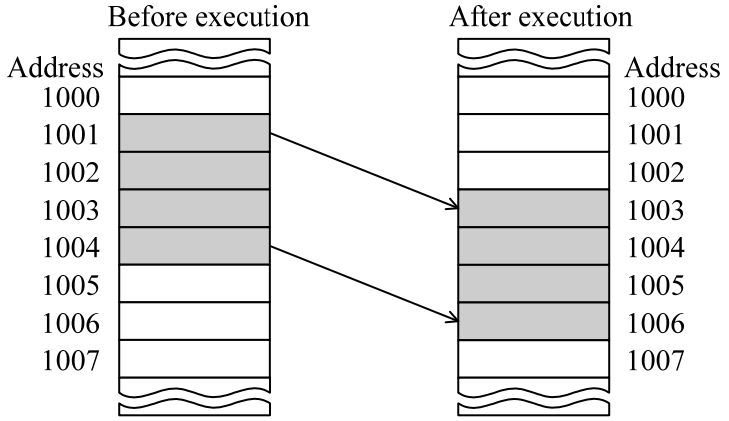
c)



d)



Q16. There is a CPU which can perform block transfers of data within the same memory by designating the starting addresses of the source data and the destination memory, the direction flag, and the number of words to be transferred, as parameters. Select the appropriate parameters when transferring the contents of addresses 1001 through 1004 to addresses 1003 through 1006 as shown in the figure below. Here, transfers are performed one word at a time from the starting address, and performed in ascending order of addresses when the direction flag is set to "0" or in descending order of addresses when set to "1."



	Starting address of source	Starting address of destination	Direction flag	Number of words to be transferred
a)	1001	1003	0	4
b)	1001	1003	1	4
c)	1004	1006	0	4
d)	1004	1006	1	4

Q17. There are two methods of performing write operations to the cache memory, the write-through method and the write-back method. Which of the following is an appropriate statement in regard to the characteristics of these methods?

a) The write-back method does not need to write the cache memory contents into the main memory, even if a cache miss occurs during a read.
b) The write-back method writes data simultaneously to both the cache memory and the main memory, so the speed is slow.
c) The write-through method writes data only to the cache memory, so high-speed writing is possible.
d) The write-through method writes data simultaneously to both the cache memory and the main memory, so the main memory contents are always up to date.

Q18. When the cache memory access time is 1/30 of the main memory access time and the hit ratio is 95%, approximately what multiple of the main memory access time is the effective access time of the main memory?

a) 0.03 b) 0.08 c) 0.5 d) 0.95

Q19. There is a method for increasing the speed of main memory by dividing the main memory into multiple access units and operating all access units in parallel, thereby, shortening the effective access time. What is it called?

a) Cache memory
b) Direct memory access
c) Memory interleaving
d) Virtual memory

Q20. Which of the following is used for memory error control and has an automatic error correction function?

a) Check digit
b) Check sum
c) Hamming code
d) Horizontal parity check

Q21. Which of the following statements appropriately describes a system bus?

a) It can be connected in a tree structure using hubs and has two data transfer modes: high speed mode and low speed mode.
b) It is a digital signal transmission path shared by multiple devices and is used in back planes and expansion slots.
c) It is a mechanism for transferring data between I/O devices and the main memory independently of the CPU.
d) It is a standard for serial data transfer between a modem and peripheral devices, and is used in many PCs.

Q22. Which of the following programming techniques ensures that the CPU pipeline function is performed in an effective way?

a) Increase the number of functions when possible.
b) Reduce the number of branch instructions.
c) Reduce the number of memory access instructions.
d) Use many CASE statements.

Q23. Which of the following is an appropriate statement in regard to FIFO that is one of the page replacement algorithms used in virtual memory?

a) Compared to the LRU algorithm, there are fewer page faults.
b) Increasing the allotted main memory space for certain types of page reference sequence results in the increase in number of page faults.
c) Reducing the main memory page size causes the number of page faults to decrease.
d) The process for determining the page to be replaced takes longer than in the LRU algorithm.

Q24. Which of the following optical disk media uses organic dye as its recording layer and records data by making burn marks called pits with a laser beam?

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

Q25. Which of the following is an appropriate statement with regard to the preemptive method in OS process control?

a) A mechanism for allowing the OS to forcibly switch and execute processes is necessary to carry out the preemptive method.
b) A specific process occupies the processor more often compared to the non-preemptive method.
c) Each process can self-manage the system resources, so this method is suited to multiprogramming.
d) The overhead required for context switching is smaller compared to the non-preemptive method.

Q26. There are cases, in a paging virtual memory system, in which the frequency of page replacement becomes high and the system performance decreases abruptly. What is this phenomenon called?

a) Fragmentation
b) Page fault
c) Swapping out
d) Thrashing

Q27. The storage areas that are used to run a program include the stack and heap areas. Which of the following is an appropriate statement concerning these areas?

a) Because the heap area serves as a spare area for the stack area, it is used dynamically when the stack area becomes full.
b) Data is stored in and retrieved from the heap area through push and pop operations in the same way as in the stack area.
c) The stack area is used to store the return addresses of subroutines. The heap area is used to store data for which there is no relationship between the order of its allocation and the order of its release.
d) The stack area may have unused areas, but the heap area can have no unused area.

Q28. Which of the following advantages can be most expected when rewriting a two-tiered client/server-type application system using stored procedures?

a) CPU load in the server is reduced.
b) More complex access to database becomes possible.
c) The number of communications between clients and servers is reduced.
d) The number of disk accesses in the server is reduced.

Q29. Select the biggest factor that degrades the performance per processor of a tightly coupled multiprocessor system compared to the performance of a single processor system.

a) Access frequency of main memory
b) Access speed of main memory
c) Amount of main memory referenced per access
d) Exclusive control of main memory access

Q30. In an M/M/1 queuing model, the average waiting time is represented by "W," and the utilization rate of the service is "ρ." When ρ is changed from 0.25 to 0.75, by what factor should W be multiplied in the relationship between W and ρ?

a) $\frac{1}{3}$ b) 3 c) 4.5 d) 9

Q31. There is a program in which, for each data, it takes 40 ms to read, 30 ms to process in CPU, and 50 ms to write. In this program, if three operations, reading n-th data, processing (n+1)-th data, and writing (n+2)-th data are all executed in parallel, what is the maximum number of data that this program can handle per minute? Here, the OS overhead is ignored.

a) 500 b) 666 c) 750 d) 1,200

Q32. Which of the following indices and benchmarks evaluates the performance of the overall system including the terminals, network, software, and other elements, in an even-handed manner?

a) Dhrystone/MIPS
b) Linpack
c) SPECint/SPECfp
d) TPC-C

Q33. In a certain computer system, the ratio of the functional parts enhanced by improvements to the overall system is R ($0 < R < 1$), and the performance ratio of those parts before and after the enhancement is represented by "A." Select the formula that represents the overall performance ratio at this time.

a) $\frac{1}{(1-R) \times A}$

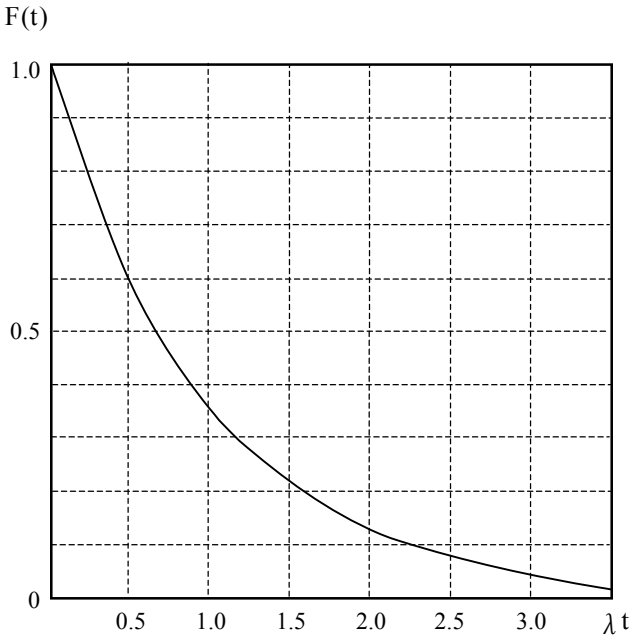
b) $\frac{1}{(1-R) + \frac{R}{A}}$

c) $\frac{1}{R + \frac{1-R}{A}}$

d) $\frac{1}{\frac{R}{A}}$

Q34. 1,000 units are running, and each unit has a failure rate of 1.0×10^{-6} incidents/second. Which of the following is the closest to average number of non-defective units after 200 hours of operation? You may read any value necessary for the calculation from the exponential graph of failure rate λ (incidents/second) and up-time t (seconds).

Exponent function $F(t) = \exp(-\lambda t)$



a) 50 b) 500 c) 950 d) 995

Q35. There are two possible countermeasures against system failures: "failsafe" and "failsoft." Which of the following is an appropriate action for a "failsoft" measure?

a) Continue processing even if performance decreases.
b) Issue a warning, and leave the decision of whether to continue processing to the operator.
c) Stop operation without causing any damage to data or devices.
d) Stop the system services sequentially and safely.

Q36. Which of the following properties is required by a shared library program that is called in parallel by multiple tasks in a real-time system?

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

Q37. Which of the following statements appropriately describes the characteristics of the abstract data type?

a) A specified number of data of the same type is arranged and defined, and each data is accessed using an index.
b) Data and associated operations are encapsulated and defined, and data is accessed via the defined operation.
c) Data having the same structure is arranged and defined in a single row, and each data is accessed using a pointer.
d) Data of different types is combined into a set and defined, and each data is accessed by a name modified by the name given to the set.

Q38. Which of the following is an appropriate explanation concerning a repository in software development?

a) It is a database for centralized management of the design and program information used in software development and maintenance.
b) It is a database for software components that are provided to support development.
c) It is a database for storing both software for source program analysis and results of analysis in order to perform reverse engineering.
d) It is a database for storing tools and data models that are used to develop software.

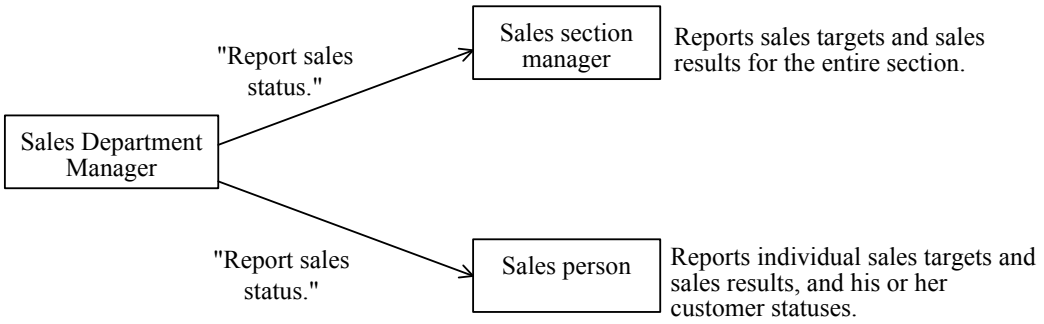
Q39. Which of the following diagrams used in UML represents the system components and their static interrelationships?

a) Class diagram
b) Sequence diagram
c) Statechart diagram
d) Use case diagram

Q40. Which of the following statements appropriately describes EJB (Enterprise JavaBeans)?

a) It is a component protocol for implementing applications, using Java, that run on a server.
b) It is a Java program which resides on a server and is executed as a thread, in order to process requests from browsers.
c) It is a technique, using Java, to create HTML documents dynamically and send them to clients.
d) It is an API for managing transactions in Java.

Q41. In the figure below, the sales section manager and sales person perform different services in response to the same message, "Report sales status." Select the object-oriented term that represents such characteristics.



- The sales department manager sends the message "Report sales status," to a sales section manager and a sales person.
- The sales section manager sends back the sales targets and sales results for his or her entire section as response.
- The sales person sends back his or her individual sales targets, sales results, and his or her customer statuses as response.

a) Abstraction
b) Encapsulation
c) Inheritance
d) Polymorphism

Q42. Module coupling must be weakened in order to increase module independence. Which of the following has the weakest module coupling?

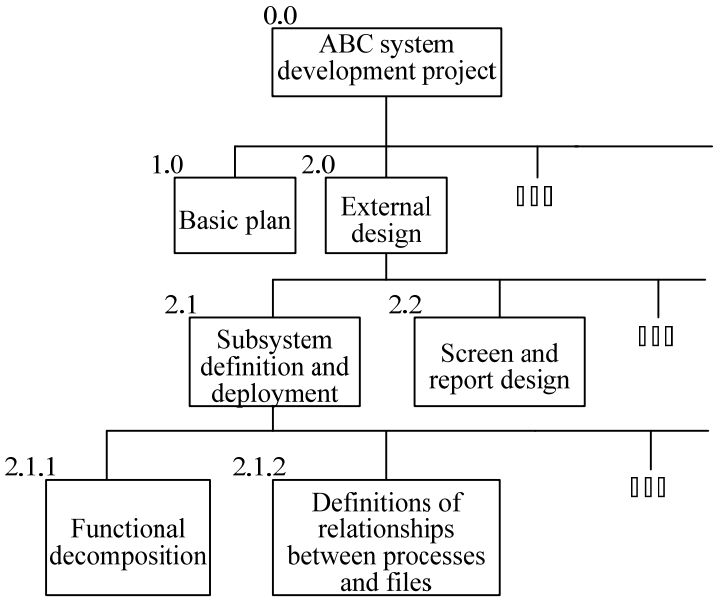
a) Data defined in the common area is referenced by related modules.
b) Only data items are transferred as arguments between modules.
c) Only necessary data is declared externally and shared.
d) The execution sequence of modules is controlled by using control parameters as arguments.

Q43. What is the following test case design method called?

We wish to test whether an error message is output, when the loaded data is incorrect. Based on the program specifications, an incorrect data class is identified, and a single arbitrary data is selected and used as the test case.

a) Boundary value analysis
b) Branch coverage
c) Cause-effect graph
d) Equivalence partitioning

Q44. Select the term that refers to breaking down a project from the overall framework into specific tasks on a detailed level as shown in the figure below.



a) DFD
b) DOA
c) PERT
d) WBS

Q45. Which of the following is required to conduct an integration test in top-down fashion?

a) Debugger
b) Driver
c) Dynamic tester
d) Stub

Q46. Which of the following activity states of a software development organization has the highest level in the Capability Maturity Model Integration?

a) A mechanism for improving the processes themselves is defined.
b) Actual performance records are measured quantitatively, and processes are managed systematically.
c) Processes are clarified in the documents, and everyone in the organization uses the documented processes.
d) The schedule and budget fall within the statistically acceptable limits.

Q47. Which of the following is an appropriate statement concerning the countermeasures against system failures?

a) If the cause of a programming or data error is found immediately after a system failure, it is desirable that the operator correct the error without anyone's help to ensure early failure recovery.
b) To recover efficiently from system failures, an operation log is always recorded and the operation periods without any error should be explicitly identified.
c) When a system failure occurs, it is desirable that recovery actions be taken prior to the report to the information systems division.
d) When transaction processing is interrupted by a system failure, it is retried to restore the system promptly.

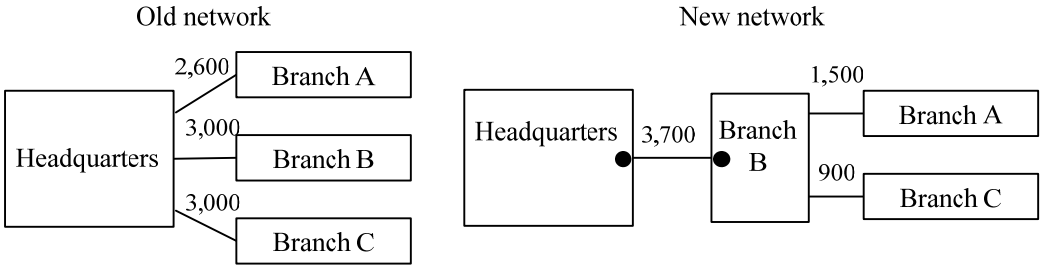
Q48. Which of the following RAID systems has only the objective of increasing performance, not reliability?

a) RAID0 b) RAID1 c) RAID3 d) RAID5

Q49. There is a database in which operations such as adding, updating, and deleting data occur at a low but constant level of frequency. The database is backed up to magnetic tapes. When the backup interval is doubled from the current interval, which of the following is an appropriate statement regarding the database operation?

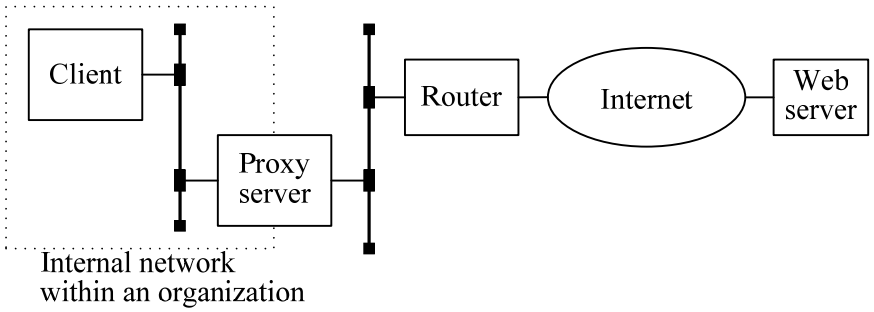
a) The amount of the database approximately doubles.
b) The average execution time of each backup operation approximately doubles.
c) The average recovery time from the journal information approximately doubles.
d) The number of magnetic tapes used per backup is reduced by approximately half.

Q50. An effort was made to reduce communication network costs by introducing multiplexers (the ● marks in the figure below) to a communication network that directly connects the headquarters with each branch office. What is the cost reduction per month in US$? Here, the monthly line costs (US$) between branches for the old and new networks are as shown in the figure below. In addition, two multiplexers were introduced under a lease contract at a monthly fee of 2% of the unit cost of US$30,000 each. The costs for modems and other communication devices can be ignored.



a) 1,000 b) 1,300 c) 1,500 d) 1,900

Q51. The figure shows the route used when a client on the TCP/IP network within an organization accesses a Web server outside the organization via a proxy server, a router, and the Internet. Where are the TCP connections for this communication established?



a) Between the client and the proxy server and between the proxy server and the Web server.
b) Between the client and the proxy server, between the proxy server and the router, and between the router and the Web server.
c) Between the client and the router and between the router and the Web server.
d) Between the client and the Web server and between the client and the proxy server.

Q52. Which of the following techniques allows multiple LAN terminals using private addresses to access the Internet by sharing a single global address by means of identifying the TCP and UDP port numbers and managing the correspondence between the private addresses and the global address?

a) IP masquerading
b) IP multicasting
c) IP spoofing
d) NTP3

Q53. Which of the following standards is used to attach image data to e-mails in an environment that uses TCP/IP?

a) JPEG
b) MIME
c) MPEG
d) SMTP

Q54. Which of the following is the appropriate characteristics of connectionless communication?

a) A connection called PVC is always adopted. A communication path with the counterpart is established in advance, so communication can be done without prior arrangement for connection.
b) All of the data units to be transmitted pass through the same route.
c) All packets to be transmitted contain information indicating the destination.
d) Reliability is high because sequence error detection and flow control are carried out.

Q55. Which of the following appropriately describes the network layer in the OSI basic reference model?

a) It absorbs the difference between the physical characteristics of the communication media and provides a transparent transmission path to higher-level layers.
b) It is the layer closest to the users and performs functions such as file transfers and e-mail.
c) It performs functions such as routing and relaying to carry out data transfer between the end systems.
d) It provides transmission control procedures such as error detection and re-transmission control between adjacent nodes.

Q56. Which of the following is the appropriate characteristics of ATM as compared with packet switching technology?

	Length of data transmission unit	Delay in network
a)	Fixed	Larger
b)	Fixed	Smaller
c)	Variable	Larger
d)	Variable	Smaller

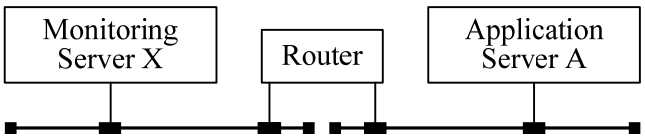
Q57. What is the transmission time in seconds required to consecutively transmit 1,000 electronic messages with a length of 1,000 bytes per message, using a 10 Mbps LAN? Here, the transmission efficiency of LAN is 40%.

a) 2 b) 8 c) 16 d) 20

Q58. Which of the following is an appropriate statement in regard to the transmission operation of nodes connected to a LAN using the CSMA/CD?

a) All the nodes are logically ordered, the transmission privilege is transferred in order, and only the node that has received this privilege performs transmission.
b) Each node investigates whether the transmission medium is busy and performs transmission if the medium is not busy. When collision is detected, transmission is tried again after a random amount of time has elapsed.
c) Only the node that has been assigned a time slot performs transmission.
d) The nodes are connected in a ring, a special frame for controlling transmission privileges is circulated, and only the node that has received this frame performs transmission.

Q59. In the network configuration shown below, which of the following is an effective means for enabling Monitoring Server X to detect not only that the DBMS daemon on Application Server A has ended abnormally but also the cause of this symptom?



a) A finger from Monitoring Server X to Application Server A
b) A ping from Monitoring Server X to Application Server A
c) An ICMP Destination Unreachable message from Application Server A to Monitoring Server X
d) An SNMP Trap PDU from Application Server A to Monitoring Server X

Q60. Which of the following is the appropriate explanation of a relational database?

a) It expresses relationships between data using a hierarchical structure.
b) It links related data using pointers.
c) It represents data sets using several two-dimensional tables.
d) It uses a data structure consisting of both data and the corresponding operation procedures.

Q61. To what degree has the table below been normalized?

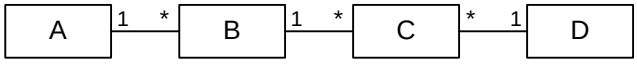
Employee number	Name	Year of employment	Position	Position allowance
12345	Tom Allen	1971	Department manager	900
12346	Jim Brown	1985	Section manager	500
12347	Sam Clark	1987	Section manager	500

a) 2nd normal form
b) 3rd normal form
c) 4th normal form
d) Non-normal form

Q62. Which of the following is an appropriate statement concerning a logical model of a database?

a) A hierarchical model is suitable for expressing many-to-many record relationships.
b) A network model can be represented by a table that consists of rows and columns.
c) In a relational model, child record belongs to only one parent record.
d) The Boyce-Codd normal form is used in relational models.

Q63. The E-R diagram below represents the relationship between the entities (Customer, Product, Order, Order Breakdown) that are used by a distributor when recording product orders. Which of the following is the appropriate combination of entities that should be placed in boxes A through D in the diagram? Here, customers are assumed to be able to place orders any number of times and to order more than one product at a time. A rectangular box represents an entity set and a "1 *" between rectangular boxes denotes a one-to-many cardinality.



	A	B	C	D
a)	Customer	Order	Order Breakdown	Product
b)	Order	Order Breakdown	Customer	Product
c)	Order Breakdown	Product	Order	Customer
d)	Product	Order	Order Breakdown	Customer

Q64. Which of the following is an appropriate statement in regard to the trigger in a relational database?

a) It is not activated by other triggers.
b) It operates when a data change operation is performed.
c) It operates when a reference command is issued.
d) It operates when the rollback process is executed.

Q65. Four types of VIEW are defined for the "Orders" table and the "Products" table below. Which of the following is an updatable VIEW?

Orders

Order_ number	Order_date	Customer_number	Customer_name	Product_number	Quantity	Amount
001	2007-03-05	K111	Company A	RX01	5	1,500
001	2007-03-05	K111	Company A	RY01	10	2,900
001	2007-03-05	K111	Company A	F001	5	3,750
002	2007-03-10	K222	Company B	TV18	10	4,500
003	2007-03-15	K333	Company C	TV18	5	2,250
003	2007-03-15	K333	Company C	F001	2	1,500
004	2007-03-20	K222	Company B	RY01	5	1,450
004	2007-03-20	K222	Company B	F001	2	1,500

Products

Product _number	Product_name	Unit_ price
F001	Refrigerator	750
RX01	Radio X	300
RY01	Radio Y	290
TV18	TV	450

a)
```
CREATE VIEW Customer_V (Customer_number, Customer_name)
    AS SELECT DISTINCT Customer_number, Customer_name  FROM Orders
```

b)
```
CREATE VIEW Order_statement_V (Order_number, Product_number,
                    Quantity, Unit_price, Amount)
    AS SELECT Order_number, Orders.Product_number,
                    Quantity, Unit_price, Amount  FROM Orders, Products
    WHERE Orders.Product_number = Products.Product_number
```

c)
```
CREATE VIEW Orders_V (Order_number, Order_date,
                    Customer_number, Total_amount)
    AS SELECT Order_number, Order_date, Customer_number, SUM(Amount)
                    FROM Orders
    GROUP BY Order_number, Order_date, Customer_number
```

d)
```
CREATE VIEW Products_V (Product_number, Product_name)
    AS SELECT Product_number, Product_name  FROM Products
```

Q66. Select the correct result when the following SQL statement is executed for the "Employees" and "Departments" tables below.

```
SELECT COUNT(*) FROM Employees, Departments
WHERE Employees.Affiliation = Departments.Department_name AND Departments.Floor = 2
```

Employees

Employee_number	Affiliation
11001	General Affairs
11002	Accounting
11003	Sales
11004	Sales
11005	Information Systems
11006	Sales
11008	Planning
12001	Sales
12002	Information Systems

Departments

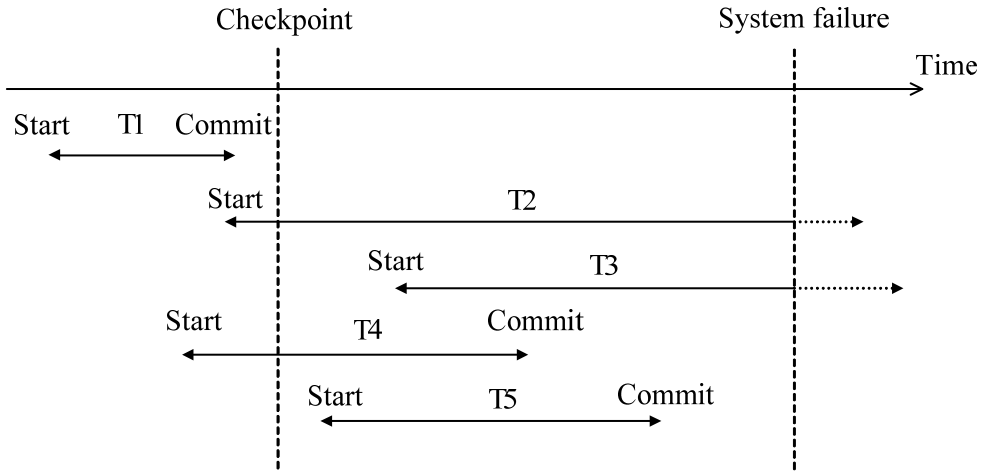
Department_name	Floor
Planning	1
General Affairs	1
Information Systems	2
Sales	3
Accounting	2
Legal	2
Purchasing	2

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

Q67. A duplicate database with the same contents as an original database is prepared in advance. When the original database is changed, it is reflected in the duplicate database after a specified period of time. What is this method called?

a) Image copy
b) Mirroring
c) Replication
d) Two-phase commitment

Q68. In a DBMS that takes in checkpoints, a system failure occurred sometime after the checkpoint as shown in the figure below. Which of the following transactions can be recovered by roll-forward?



a) T1 b) T2 and T3 c) T4 and T5 d) T5

Q69. In the 2-phase commit protocol used in distributed transaction processing, there are one coordinator, who start the commit process, and many participants, who start necessary actions only after receiving a directive from the coordinator. Which of the following is an appropriate description concerning this 2-phase commit protocol?

a) Depending on at which point a failure occurs with the coordinator, it is possible to have a situation where no participants can do commit or rollback processing until the recovery process is completed.
b) Even if there is a participant who does not respond in Phase 1, the coordinator can commit the transaction by force.
c) It is possible for one distributed transaction to have multiple coordinators and participants. For instance, if there are five systems (programs) involved, there may be 2 coordinators and 3 participants.
d) Once a participant sends a commit-approved response to the coordinator in Phase 1, the commit process continues locally without receiving a Phase 2 commit request.

Q70. Mr. X is attempting to send an e-mail to Mr. Y via the Internet. The contents of the e-mail are confidential, so Mr. X wants to encrypt and send the e-mail using public key cryptography. Which of the following keys should be used to encrypt the e-mail contents?

a) Mr. X's private key
b) Mr. X's public key
c) Mr. Y's private key
d) Mr. Y's public key

Q71. Which of the following is an appropriate statement in regard to message authentication that uses a hash function?

a) The recipient decrypts the message from the hash value using the sender's public key and the hash function.
b) The recipient generates a hash value from the message using the hash function and compares it with the hash value decrypted using the sender's public key.
c) The sender generates a hash value from the message using the sender's public key and the hash function and sends it together with the message.
d) The sender generates a hash value of the sender's private key using the hash function and sends it together with the message.

Q72. Which of the following is classified as information leakage caused by spyware?

a) The system administrator provided the password to a caller claiming to have forgotten his/her password, resulting in an unauthorized person learning the password.
b) When a PC was connected to the Internet, the user's information stored inside the PC was transmitted unknowingly.
c) When a PC was simply discarded as is, the data remaining on the magnetic recording media was read out.
d) When an e-mail was sent without encryption, its contents were read on a network.

Q73. Which of the following departments is the appropriate owner of the data in an information system?

a) The department in charge of applications that commissioned the system development, operation, and maintenance to the system department
b) The maintenance department that assures data integrity and corrects the data contents as necessary
c) The systems operation department that maintains and manages the system and the data
d) The user department that determines the layout of screens and ledger sheets for handling the data

Q74. Which of the following is an appropriate statement in regard to firewall systems?

a) In the application gateway system, the gateway function must be set for each application protocol.
b) The circuit gateway system controls whether to permit the passage of commands.
c) The packet filtering system can provide filtering by words contained in an e-mail.
d) The transport gateway system provides a gateway function that depends on the application protocol.

Q75. Which of the following refers to faking an emergency situation in order to illegally elicit and obtain passwords and the whereabouts of confidential information from personnel in an organization without using electronic methods?

a) Password cracking
b) Social engineering
c) Springboard attack
d) Trojan horse

Q76. Which of the following is an appropriate statement concerning the security of a system that accesses a Web server from a browser?

a) Because the HTML documents that are created by CGI programs or servlets change their contents dynamically, the contents of the cache on the proxy server are never disclosed to any unauthorized user.
b) If provisions are made so that every user must initially log into a PC by using HTTP basic authentication when the same PC is to be used by multiple users, then no information can be disclosed to any unauthorized user even when the user is changed with the browser running.
c) The time required to respond to clients' requests cannot be improved by the use of a reverse proxy because a reverse proxy provides no capability for caching static contents.
d) The use of SSL ensures that the information exchanged between users and the Web server is never disclosed to any unauthorized user, even if a proxy server exists in the communication path.

Q77. Which of the following appropriately describes the content of the Common Criteria (CC) that has been reached by integrating and standardizing the TCSEC used by the U.S. and ITSEC for European governmental procurement?

a) Basic information security technology standards
b) Security evaluation criteria concerning information technology
c) Security function standards concerning communication services
d) Security management protocol standards

Q78. Which of the following is an appropriate statement concerning the implementation contents of risk management?

a) Because speculative risks can occur outside the scope of management by the business entity, such potential risks are not included in the objects of management.
b) Because the risk of future occurrences of losses is uncertain, risk is estimated in terms not of the budget for implementing the countermeasures but of the amount of possible loss.
c) Risk analysis covers not only pure risks but also speculative risks.
d) Risk finance covers all the costs of risk management such as risk analysis and risk control.

Q79. Which of the following statements appropriately describes the Security Assertion Markup Language (SAML)?

a) SAML defines a mechanism for widely publicizing information concerning Web services and allows searching functions which those services provide, etc.
b) SAML defines a protocol for sending e-mail that is protected from eavesdropping, reading, and modification by unauthorized users.
c) SAML defines a Web service protocol for efficiently managing key information that is used in digital signatures.
d) SAML defines a Web service protocol for transmitting authentication, attribute, and access control information to different domains.

Q80. Which of the following compression methods may not be able to completely restore the original information when the compressed information is decompressed?

a) GIF
b) JPEG
c) Run length method
d) ZIP