



October 2009

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 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]

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. Which of the following represents the hexadecimal fraction 3A.5C as a decimal fraction?

- a) $\frac{939}{16}$ b) $\frac{3735}{64}$ c) $\frac{14939}{256}$ d) $\frac{14941}{256}$

Q2. Which of the following hexadecimal numbers, representing signed 16-bit binary numbers, results in overflow when multiplied by 4? Here, a negative number is represented in 2's complement.

- a) 1FFF b) DFFF c) E000 d) FFFF

Q3. Which of the following is the appropriate reason why the mantissa is normalized in the floating point representation?

- a) The arithmetic operation algorithm can be simplified.
b) The maximum number of significant digits can be maintained.
c) The range of representable values can be expanded.
d) The relative size relationships can be investigated as if in fixed point numbers.

Q4. The function $f(x)$ has a real-type argument and a real-type return value. The procedure using this function is shown in the steps 1 through 5. When this procedure is executed repeatedly a sufficient number of times and the value of y stops changing in the step 3, which of the following expressions holds?

[Steps]

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

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

Q5. The student scores in a certain examination are shown in the table below. What is the standard deviation of these student scores? Here, the standard deviation δ can be defined as follows:

$$\delta^2 = \frac{1}{n} \sum_{i=0}^n (x_i - \bar{x})^2$$

“ δ ” is a positive number, and “ n ” is the number of sample values. “ x_i ” is each sample value, and “ \bar{x} ” is an arithmetic average of the sample values.

Student name	Score
Mr. Brown	30
Ms. Rose	50
Mr. White	60
Ms. Green	70
Mr. Black	90

- a) 10 b) 20 c) 30 d) 60

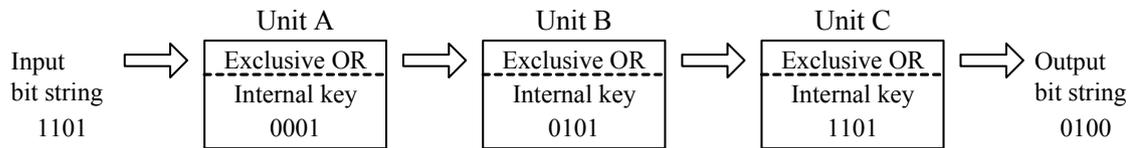
Q6. There are three different sizes of white balls and three different sizes of green balls. When these six balls are laid out in a line so that the three white balls can be placed in adjacent positions, how many arrangements of all the balls can be made?

- a) 10 b) 144 c) 576 d) 720

Q7. Which of the following expressions results in a loss of trailing digits when calculated by a computer whose floating-point representation has a 23-bit mantissa? Here, the numbers in “()₂” are represented in binary.

- a) $(10.101)_2 \times 2^{-16} - (1.001)_2 \times 2^{-15}$ b) $(10.101)_2 \times 2^{16} - (1.001)_2 \times 2^{16}$
c) $(1.01)_2 \times 2^{18} + (1.01)_2 \times 2^{-5}$ d) $(1.001)_2 \times 2^{20} + (1.1111)_2 \times 2^{21}$

Q8. There is a device consisting of Unit A, Unit B, and Unit C. Each unit can execute the “exclusive OR” operation in units of 4 bits. When an input bit string 1101 is given, an output bit string 0100 is obtained. In this device, if the internal key for Unit B is changed and the output bit string 1111 is generated, which of the following is the newly changed internal key for Unit B?



- a) 1011 b) 1100 c) 1101 d) 1110

Q9. As shown in the truth table below, when an output signal is generated using three input signals A, B, and C, which of the following Boolean expressions can be applied to the output signal? Here, “ \cap ” stands for the logical product, “ \cup ” for the logical sum, and “ \bar{X} ” for the logical negation of “X”.

Input signal			Output signal
A	B	C	
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

- a) $A \cap \bar{B} \cap C$ b) $\bar{A} \cap (B \cup C)$ c) $A \cup \bar{B} \cup C$ d) $\bar{A} \cap (B \cap C)$

Q10. A “negative AND” operation “ $X \text{ NAND } Y$ ” of X and Y is defined as “NOT ($X \text{ AND } Y$)”. Which of the following is the logical expression that represents “ $X \text{ OR } Y$ ” by using NAND only?

- a) $((X \text{ NAND } Y) \text{ NAND } X) \text{ NAND } Y$
- b) $(X \text{ NAND } X) \text{ NAND } (Y \text{ NAND } Y)$
- c) $(X \text{ NAND } Y) \text{ NAND } (X \text{ NAND } Y)$
- d) $X \text{ NAND } (Y \text{ NAND } (X \text{ NAND } Y))$

Q11. Which of the following is included as an element of a set of character strings represented by a regular expression “ $[A-Z]^+[0-9]^*$ ”? Here, the regular expression follows the rules described below.

$[A - Z]$ denotes a single alphabetical letter.

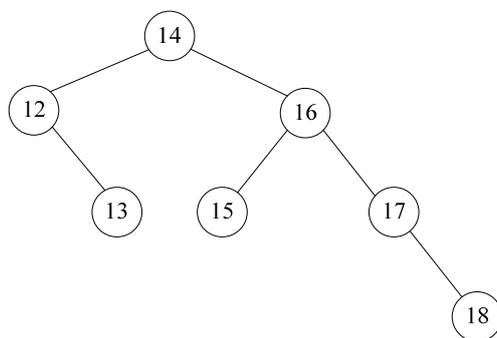
$[0 - 9]$ denotes a single numeral.

The symbol “ $*$ ” denotes zero or more repetitions of the immediately preceding regular expression.

The symbol “ $+$ ” denotes one or more repetitions of the immediately preceding regular expression.

- a) 456789
- b) ABC99*
- c) ABC+99
- d) ABCDEF

Q12. Which of the following terms is applicable to the binary tree shown below?



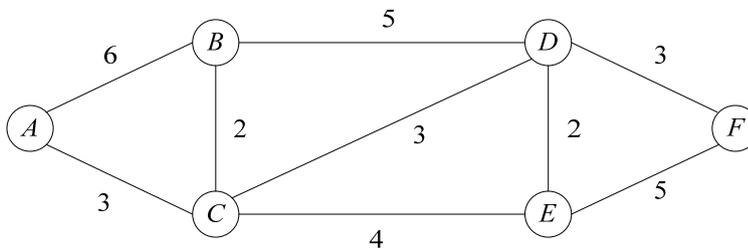
- a) AVL tree
- b) Full binary tree
- c) Max heap
- d) Perfect binary tree

Q13. In a unidirectional list shown below, *Blue* is the top of the list, and its pointer indicates the next data address 110. In addition, *Yellow* is the end of the list, and its pointer is 0. Which of the following operations can replace *Green* with *Red* in the list?

Pointer to top of list	Address	Data	Pointer
120	100	<i>Pink</i>	130
	110	<i>Green</i>	100
	120	<i>Blue</i>	110
	130	<i>Yellow</i>	0
	140	<i>Red</i>	

- a) Set the pointers of *Red* and *Blue* to 100 and 140 respectively.
- b) Set the pointers of *Red* and *Blue* to 110 and 140 respectively.
- c) Set the pointers of *Red* and *Green* to 100 and 140 respectively.
- d) Set the pointers of *Red* and *Green* to 110 and 140 respectively.

Q14. In the graph shown below, which of the following is an appropriate description concerning the shortest path from the node “A” to another node? Here, the number shown beside the line indicates the distance between the two adjacent nodes.

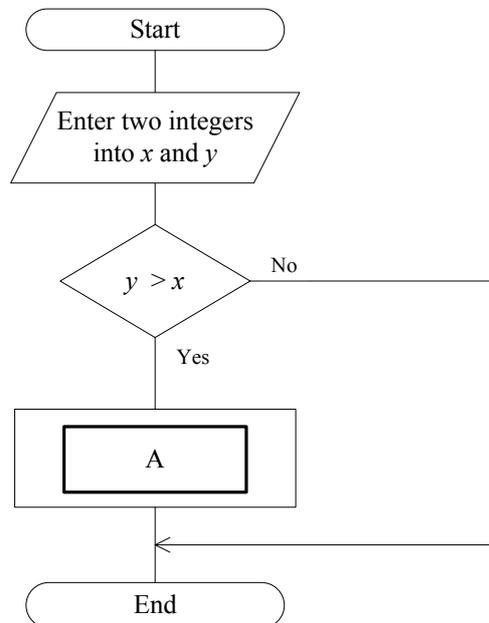


- a) The shortest distance from *A* to *B* is 6.
- b) The shortest distance from *A* to *D* is 10.
- c) The shortest distance from *A* to *E* is 13.
- d) The shortest distance from *A* to *F* is 9.

Q15. When the bubble sort algorithm is used for sorting the dataset (23, 43, 56, 12, 87, 14, 87, 15, 90, 23, 10) in descending order, how many data exchanges occur during the first pass?

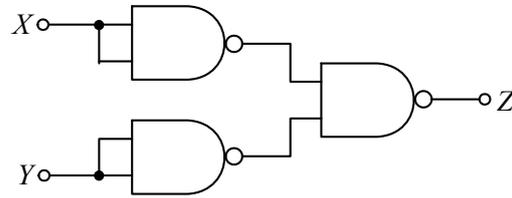
- a) 7 b) 8 c) 9 d) 10

Q16. The flowchart below shows an algorithm in which two integers are temporarily entered into two variables x and y at the beginning, and then, after comparison of the two integers, the larger number is stored in the variable x and the smaller is in the variable y . In order to complete the algorithm, which of the following should be inserted in the process box **A** in the flowchart?



- | | | | |
|----------------------|--------------------------|--------------------------|----------------------|
| a) $x \rightarrow t$ | b) $x + y \rightarrow x$ | c) $x + y \rightarrow x$ | d) $y \rightarrow x$ |
| $t \rightarrow y$ | $x - y \rightarrow x$ | $x - y \rightarrow y$ | $x \rightarrow y$ |
| $y \rightarrow x$ | $x - y \rightarrow y$ | $x - y \rightarrow x$ | |

Q17. Which of the following expressions shows the output Z of the combinational circuit using NAND gates as shown below? Here, “ \cdot ” stands for the logical product, “ $+$ ” for the logical sum, and \overline{X} for the logical negation of X .



- a) $X \cdot Y$ b) $X + Y$ c) $\overline{X+Y}$ d) $\overline{X \cdot Y}$

Q18. When a certain RISC processor has a 5-stage instruction pipeline, how long (in nanoseconds) does it take to continuously execute 7 instructions excluding branch/jump instructions? Here, it takes 1.5 nanoseconds to complete each stage. In addition, any delay, such as pipeline stall and bubble, does not occur during the execution of those instructions.

- a) 7.5 b) 10.5 c) 16.5 d) 52.5

Q19. At least how many bits are required for the register identification field of a machine instruction code in order to specify one of 16 general purpose registers in the machine?

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

Q20. Which of the following architectures in a uniprocessor requires multiple functional units that can execute two or more instructions in parallel during a clock cycle by simultaneously dispatching the instructions to the functional units?

- a) Pipeline b) Super-pipeline c) Superscalar d) VLIW

Q21. Which of the following is used to hold the address of the instruction being executed or the address of the next instruction to be executed, and is automatically incremented after fetching an instruction?

- a) Accumulator
- b) Base address register
- c) Index register
- d) Program counter

Q22. When a microprocessor works at a clock speed of 200 MHz and the average CPI (“cycles per instruction” or “clocks per instruction”) is 4, how long does it take to execute one instruction on average?

- a) 5 nanoseconds
- b) 20 nanoseconds
- c) 5 milliseconds
- d) 20 milliseconds

Q23. Which of the following is a method that serves to enhance the reliability of memory access and makes it possible to automatically correct some of data errors?

- a) Checksum
- b) CRC
- c) ECC
- d) Parity

Q24. Which of the following is an appropriate description concerning RAID?

- a) RAID 0 increases performance by using disk striping. However, the reliability is rather low because damages on even one disk cause whole data to be lost.
- b) RAID 1 enhances both performance and reliability by using disk mirroring. Data can be restored immediately by using redundant disks at the occurrence of a failure.
- c) RAID 3 improves both performance and reliability by generating parity information which is distributed and recorded together with striped data across all disks.
- d) RAID 5 uses bit-level or byte-level striping with a dedicated parity disk, which contributes to improvement of performance and reliability.

Q25. Which of the following USB transfer modes is mainly used for a mouse, joystick, etc.?

- a) Bulk transfer
- b) Control transfer
- c) Interrupt transfer
- d) Isochronous transfer

Q26. When an image is read with a scanner at a resolution of 600 dpi and printed with a printer at a resolution of 300 dpi, how many times as large as the area of the original image is the area of the printed image?

- a) $\frac{1}{4}$
- b) $\frac{1}{2}$
- c) 2
- d) 4

Q27. Which of the following input devices is classified as a pointing device and used for graphics input in a CAD system?

- a) Image scanner
- b) OCR
- c) OMR
- d) Tablet

Q28. Which of the following combinations of access time and hit ratio for cache memory and access time for main memory results in the shortest effective access time to main memory?

	Cache memory		Main memory
	Access time (nanoseconds)	Hit ratio (%)	Access time (nanoseconds)
a)	8	60	40
b)	8	70	40
c)	10	70	30
d)	10	80	30

Q29. The LRU method can be used as one of the methods for replacing blocks between the cache memory and the main memory. Which of the following blocks is subject to replacement by this method?

- a) A block that has not been referenced for a certain period of time
- b) The block with the lowest reference frequency
- c) The block with the longest time since it was loaded
- d) The block with the longest time since it was referenced last

Q30. As one of the virtual storage methods, virtual address space is divided into fixed-length areas. What is such a fixed-length area called?

- a) Frame
- b) Page
- c) Sector
- d) Segment

Q31. Which of the following descriptions about file storage is appropriate as the explanation of an archive?

- a) It bundles multiple files into one file and stores it in a storage device.
- b) It stores the same file on two hard disks and ensures the reliability of data storage.
- c) It stores the specific main memory data and the register values in other storage devices temporarily.
- d) It stores the update history of a file on a hard disk.

Q32. There is a fault-tolerant computer system with high reliability and availability in which two CPUs perform the same processing and compare the processing results to each other. If one CPU fails, the system cuts off the failed CPU and continues processing on the other CPU. What is this system configuration called?

- a) Dual system
- b) Duplex system
- c) Load sharing system
- d) Multiprocessing system

Q33. Which of the following is an appropriate explanation of fault-tolerant systems?

- a) Even in the event of a partial system failure, the system as a whole can provide necessary operational capabilities.
- b) In preparation for local disasters, there is a backup system available in a remote site.
- c) Individual transactions are processed in parallel by multiple processors and the results are compared.
- d) Resources are shared among multiple processors connected via a network.

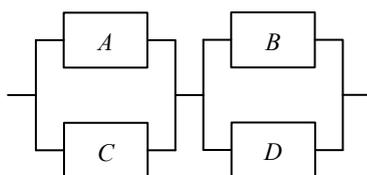
Q34. There are four hard disk subsystems *A*, *B*, *C*, and *D* including two or three disks with designated MTBF values as shown in the table below. Which of the following hard disk subsystems can provide the highest reliability? Here, if one of the disks fails in each subsystem, it is regarded as a failure of the entire hard disk subsystem.

Unit: hour

Hard disk subsystem	MTBF		
	Disk 1	Disk 2	Disk 3
<i>A</i>	400,000	600,000	–
<i>B</i>	400,000	500,000	600,000
<i>C</i>	500,000	500,000	–
<i>D</i>	500,000	500,000	500,000

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

Q35. Which of the following is the closest value as overall availability of the system composed of the four devices *A* to *D*? Here, availability of individual device is 0.9 for *A* and *C*, and 0.8 for *B* and *D*. In addition, when either of the parallel connections is operating, the corresponding parallel portion can be regarded as operating.



- a) 0.72
- b) 0.92
- c) 0.93
- d) 0.95

Q36. Which of the following is the most appropriate description concerning the interconnection interfaces between computers and peripheral devices or between peripheral devices?

- a) Bluetooth is a serial bus interface which can provide a small amount of power, eliminating the need for external power cables for most peripherals, besides the capability of transferring data to and from peripheral devices at low, high, or full speed.
- b) FireWire is a wireless technology which is designed primarily to replace cables for low cost, short-range radio links between PCs and peripheral devices or between peripheral devices.
- c) IEEE 802.11 refers to a family of specifications for wireless LAN, and includes several standards, such as IEEE 802.11a, 802.11b, and 802.11g, which define over-the-air interfaces between a wireless client and a base station or between two wireless clients.
- d) USB is a type of serial bus interface, officially known as IEEE 1394a/b/c, which is used for transferring data to and from multimedia peripherals and other high-speed devices like the latest hard disk drives and printers.

Q37. Which of the following performs reasoning using a knowledge base?

- a) Expert system
- b) Fuzzy computer
- c) Neural network
- d) Virtual reality

Q38. Which of the following is the main purpose of optimization performed by a compiler?

- a) To improve the maintainability of a program
- b) To make it easy to debug a program at source code level
- c) To reduce program execution time
- d) To reduce the time to generate an object program

Q39. Which of the following is the international standard of the document description language that defines how to describe the logical structure and makes it easy to manage and exchange electronic documents?

- a) DML
- b) HTML
- c) SGML
- d) UML

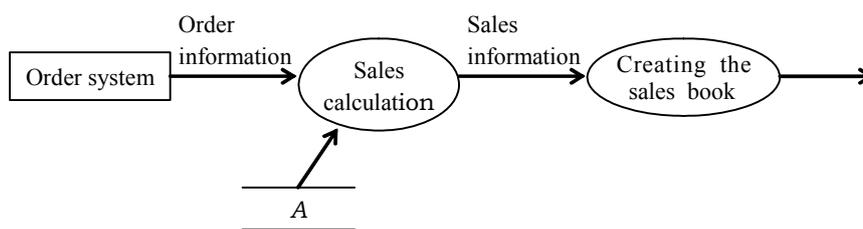
Q40. Which of the following software, as represented by Linux, requires the freedom to redistribute, inclusion of the source code at redistribution, and consent to modify derived software?

- a) Componentware
- b) Middleware
- c) Open source software
- d) Shareware

Q41. Which of the following is the activity performed during the external design phase in system development?

- a) Logical data design
- b) Physical data design
- c) Requirements analysis
- d) Structured program design

Q42. In the DFD for a sales management system shown below, which of the following is appropriate for item *A*?



- a) Order file
- b) Records of money received
- c) Sales file
- d) Unit price list

Q43. Which of the following is the appropriate description of the relationship between a class and an instance in the object-oriented approach?

- a) An instance defines the specification for a class.
- b) An instance is generated based on the definition of a class.
- c) Multiple classes correspond to one instance.
- d) Only one instance exists for one class.

Q44. Module coupling needs to be weakened in order to increase module independence. Which of the following has the weakest level of module coupling among methods of information transfers between modules?

- a) A control parameter is passed as an argument to control the execution sequence of modules.
- b) Data defined in a common area is referenced by related modules.
- c) Only data items are passed as arguments between modules.
- d) The required data is externally declared and shared.

Q45. Which of the following is the appropriate point to notice at the time of creating the test data for a white box test?

- a) The boundary values for each equivalent class obtained with the application of equivalence partitioning
- b) The functions of the program
- c) The internal structures, such as the algorithm, for the program
- d) The relationships between the input and output of the program

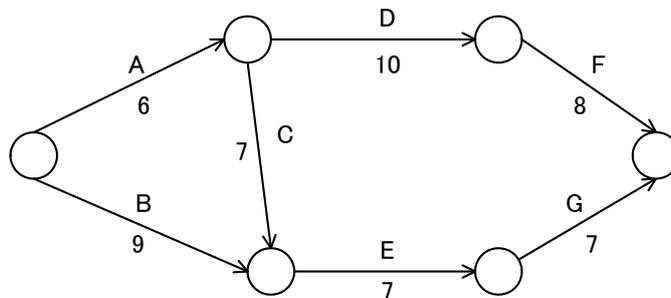
Q46. Which of the following is the appropriate purpose of design review?

- a) To find specification defects and design errors at an early stage, and reduce the person hours for rework
- b) To improve the design quality to more precisely estimate the development scale
- c) To prevent errors in the design phase, simplify the test, and improve development efficiency
- d) To review the development schedule and make it feasible

Q47. When the cost associated with information systems can be broken down into the initial cost and the running cost, which of the following is included in the initial cost?

- a) Amortization cost for equipment and facilities
- b) Development cost of application software
- c) Personnel cost associated with operations
- d) Rental or lease cost of equipment

Q48. In an arrow diagram shown below, how many days are needed in minimum to complete all the activities A through G? Here, in the diagram, each number shown beside the arrow indicates the number of days required to complete the activity.



- a) 10
- b) 23
- c) 24
- d) 27

Q49. When the development department and the operations department of a system are organized separately, which of the following is the appropriate method for smooth and effective transfer from development to operations?

- a) After the operational test is completed, the development department explains the system specifications and the operations method to the operations department.
- b) Only the operations department performs the operational test without support from the development department for efficiency.
- c) The development department performs the operational test, creates an operations manual, and delivers it to the operations department.
- d) The operations department proactively participates in the system development and provides advice from the viewpoint of operations.

Q50. When there are multiple business application systems available, which of the following is the most appropriate method for access control?

- a) A common user ID is used for each application group in order to quickly respond to changes in the personnel in charge.
- b) All users are registered to all the business application systems beforehand, based on the list of new employees.
- c) Appropriate access permissions are granted for each business application system, irrespective of a user's position and authority.
- d) When staff reassignment occurs frequently, access permissions are changed all together at the beginning of the year.

Q51. Which of the following is the most appropriate description concerning the changes in network configuration after the beginning of operations?

- a) It is necessary to update the equipment control log, network diagram, etc. on a timely basis so that the network configuration can be changed at any time as needed.
- b) Management with network management software is more difficult as the network configuration becomes more complicated. Therefore, an experienced engineer must change the configuration.
- c) The network configuration must be changed after all business applications are stopped to ensure network security.
- d) The network configuration must be fully studied at the time of network construction. The configuration should not be changed after the beginning of operations.

Q52. Which of the following is an appropriate description concerning maintenance of applications?

- a) Consider maintenance activity completed, when the test by the maintenance engineer in charge is finished.
- b) Record the completion of maintenance in order to prevent maintenance activities from being left uncompleted.
- c) Register the program into the library under full operations after the successful completion of the test, and then report to the maintenance approver.
- d) Update the library directly under full operations, when the change can be considered to be simple.

Q53. Which of the following appropriately explains the function of the transport layer in the OSI basic reference model?

- a) It is responsible for establishing, managing, and terminating communication connections between the applications running in different nodes, and provides means for dialogue control between end systems.
- b) It is responsible for maintaining reliable end-to-end communications and data transfer between systems across the network, and provides a variety of functions including flow control, virtual circuit, and error checking and recovery.
- c) It provides a set of interfaces for applications to obtain access to networked services as well as access to a variety of network services that support applications directly.
- d) It provides a variety of coding and conversion functions which ensure that information sent from the application layer of one system is readable by that of another system.

Q54. Which of the following is the appropriate statement concerning the number of host addresses available to one sub-network in IPv4?

- a) The number of host addresses available in a sub-network is always fixed, depending on the class of IP address; 2^8 for class A, 2^{16} for class B, and 2^{24} for class C.
- b) The number of host addresses available in a sub-network is always fixed, depending on the class of IP address; 2^{24} for class A, 2^{16} for class B, and 2^8 for class C.
- c) The number of host addresses available in a sub-network is determined by the number of “0” bits in the subnet mask.
- d) The number of host addresses available in a sub-network is determined by the number of “1” bits in the subnet mask.

Q55. Which of the following is the local broadcast address to be used by a computer with IP address 202.130.17.63 and subnet mask 255.255.255.0 if classless addressing is used?

- a) 202.130.0.0
- b) 202.130.0.1
- c) 202.130.17.1
- d) 202.130.17.255

Q56. When a 9-Kbyte data file is transmitted using the asynchronous (or start-stop) communication protocol at a speed of 2,400 bps, what is the “overhead” (time spent on sending start, stop, and parity bits except data bits) in seconds? Here, a start bit is first sent, followed by eight data bits, no parity bit, and one stop bit, for each byte of the data file.

- a) 7.5 b) 11.25 c) 30 d) 37.5

Q57. When MAC (Media Access Control) frames defined by IEEE 802.3 are transmitted over Ethernet, which of the following methods is used for error detection?

- a) Checksum b) CRC
c) Hamming code check d) Parity check

Q58. Which of the following methods is used for avoiding unnecessary collisions in the IEEE 802.11 family of wireless LAN standards?

- a) CDMA b) CSMA/CA
c) CSMA/CD d) TDMA

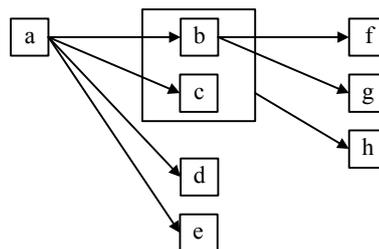
Q59. VLAN (Virtual LAN) is used to logically segment a LAN into different broadcast domains. In which of the following network devices should the function of VLAN be supported?

- a) Bridge b) Hub
c) Repeater d) Switch

Q60. Which of the following is an appropriate explanation of the schema in a relational database management system?

- a) It is a set of data definitions, such as the data attributes, data formats, and relationships with other data.
- b) It is not an actual table, but instead a virtual table from the viewpoint of the user.
- c) It is the umbrella term for database operations, such as the insert, update, delete, and search operations for data.
- d) It is the umbrella term for various constraints that maintain database consistency.

Q61. $\boxed{x} \rightarrow \boxed{y}$ indicates that the value of attribute y is determined uniquely by the value of attribute x . Which of the following appropriately defines the relationships shown in the figure as a set of tables of the third normal form? Here, multiple attributes contained in a box \boxed{x} show that the value of attribute y is determined uniquely by the values of all those multiple attributes.



- | | |
|--|---|
| <ul style="list-style-type: none"> a) Table 1 { a } Table 2 { b, c, d, e } Table 3 { f, g, h } | <ul style="list-style-type: none"> b) Table 1 { a, b, c, d, e } Table 2 { a, c } Table 3 { b, e, f, g, h } |
| <ul style="list-style-type: none"> b) Table 1 { a, b, c, d, e } Table 2 { b, c, f, g, h } Table 3 { b, c, h } | <ul style="list-style-type: none"> d) Table 1 { a, b, c, d, e } Table 2 { b, f, g } Table 3 { b, c, h } |

Q62. Which of the following is a non-updatable view?

- a) A view for a view
- b) A view including a “GROUP BY” clause in the view definition
- c) A view including a “WHERE” clause in the view definition
- d) A view not including the primary key of the original table

Q63. There are two tables X and Y as shown below. Which of the following SELECT statements returns the maximum number of rows by using these two tables?

X	Y
VAL	VAL
1	1
2	2
3	3

- a) `SELECT * FROM X, Y`
- b) `SELECT * FROM X, Y WHERE X.VAL > Y.VAL`
- c) `SELECT * FROM X`
`UNION`
`SELECT * FROM Y`
- d) `SELECT * FROM X X1, X X2 WHERE X1.VAL = X2.VAL`

Q64. When a new record is inserted in the relational database table “Payment” shown below, which of the following SQL statements causes a unique constraint violation? Here, “Contract_number” and “Contract_date” are primary keys.

Payment

<u>Contract_number</u>	<u>Contract_date</u>	Amount
1001	2009-01-10	1,000
1003	2009-01-15	890
1003	2009-02-10	80

- a) INSERT INTO Payment VALUES (1001, '2009-01-15', 80)
- b) INSERT INTO Payment VALUES (1002, '2009-01-10', 970)
- c) INSERT INTO Payment VALUES (1003, '2009-01-10', 890)
- d) INSERT INTO Payment VALUES (1003, '2009-01-15', 1000)

Q65. Which of the following files is used for writing the values before and after a database update, and storing them as a database update record?

- a) Backup file
- b) Checkpoint file
- c) Dump file
- d) Journal file

Q66. When secret documents are sent and received using public key cryptography, which of the following is an appropriate description of the key management?

- a) The decryption key must be kept private, but the encryption key is public.
- b) The encryption and decryption keys may be public, but the encryption algorithm must be kept private.
- c) The encryption key may be public, but the encryption algorithm must be kept private.
- d) The encryption key must be kept private, but the decryption key is public.

Q67. In the context of message authentication code, which of the following is the purpose of using message digests?

- a) To check a summary of the message
- b) To check the message encryption method
- c) To confirm that no message has been tampered with
- d) To ensure message confidentiality

Q68. Which of the following is an appropriate explanation of Web beacons?

- a) Images embedded in Web pages to gather information such as user access trends
- b) Latent errors in application programs used on Web sites
- c) Unauthorized techniques to inflict damage on both PCs and Web servers themselves, through malicious script
- d) Viruses downloaded from Web sites that delete image files on a PC

Q69. Which of the following is an appropriate description concerning security measures for network systems?

- a) By using a circuit-switched network with closed-area connection functions, limiting connections to particular user groups is an effective way to prevent unauthorized external access.
- b) In ISDN and packet-switched lines, it is possible to confirm the other party based on the subscriber number which is received in notification at the time of connection. This is referred to as callback.
- c) Installing a line encryption device between DTEs (such as communication control units and terminal equipment) and DCEs (such as modems and DSUs) as an encryption method for each transmission segment requires modification of some existing hardware and software.
- d) Using a wireless LAN is an effective way to prevent interception of transmissions because there is no cable in between.

Q70. There are two types of attacks which an information system might face: active attack and passive attack. Which of the following is categorized as an active attack?

- a) Analysis of data traffic
- b) DoS (Denial of Service)
- c) Falsification of data
- d) Replay of messages

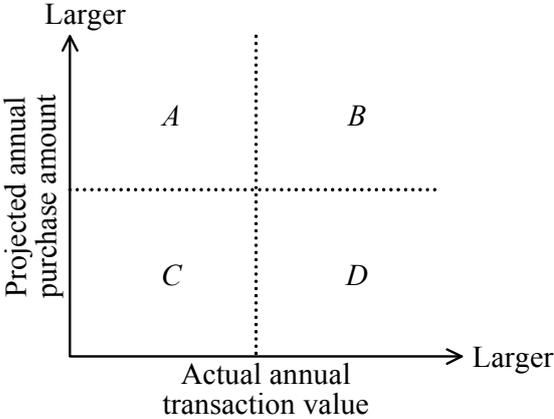
Q71. Which of the following shows the appropriate sequence of items 1 through 3 that are required for establishing ISMS according to ISO/IEC27001:2005?

[Items]

1. Prepare a Statement of Applicability
2. Select control objectives and controls for the treatment of risks
3. Analyze and evaluate the risks

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

Q72. The projected annual purchase amount and the actual annual transaction value of each client company are plotted on the graph. Which of the following is the appropriate description concerning the future sales policy?



- a) A client in area *A* has the potential of becoming a major customer, so it is better to strengthen sales activities.
- b) A client in area *B* can be regarded as a regular customer, so it is better to minimize an injection of sales force.
- c) A client in area *C* has little potential of becoming a major customer, but is a prospective regular customer, so it is better to strengthen sales activities.
- d) A client in area *D* is expected to increase the amount of transactions, so it is better to strengthen sales activities.

Q73. Which of the following financial statements indicates the assets, liabilities, and net assets of a company at a specific time and shows the financial condition of the company?

- a) Balance sheet
- b) Cash flow statement
- c) Income statement
- d) Statements of shareholders' equity

Q74. The table shows the sales, cost, and profit for a certain product in the current period. When the sales unit price of this product is 5 dollars, at least how many should be sold to earn twice or more in profit during the next period?

Unit: dollar

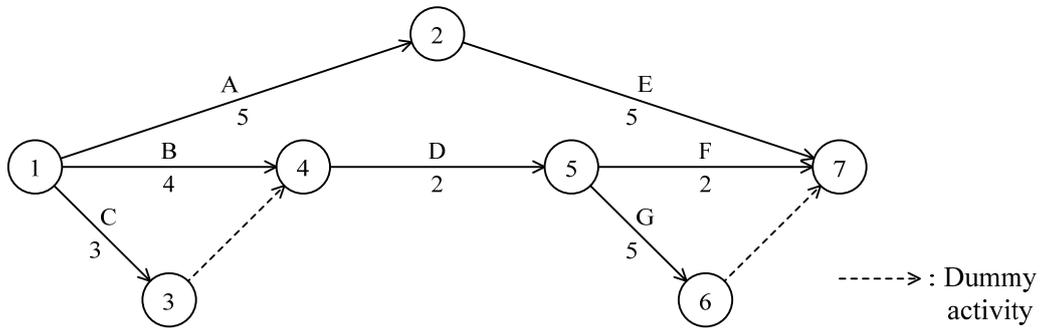
Sales	10,000
Cost	
Fixed cost	2,000
Variable cost	6,000
Profit	2,000

- a) 2,400 b) 2,500 c) 3,000 d) 4,000

Q75. Which of the following is the work sampling method?

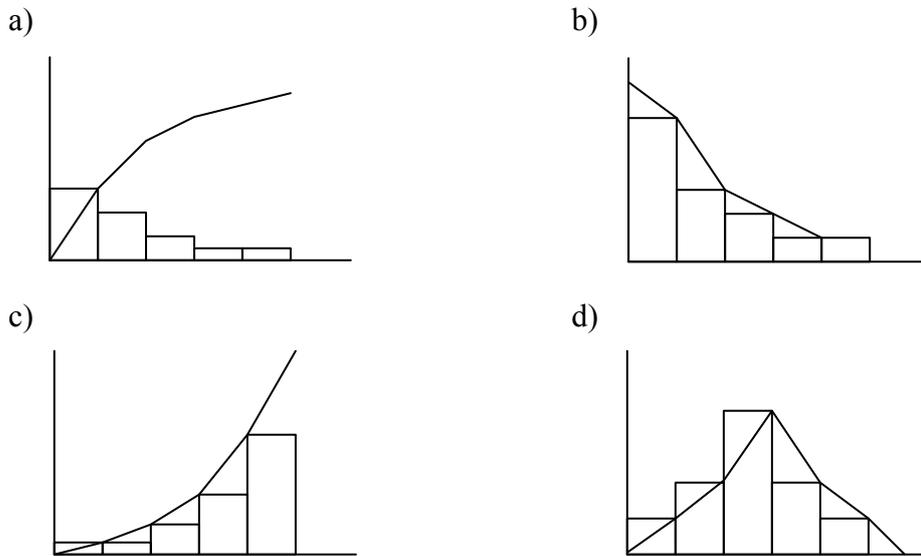
- a) It breaks down the work operations even into fundamental motions, and calculates working hours from the time standard table for fundamental motions by totaling the time for the fundamental motions.
- b) It calculates working hours by tallying questionnaires completed by experienced persons in charge of the actual work operations.
- c) It measures the actual work operations several times with a stopwatch and investigates working hours.
- d) It specifies the number of observations and observation time, and estimates working hours from the ratio of the number of observation points by actual observation based on statistical theory.

Q76. How many days in total are required in the critical path of the arrow diagram? Here, the number shown beside the arrow indicates the number of days for each activity.



- a) 7 b) 8 c) 10 d) 11

Q77. A certain factory has recorded the number of defective products in the past on a root cause basis. Which of the following is the graph that indicates the factors that are ranked high for defective products and their rates, based on this record?



Q78. You want to invest in one of the stocks A through D , all of which are 100 dollars at the current price. The table shows the predicted price increase of each stock when the growth of the economy is high, medium, or low. When the “maximin” principle is applied, which of the following stocks should be invested in?

Unit: dollar

Stock \ Economic growth	High	Medium	Low
	A	20	10
B	25	5	20
C	30	20	5
D	40	10	-10

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

Q79. Three products A , B , and C are processed by two machines $M1$ and $M2$. Processing must be performed in order of $M1 \rightarrow M2$ ($M1$ first and then $M2$). The table shows the time required to process each product on each machine.

In this case, which of the following shows the order of processing these three products so that the time required from the start of the process to the completion of the process for all the products may be the shortest? Here, when processing of a product at $M1$ is completed, another product can be processed consecutively at $M1$. Preparation time, such as setup time, is ignored.

Product \ Machine	$M1$	$M2$
	A	7
B	5	6
C	4	2

- a) $A \rightarrow C \rightarrow B$ b) $B \rightarrow A \rightarrow C$
c) $B \rightarrow C \rightarrow A$ d) $C \rightarrow B \rightarrow A$

Q80. Which of the following explains a volume license agreement?

- a) The agreement limits the location of use. Usage is allowed without a limit in the number if the software is used in specific facilities.
- b) The agreement offers a master to a bulk buyer of the software, such as a company, and determines the maximum installable number of licenses beforehand.
- c) The agreement where standard licensing conditions are defined and, when a certain limited number of packages are opened, the license agreement is considered to be automatically concluded between the rights holder and the purchaser.
- d) The agreement where usage is allowed by agreeing to the details displayed on the screen when the software is downloaded from the Internet.