



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

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.

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Q1. There is an 8-bit register where integers are represented in binary by using 2's complement for negative numbers. When the decimal integer “-24” is stored in the register and then arithmetically shifted 2 bits right, what is the resulting value in decimal? Here, the leftmost bit of the register is used as a sign bit.

- a) -102 b) -96 c) -6 d) 58

Q2. When a single-bit “half adder” circuit is used for simply adding two input signals x_1 and x_2 , which of the following is the appropriate combination of logical expressions for two output signals s (sum) and c (carry)? Here, “+” stands for the logical OR operation and “ \cdot ” for the logical AND operation.

	s	c
a)	$x_1 + x_2$	$x_1 \cdot x_2$
b)	$\overline{x_1 \cdot x_2}$	$x_1 + x_2$
c)	$(x_1 + x_2) \cdot \overline{(x_1 \cdot x_2)}$	$x_1 \cdot x_2$
d)	$\overline{(x_1 + x_2)} + (x_1 \cdot x_2)$	$x_1 + x_2$

Q3. Which of the following prefix expressions is equivalent to the infix expression “ $(A + B) * C - (D - E)$ ”?

- a) $- * + A B C - D E$ b) $- + A B * C - D E$
c) $A B + C * - D E -$ d) $A B + C * D E - -$

- Q4.** The syntax rules of the field identifier “field ID” are represented in BNF notation as shown below. When each ID is defined as an arbitrary sequence of letters and/or digits, which of the following should be inserted into the blank *A*?

$\langle \text{field ID} \rangle ::= \langle \text{ID} \rangle \mid \langle \text{field ID} \rangle . \langle \text{ID} \rangle$

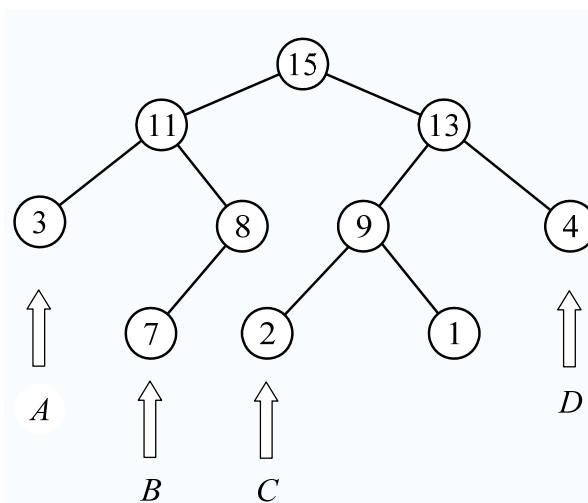
$\langle \text{ID} \rangle ::= \boxed{}$

$\langle \text{letter} \rangle ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z$

$\langle \text{digit} \rangle ::= 0|1|2|3|4|5|6|7|8|9$

- a) $\langle \text{ID} \rangle . \langle \text{letter} \rangle \mid \langle \text{ID} \rangle . \langle \text{digit} \rangle$
- b) $\langle \text{ID} \rangle \langle \text{letter} \rangle \mid \langle \text{ID} \rangle \langle \text{digit} \rangle \mid \langle \text{ID} \rangle . \langle \text{ID} \rangle$
- c) $\langle \text{letter} \rangle \mid \langle \text{digit} \rangle \mid \langle \text{ID} \rangle \langle \text{letter} \rangle \mid \langle \text{ID} \rangle \langle \text{digit} \rangle$
- d) $\langle \text{letter} \rangle \langle \text{ID} \rangle \mid \langle \text{digit} \rangle \langle \text{ID} \rangle$

- Q5.** As shown in the figure below, there is a binary tree which is created in accordance with a specific rule that the value of a parent node is greater than that of a child element.



When a new element with the value 12 is inserted in the places marked by *A*, *B*, *C*, or *D* in the tree according to the steps defined below, where should it be inserted in order to maintain the specific rule and minimize the number of exchanges?

[Steps]

1. Add the element to a leaf node of the tree.
2. Compare the added element with its parent; if the result is in the correct order, stop. If not, go to Step 3.
3. Exchange the element for its parent and return to Step 2.

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

Q6. When a set of values “5, 4, 3, 2, 8, 6, 0, 1, 9, and 7” is inserted in this order to create a binary search tree, which of the following represents the sequence of node values visited in the post-order traversal of the binary search tree?

- a) 0 1 2 3 4 5 6 7 8 9 b) 1 0 2 3 4 7 6 9 8 5
c) 5 4 3 2 0 1 8 6 7 9 d) 5 4 8 3 6 9 2 7 0 1

Q7. There is a queue with eight cells and two pointers as shown below.

0	1	2	3	4	5	6	7
		6	8	15			

Start pointer: 2

End pointer: 4

At this point, three values 6, 8, and 15 are stored in the queue. The start and end pointers indicate the location of the first and last data values respectively. After the series of operations described below is performed, which of the following is the appropriate combination of the two pointers? Here, upon reaching the end of the queue area, the pointers wrap around to the beginning of the queue again.

[Operations]

1. One value is enqueued.
2. Two values are dequeued.
3. Three values are enqueued.
4. One value is dequeued.

	Start pointer	End pointer
a)	0	5
b)	1	6
c)	5	0
d)	6	1

Q8. When the series of operations below is performed on an empty stack, which of the following is the data remaining on the stack? Here, “push x ” is the operation to save data x to the stack, and “pop” is used to retrieve data from the stack.

push 1 \rightarrow push 2 \rightarrow pop \rightarrow push 3 \rightarrow push 4 \rightarrow pop \rightarrow push 5 \rightarrow pop

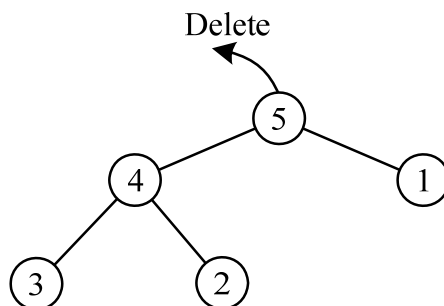
- a) 1 and 3 b) 2 and 4 c) 2 and 5 d) 4 and 5

Q9. The steps below are used to sort a dataset in descending order by using a max heap.

[Steps]

1. Extract an element one by one from an unsorted dataset, and insert it into a max heap until all the elements are extracted and inserted.
2. Delete the root element from the max heap, and store it in a sorted dataset. Stop if all the elements are deleted. Otherwise, go to Step 3.
3. Move the rightmost element on the deepest level to the root. Go to Step 2 if the remaining elements are in the correct order as a max heap (that is, all the parent elements are greater than or equal to their corresponding child elements). Otherwise, go to Step 4.
4. Compare the replaced element with its children, and then exchange the element for its larger child. Go to Step 2 if all the elements are in the correct order as a max heap. Otherwise, continue Step 4 toward deeper levels.

In the max heap shown below, how many element exchanges in Step 4 are executed to build the next max heap after deletion of the root “5” in Step 2?



- a) 0 b) 1 c) 2 d) 3

Q10. The Fibonacci sequence (0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...) can be defined recursively as follows:

$$f(x) = \begin{cases} 0 & (x=0) \\ 1 & (x=1) \\ f(x-1) + f(x-2) & (x>1) \end{cases}$$

How many times is the function $f(x)$ called to calculate the Fibonacci number $f(5)$?

- a) 1 b) 3 c) 5 d) 15

Q11. In a certain CPU, a floating point adder unit uses a total of 40 percent of the execution time. If the floating point adder unit is replaced with a new unit whose speed is ten times faster than the original unit, approximately how many times faster is the new CPU than the original one? Here, there is no modification in the instruction set of the new CPU.

- a) 1.25 b) 1.40 c) 1.56 d) 2.17

Q12. There is a CPU with a clock frequency of 1 GHz. When the instructions consist of two types as shown in the table below, what is the performance in MIPS of the CPU?

Type	Execution time (clocks)	Frequency of appearance (%)
Instruction 1	10	60
Instruction 2	5	40

- a) 34 b) 100 c) 125 d) 133

Q13. When a color image is stored in video memory at a tonal resolution of 24 bits per pixel, approximately how many megabytes (MB) are required to display the image on the screen with a resolution of 1024×768 pixels? Here, 1 MB is 10^6 bytes.

- a) 0.8 b) 2.4 c) 6.3 d) 18.9

Q14. How many memory cells (or latches for holding 1 bit each) are implemented in SRAM with 24 address lines and 16 data lines?

- a) 2^{16} b) 2^{24} c) 24×16 d) $2^{24} \times 16$

Q15. There is a hard disk drive that has the specifications shown in the table below. When a record of 10,000 bytes is read out from this disk, approximately how long (in milliseconds) does it take to access the disk and to complete the data transfer? Here, the data is stored contiguously from the beginning of one track, and the entire data on the track can be read and transferred per revolution.

Capacity per track	12,000 bytes
Rotation speed	3,000 rpm
Average seek time	15 milliseconds

- a) 17 b) 27 c) 32 d) 42

Q16. Which of the following is the appropriate purpose of defragmentation of hard disks?

- a) To access disk files faster and more efficiently
- b) To clean up temporary and junk files
- c) To delete IBG and increase capacity
- d) To protect disk drives from physical failures

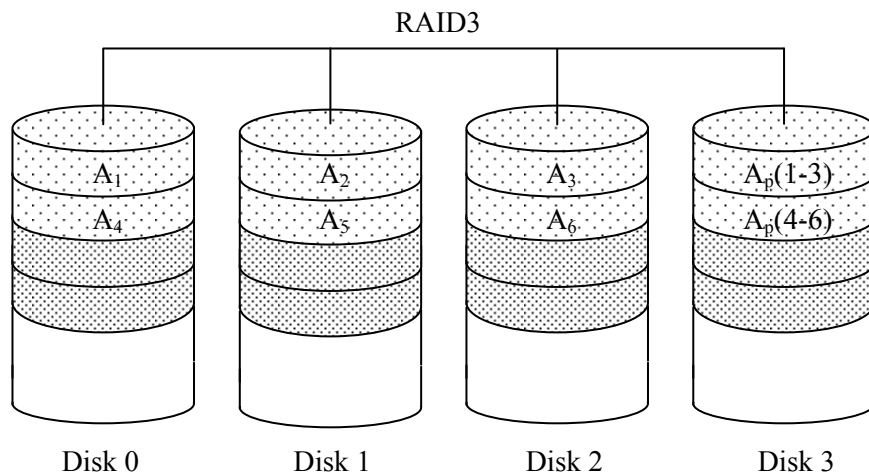
Q17. Which of the following is an appropriate explanation of TCO?

- a) Total cost required for system development
- b) Total cost required for system installation
- c) Total cost required for the initial investment of a system
- d) Total cost required throughout the life cycle of a system

Q18. In the RAID3 system shown below, three disks (Disks 0 through 2) for byte-striped data and one dedicated parity disk (Disk 3) are used as one volume. Parity byte A_p is generated by calculating the “exclusive OR” (\oplus) of three bytes in Disks 0 through 2. For example, $A_p(1-3)$ is calculated as follows:

$$A_p(1-3) = A_1 \oplus A_2 \oplus A_3$$

In the event of a disk failure, data recovery can be accomplished by using the information recorded on the remaining three error-free disks. Which of the following operations should be executed for this data recovery?



- a) AND
- b) Exclusive NOR
- c) Exclusive OR
- d) OR

Q19. Backup sites, which are used during system downtime, are classified into three types: warm, cold, and hot sites. In general, which of the following is the list arranged in order from shortest to longest recovery time?

- a) Cold site, warm site, hot site
- b) Hot site, warm site, cold site
- c) Warm site, cold site, hot site
- d) Warm site, hot site, cold site

Q20. Which of the following is the appropriate explanation of throughput?

- a) It is the elapsed time after a job is submitted to the system until the final result is returned. It is affected by the I/O speed, overhead time, etc.
- b) It is the maximum number of concurrently executable jobs. It depends on the resources of the system that can be used.
- c) It is the number of jobs processed per unit time. Spooling helps to improve throughput.
- d) It is the operating rate of a job, which can be calculated by the expression “running time of the job ÷ operations time”.

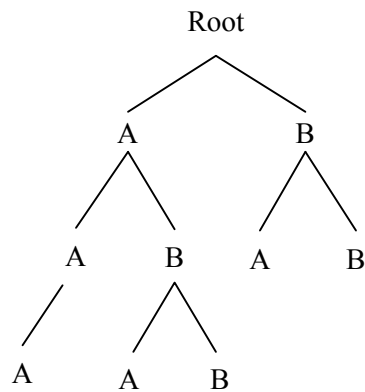
Q21. In an online transaction system environment, which of the following represents the interval of time from the time the system completes receipt of an input to the time the system begins to return its resulting output?

- a) Access time
- b) Latency time
- c) Response time
- d) Turnaround time

Q22. Which of the following is the most appropriate set of major functions supported by an OS?

- a) Compiler management, I/O management, and network management
- b) Data management, job management, and task management
- c) Development tool management, job management, and memory management
- d) I/O management, multimedia management, and security management

Q23. Multiple directories having the names “A” and “B” are managed in the structure shown below.



When the current directory is changed in order of “\A\B → .. → ..\B → .\A”, which of the following is the resulting current directory? Here, directories are specified as follows:

[Methods to specify directories]

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

a) \A

b) \A\A

c) \A\B\A

d) \B\A

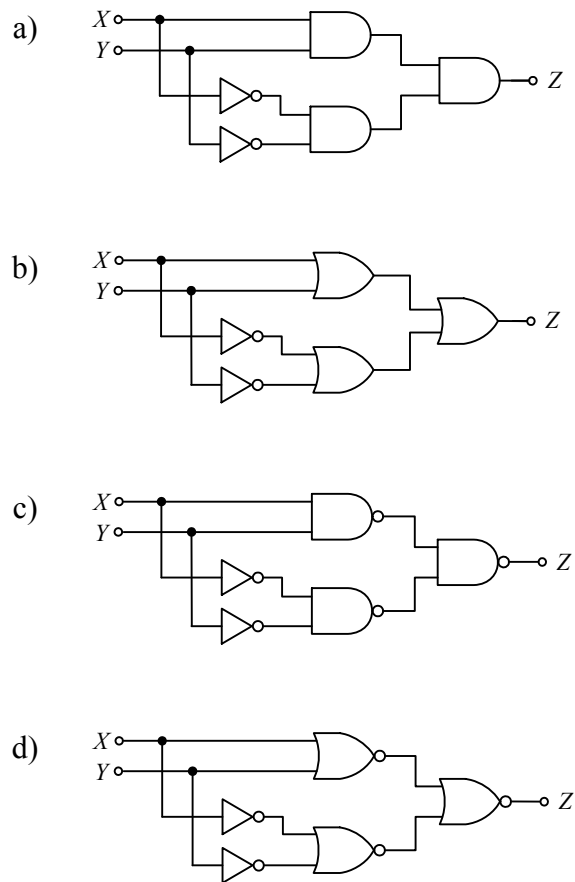
Q24. Which of the following is an appropriate explanation of the spooling function?

- a) Execution of the programs is temporarily suspended, and control is transferred to the control program.
- b) If a CPU becomes idle because of the execution of input/output instructions while executing a certain task, the CPU is assigned to another task.
- c) The access time to auxiliary storage devices is reduced by providing a buffer pool consisting of multiple buffers and by increasing the probability of accessing buffers located in the main storage.
- d) The overall processing power of a system is enhanced by performing data transfer between the main storage and low-speed input/output devices via auxiliary storage devices.

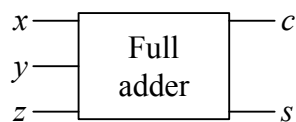
Q25. There are some methods of getting backup files for the purpose of recovering files and managing generations. Which of the following is an appropriate description concerning those methods or procedures?

- a) A differential backup contains all files changed after the last full backup, while an incremental backup saves all files changed after the last full, differential, or incremental backup.
- b) A differential backup may take longer to restore files than an incremental backup, because the most recent versions of files are spread across a larger number of backup sets.
- c) A multiplexed backup is used as a mixed combination of a full backup, a differential backup, and an incremental backup.
- d) An incremental backup tends to take longer to get backup files than a differential backup, because more files are copied during each backup.

Q26. Which of the following circuits can write out “1” to the output line Z only when the input lines X and Y have the same value?



Q27. The figure below shows a logic circuit representing a full adder. When 1, 0, and 1 are entered into x , y , and z respectively, which of the following is the appropriate combination of the output values of c (carry) and s (sum)?



	c	s
a)	0	0
b)	0	1
c)	1	0
d)	1	1

Q28. Which of the following is an appropriate explanation of SoC (System on a Chip)?

- a) A semiconductor chip equipped with a set of circuits which manages the data exchanged between devices, such as CPU, memory, or peripherals
- b) A semiconductor chip in which all required functions (systems) are integrated in the same manufacturing process
- c) A semiconductor chip in which functions with different processes are manufactured in separately optimized processes and each chip is appropriately wired on a package
- d) An electronic circuit board used for computers composed of CPU, chipset, video chip, memory, etc.

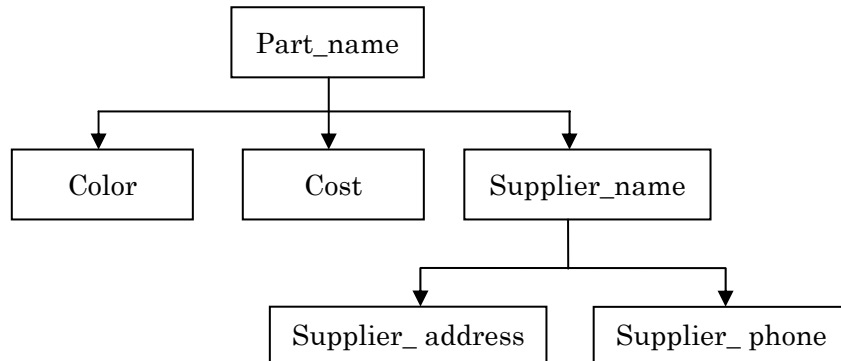
Q29. Which of the following is a user interface that enables frequently-used operations to be performed efficiently?

- a) Online help
- b) Progress bar
- c) Shortcut key
- d) Undo function

Q30. Which of the following is the data model that was originally introduced for the purpose of conceptual modeling and is often used for logical modeling and physical modeling as well as conceptual modeling?

- a) E-R model
- b) Hierarchical model
- c) Network model
- d) Relational model

Q31. The figure below shows the relationships among data items used in a certain parts management system. When the system is implemented as a relational database, which of the following is the most appropriate and effective table structure of the relational database?



a) Parts table

Part_name	Color	Cost	Supplier_name	Supplier_address	Supplier_phone
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b) Parts table

Part_name	Color	Cost
-----------	-------	------

Supplier table

Supplier_name	Supplier_address	Supplier_phone
---------------	------------------	----------------

c) Parts table

Part_name	Color	Cost	Supplier_name
-----------	-------	------	---------------

Supplier table

Supplier_name	Supplier_address	Supplier_phone
---------------	------------------	----------------

d) Parts table

Part_name	Color	Cost
-----------	-------	------

Supplier table

Part_name	Supplier_name	Supplier_address	Supplier_phone
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Q32. As shown below, there are two relational database tables Movie and Actor. Which of the following SQL statements should be used for retrieving a list of movie titles, released years, and directors, from all the movies that include “Action” or “Comedy” as a genre and “Cooper” as an actor’s name? Here, there is no movie remade with different actors, so “Title” and “Movie_title” are both primary keys in each table.

Movie (Released_year, Title, Director, Genre, Description)

Actor (Name, Movie_title, Role)

- a) `SELECT Movie_title, Released_year, Director FROM Movie, Actor
WHERE Name = 'Cooper '
AND (Genre = 'Action ' OR Genre = 'Comedy ')
AND Title = Movie_title`
- b) `SELECT Movie_title, Released_year, Director FROM Movie, Actor
WHERE Name = 'Cooper '
AND Genre = 'Action ' AND Genre = 'Comedy '
AND Title = Movie_title`
- c) `SELECT Title, Released_year, Director FROM Movie, Actor
WHERE Name = 'Cooper '
AND (Genre = 'Action ' OR Genre = 'Comedy ')`
- d) `SELECT Title, Released_year, Director FROM Movie, Actor
WHERE Name = 'Cooper '
AND Genre = 'Action ' AND Genre = 'Comedy '`

Q33. As shown below, there are four relational database tables Product, Supplier, Sale, and Employee that are used for a database system in a retail store. Here, the solid and dotted lines indicate the primary and foreign keys, respectively.

Product (ProdNo, ProdName, Cost, Price, SupplierNo)

Supplier (SupplierNo, SuppName, SuppAddress)

Sale (ProdNo, EmpNo, DateTime, Quantity)

Employee (EmpNo, EmpName, EmpAddress)

The number of records for each table is as follows:

Table name	Number of records	Remarks
Product	200	Each of the groups of 10 records has the same supplier.
Supplier	30	
Sale	10,000	Each of the groups of 100 records is from the same product.
Employee	10	

How many records are returned after execution of the SQL statement below?

```
SELECT * FROM Product A, Supplier B, Sale C
WHERE A.ProdNo = C.ProdNo AND A.SupplierNo = B.SupplierNo
```

- a) 200 b) 10,000 c) 10,230 d) 60,000,000

Q34. As shown in the table below, there are five transactions T_1 through T_5 that are performed simultaneously in parallel, in any order. Which of the following is the combination of transactions that has the possibility of a deadlock? Here, only one transaction can have an exclusive lock at a time. Shared locks can be used with multiple transactions.

T_1	T_2	T_3	T_4	T_5
X(A)	X(A)	X(B)	S(B)	X(C)
R(A)	R(A)	R(B)	S(A)	X(A)
W(A)	W(A)	W(B)	R(A)	R(A)
Commit	X(B)	S(C)	R(B)	R(C)
	R(B)	R(C)	Commit	W(C)
	W(B)	W(C)		W(A)
	Commit	Commit		Commit

The notation used in the above table is shown below.

Symbol	Operation
X(#)	Exclusive lock
S(#)	Shared lock
R(#)	Read
W(#)	Write
Commit	End transaction
#	Resource name

- | | |
|------------------------------|------------------------------|
| a) T_1 , T_2 , and T_4 | b) T_1 , T_2 , and T_5 |
| c) T_2 , T_3 , and T_4 | d) T_2 , T_3 , and T_5 |

Q35. Which of the following explains the database rollback process?

- The “redo journal” is used to restore the data to the status immediately before the failure after the start of the transaction.
- The “redo journal” is used to restore the data to the status immediately before the start of the transaction.
- The “undo journal” is used to restore the data to the status immediately before the failure after the start of the transaction.
- The “undo journal” is used to restore the data to the status immediately before the start of the transaction.

Q36. Which of the following information in IP header is used for routing the IP packets across networks?

- a) Destination address and source address fields
- b) Destination address field
- c) Destination address, source address, and protocol fields
- d) Source address field

Q37. Which of the following network topologies is commonly used, especially in Fast or Gigabit Ethernet, for connecting network devices via a centralized unit such as a hub or a switch?

- a) Bus
- b) Mesh
- c) Ring
- d) Star

Q38. What is the minimum number of communication cables that are needed to connect six network devices in a full mesh topology? Here, at least one communication cable is required to connect two network devices.

- a) 5
- b) 6
- c) 12
- d) 15

Q39. Which of the following is the IP network addressing and routing scheme whereby data is routed to the “nearest” or “best” destination as viewed by the routing topology?

- a) Anycast
- b) Multicast
- c) Singlecast
- d) Unicast

Q40. Which of the following protocols can be used to access e-mail messages that are stored on a remote, and possibly shared, mail server, and thereby are manipulated from a desktop computer at home, a workstation at the office, and a notebook computer while traveling, without the need to transfer messages back and forth between these computers?

- a) FTP
- b) IMAP
- c) POP3
- d) SMTP

Q41. When a message is sent to Person A from Person B using public key cryptography, which of the following keys should be used for encrypting the message?

- a) A's private key
- b) A's public key
- c) B's private key
- d) B's public key

Q42. Which of the following is the function of S/MIME used for e-mails?

- a) Compressing e-mails
- b) Encrypting e-mails and attaching a signature
- c) Notifying senders that e-mails have been delivered and opened
- d) Resending e-mails

Q43. Which of the following can be achieved by using SSL/TLS?

- a) Communication between clients and servers is encrypted.
- b) Processing time is shortened in communication between clients and servers.
- c) The SMTP connection from mail software to a Web server is enabled.
- d) The trails of communication between browsers and Web servers are secured.

Q44. Which of the following refers to online scams where thieves attempt to entice e-mail recipients into clicking on a link that takes them to a bogus website, and the website may prompt the recipient to provide personal information such as social security number, bank account number, and credit card number, and/or it may download malicious software onto the recipient's computer?

- a) Cross site scripting
- b) DoS attack
- c) Phishing
- d) Trojan horse

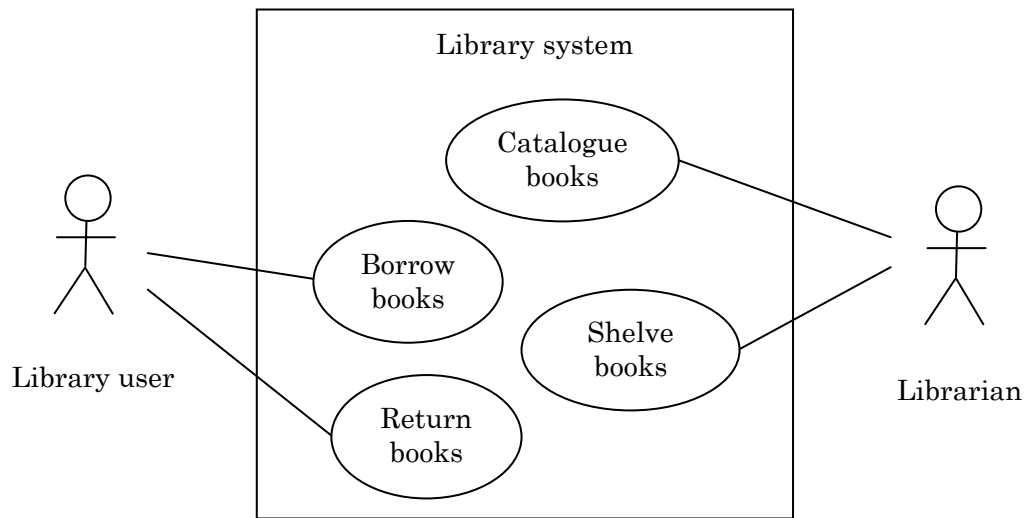
Q45. A government website accepts passport applications using HTTP forms to collect information. Users provide complete personal information in the forms to help expedite processing of face-to-face transactions, and payments are done offline. The information collected enters a secure server for processing and document releasing. In this system environment, which of the following is the most likely security attack?

- a) Password-guessing attack
- b) Sniffing traffic for identity theft
- c) Spamming to attain denial of service
- d) Spoofing attack

Q46. Which of the following explains the pattern matching method that is used by antivirus software?

- a) Viruses are detected by comparing files before infection with files after infection to investigate whether any change has been made to the files.
- b) Viruses are detected by comparison with the file checksum.
- c) Viruses are detected by comparison with the signature codes of known viruses.
- d) Viruses are detected by monitoring the system for abnormal phenomena caused by viruses.

Q47. The diagram shown below depicts who can use the system and in what ways the users (or external systems) expect to interact with the system. What is this type of diagram called?



- | | |
|--------------------------------|----------------------|
| a) Activity diagram | b) Data flow diagram |
| c) Entity relationship diagram | d) Use case diagram |

Q48. Which of the following is an appropriate description concerning object-oriented design?

- a) “Aggregation” is the feature that allows values of different data types to be handled using a uniform interface.
- b) “Encapsulation” is the technique to integrate data and operational procedures as an object and hide implementation details from the outside.
- c) “Inheritance” is the property of an object where data or methods in the subclass can be used in the super class.
- d) “Method” sent to an object is the only means of performing its specific functions.

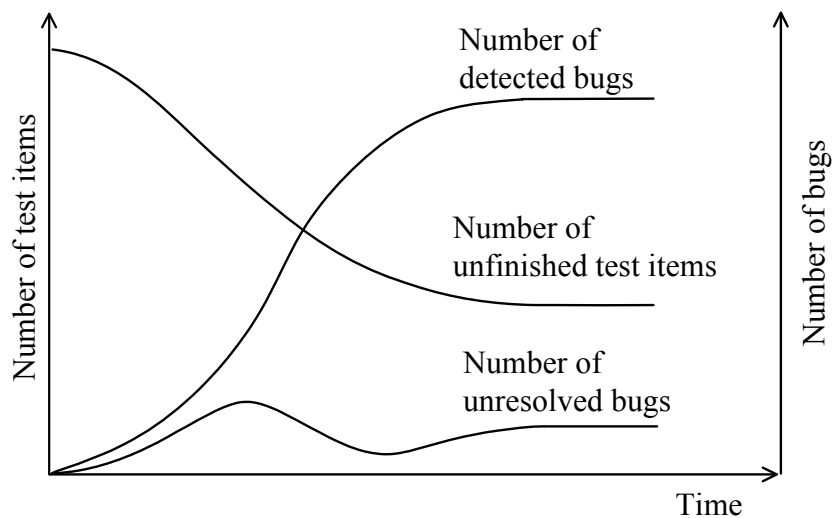
Q49. Which of the following is an appropriate combination of the fundamental object-oriented concepts?

- a) Abstraction, encapsulation, inheritance, class
- b) Materialization, structuring, continuity, class
- c) Normalization, encapsulation, division, class
- d) Virtualization, structuring, projection, class

- Q50.** In software development, it is a good practice to develop highly independent modules. When module independence depends primarily on two measures, module strength (or cohesion) and module coupling, which of the following is the appropriate combination of good programming practices?

	Module strength	Module coupling
a)	High	High
b)	High	Low
c)	Low	High
d)	Low	Low

- Q51.** As shown in the figure below, all the lines show signs of leveling off in the control chart of a program test. Which of the following can be inferred from this condition?



- a) Numerous bugs have occurred, and the number of completed test items has stopped rising.
- b) The bug occurrence and test item completion rates match, and there are no more unresolved bugs.
- c) The number of completed test items has risen, and bugs have stopped occurring.
- d) The process is facing some bugs that are difficult to resolve, and subsequent tests are not proceeding.

Q52. Which of the following is the test that is performed to ensure that the components and modules of a system can communicate with one another in accordance with the functional specifications and design?

- a) Integration test
- b) Operational test
- c) System test
- d) Unit test

Q53. Which of the following is the software development process model that incorporates the best features of both the classic lifecycle and the prototyping approaches, by beginning each repeated development cycle with extensive risk analysis throughout the entire software development life cycle for large-scale applications?

- a) Evolution model
- b) Growth model
- c) Spiral model
- d) Waterfall model

Q54. Which of the following is an appropriate description concerning the maturity level in the staged representation of CMMI?

- a) At the “defined” level, processes are statistically measured and controlled.
- b) At the “initial” level, processes are characterized for projects and are often reactive.
- c) At the “managed” level, processes are documented and followed.
- d) At the “quantitatively managed” level, processes are continually improved.

Q55. Which of the following is the project management tool whereby the project activities and their relationships can be graphically represented, and the project manager can understand how the various activities flow towards completion in order of time?

- a) Gantt chart
- b) Network diagram
- c) Sequence diagram
- d) WBS

Q56. A painter has 20 houses and 4 shops to paint. In comparison with the shop, the house usually takes half the time to paint. The painter has finished painting 10 houses in 3 days. If the painter continues to work at the same pace, how many days does it take to complete the remaining work?

- a) 3.0 b) 3.6 c) 5.4 d) 8.4

Q57. Which of the following is the appropriate element that is used to calculate slack time in the PERT (Program Evaluation and Review Technique)?

- a) The earliest of the earliest start times of the successor activities
- b) The earliest of the latest start times of the successor activities
- c) The latest of the earliest start times of the successor activities
- d) The latest of the latest start times of the successor activities

Q58. Which of the following is the method used for estimating the scales or person-months in system development where the five basic components—external input, external output, internal logical file, external interface file, and external inquiry—are defined and classified with their complexity weights?

- a) COCOMO b) Function point method
- c) LOC method d) Standard task method

Q59. Which of the following is the risk response which accepts the cost of damages because risk impact is assumed to be small when the risk becomes exposed?

- a) Risk avoidance b) Risk reduction
- c) Risk retention d) Risk transfer

Q60. Which of the following is an appropriate characteristic of the single-step (so-called “big bang”) migration method?

- a) It requires an application that provides a connection between the new and old systems.
- b) Operational costs are additionally required for parallel operations.
- c) Problems during migration to the new system have serious impacts.
- d) The new and old systems are operated in parallel, and then migration to the new system is performed at a certain point in time.

Q61. From a viewpoint of reliability of systems, which of the following is the appropriate timing for measuring the availability of a system?

- a) When failures begin to increase because of the aging of the system through long-term operations
- b) When system operations are started
- c) When the decision is made on whether or not to release the system
- d) When the problems found immediately after the start of system operations have been resolved and the system is becoming stable

Q62. When a company is notified of the necessity of upgrading the version for the server OS on which a database system and business application are running, which of the following is an appropriate decision on whether or not to upgrade the OS?

- a) The business application has been used for a long time, but the database system is relatively new. Therefore, the company upgrades the OS after checking the compatibility of the OS and the database.
- b) The company checks if the database system runs without problem in the new OS environment, and then checks the operation of the business application. If there is no problem, the company upgrades the OS.
- c) The database system uses the database management functions provided by the OS vendor, so there should be no problem. Therefore, the company upgrades the OS if there is no problem found by investigating the compatibility between the business application and the OS.
- d) The support services for the OS being in use are terminated soon after the new OS is released, so the company immediately upgrades the OS.

Q63. Which of the following is an effective measure to protect information systems from overvoltage caused by lightning?

- a) Connecting communication cables to computers via SPD (Surge Protection Device)
- b) Digitizing the control circuits of power supply facilities
- c) Preparing a private power generator
- d) Using two communication lines that pass through different routes

Q64. Which of the following is an appropriate responsibility of a system auditor for problems found during an audit?

- a) Correcting on his or her own the problems found
- b) Instructing the audited department to correct the problems found
- c) Reporting the problems found to the audit requester
- d) Reporting the problems found to the user departments of the system

Q65. Which of the following is an explanation of ERP?

- a) It is the technique and concept for improvement in management efficiency by planning and controlling the company-wide management resources in an effective and integrated way.
- b) It is the technique and concept to perform commercial transactions for consumers and between companies by using electronic networks, such as the Internet.
- c) It is the technique and concept to use IT for business activities to improve efficiency and quality for a significant increase in sales/profits and improved customer satisfaction.
- d) It is the technique and concept where wholesalers and manufacturers support the business activities of retail stores for increased turnover.

Q66. Which of the following is an explanation of BPR?

- a) Focusing the management resources on proprietary skills and techniques that are profitable and superior to those of the competitors
- b) Planning and managing effectively and comprehensively the allocation of management resources of the entire company to improve management efficiency
- c) Redesigning the business processes from a customer perspective, by making full use of information technology to radically change the characteristics and structure of the company
- d) Understanding qualitatively and quantitatively the products, services, and operations of the company by comparing them with those of the strongest competitor or of other advanced corporations

Q67. Which of the following is the service provided by ASPs?

- a) Services in which external providers collectively undertake business operations, such as general affairs, personnel affairs, accounting, and payroll accounting, which are performed internally at customer organizations
- b) Services in which providers lend some of their servers to customers so that these customers can use the servers as their own servers
- c) Services to provide a variety of functions of a general-purpose application system to multiple customers over a network
- d) Services to provide facilities equipped with high-speed lines and earthquake-resistant features owned by providers in order to install customer servers or communication equipment

Q68. Which of the following is an activity concerning a model of business operations developed during the overall planning of information systems?

- a) Associating business processes with data classes
- b) Associating functions with forms in an organization
- c) Defining the functions and necessary data items of mission-critical systems
- d) Defining the relationships between the existing information systems and databases

Q69. Which of the following is an explanation of SOA?

- a) It is an architectural style or method to implement software functions corresponding to each activity in business operations as services, and to build the entire system by combining these services.
- b) It is an architectural style or method to provide IT services that satisfy customer requirements in accordance with a service level agreement, and to build a process required to continuously improve their quality.
- c) It is an architectural style or method to realize data communication between heterogeneous systems by dividing communication services into seven layers and defining standard protocols and specifications of communication services for each layer.
- d) It is an architectural style or method to store software on servers in the network to provide only services required by users via a network.

Q70. Which of the following is an explanation of digital divide?

- a) It refers to a single point of contact to provide all services for each segment of civic events or corporate activities.
- b) It refers to allowing citizens to directly participate in shaping central or local government policies by means such as the Internet.
- c) It refers to communication and broadcasting services which are equally available to all citizens without regional disparities at a reasonable price.
- d) It refers to economic or social disparities caused by differences in capabilities or opportunities to use PCs and telecommunications.

Q71. Which of the following describes characteristics of the growth stage of the product life cycle?

- a) Demand decreases, and some companies withdraw from the market. In this stage, the company decides if it can maintain its competitive advantage and examines the possibility of entering alternative markets.
- b) Demand increases, and the differentiation of the product and the segmentation of the market become more apparent. Competition also increases, and the company needs to create a new variety of products and reduce costs.
- c) Demand is limited, and it is essential to create new demand. The company needs to sell the product to specific target customers with conviction.
- d) The market begins to understand the value of the product. The company needs to expand its product lines and distribution channels. During this stage, sales increase but more investment is required.

Q72. Which of the following is a mechanism used in electronic commerce to exchange data between companies?

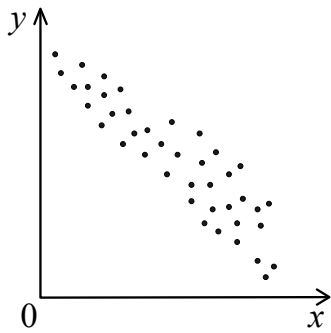
- a) CA b) EDI c) SSL d) XBRL

Q73. Which of the following is the most appropriate position that is primarily responsible for centralized oversight of enterprise IT strategic planning?

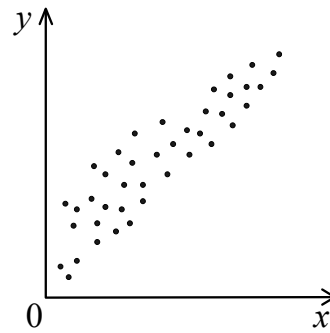
- a) CEO (Chief Executive Officer) b) CFO (Chief Financial Officer)
- c) CIO (Chief Information Officer) d) COO (Chief Operating Officer)

Q74. When the relationship between the value “ x ” of a certain factor in manufacturing a product and the value “ y ” of a quality characteristic for the product is plotted in a chart, which of the following charts has the positive correlation coefficient between x and y ?

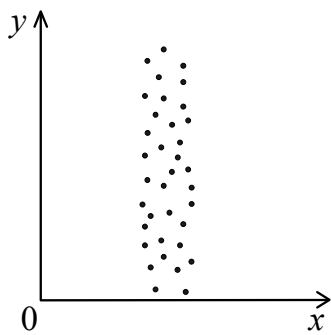
a)



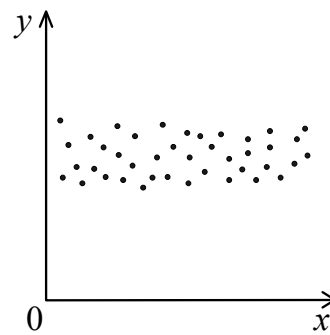
b)



c)



d)



Q75. When ABC analysis is used to categorize product items in the table below, which of the following is the combination of the product numbers for the items that are categorized into the group “A”?

Product number	Annual sales quantity	Unit price	Annual sales amount
1	110	2	220
2	60	40	2,400
3	10	4	40
4	130	1	130
5	50	12	600
6	1	25	25
7	10	2	20
8	150	2	300
9	20	2	40
10	50	1	50
Total	591		3,825

- a) 1 and 2 b) 2 and 5 c) 2 and 6 d) 4 and 8

Q76. When the relationship between the list price and expected demand of a product can be expressed by a linear expression, which of the following is the appropriate value to be inserted in the blank *A*?

- (1) When the list price is set to 30 dollars, the quantity demanded is 0.
 (2) When the list price is set to 10 dollars, the quantity demanded is 60,000.
 (3) When the list price is set to 15 dollars, the quantity demanded is *A*.

- a) 30,000 b) 35,000 c) 40,000 d) 45,000

Q77. Which of the following is an appropriate description concerning financial indicators?

- a) The current ratio is the ratio of current assets to current liabilities. As the value is smaller, safety and soundness are higher.
- b) The equity to total asset is the ratio of equity capital to fixed assets. As the value is larger, steadiness and soundness are higher.
- c) The fixed ratio is the ratio of fixed assets to fixed liabilities. As the value is smaller, safety and soundness are higher.
- d) The total capital profit ratio is the ratio of profit to gross capital. As the value is larger, profitability is higher.

Q78. The table below shows records of purchase and withdrawal for a component. When the first-in first-out method is applied, which of the following is the unit price of the withdrawal on April 10?

Transaction date	Transaction type	Quantity	Unit price (dollars)	Amount (dollars)
April 1	Carry-forward from the previous month	2,000	100	200,000
April 5	Purchase	3,000	130	390,000
April 10	Withdrawal	3,000		

- a) 100
- b) 110
- c) 115
- d) 118

Q79. Which of the following is a law that protects coded expressions of programs rather than ideas or algorithms in programs?

- a) Copyright law
- b) Industrial design law
- c) Patent law
- d) Trademark law

Q80. Which of the following sets of standards should be applied for the purpose of developing the new products that are expected to be employed by government agencies of countries who are members of the WTO?

- | | |
|-------------------|------------------|
| a) ANSI standards | b) FCC standards |
| c) IEEE standards | d) ISO standards |