October, 2007

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 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 next Fundamental IT Engineer Examination conducted?

      Answer group

        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	Ⓐ	●	Ⓒ	Ⓓ

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Q1. What range of decimal numbers can be represented with an 11-bit two's-complement number?

    a) -2048 to 2047
    b) -2048 to 2048
    c) -1024 to 1023
    d) -1024 to 1024

Q2. Which of the following decimal fractions becomes a finite fraction in an octal representation?

    a) 0.3   b) 0.4   c) 0.5   d) 0.8

Q3. When a certain natural number x is expressed as a $2n$-digit binary number "1010...10" consisting of 1 and 0 arranged alternately, which of the following equations can be formulated in terms of the number x?

    a) $x + \dfrac{x}{2} = 2^{2n}$

    b) $x + \dfrac{x}{2} = 2^{2n} - 1$

    c) $x + \dfrac{x}{2} = 2^{2n+1}$

    d) $x + \dfrac{x}{2} = 2^{2n+1} - 1$

Q4. An integer m is stored in a register as a binary value. If this value is shifted to the left by three bits and m is added to the shifted value, how many times as large as m is the resulting number? Here, no overflow occurs.

    a) 4   b) 7   c) 8   d) 9

Q5. Which of the following is the reason why a large number of computers use "complement representation" to simplify arithmetic circuits?

a) Addition can be processed by subtraction.
b) Division can be processed by a combination of subtractions.
c) Multiplication can be processed by a combination of additions.
d) Subtraction can be processed by addition.

Q6. Which of the following is the appropriate statement concerning Newton's method that is known as an algorithm for obtaining the approximate value of the solution to the formula $f(x) = 0$?

a) An approximate value of the solution can be obtained even if the function $f(x)$ is indifferentiable.
b) An approximate value of the solution is obtained geometrically using the tangent lines of $y = f(x)$.
c) No matter what initial values are provided, an approximate value of the solution can always be obtained.
d) Two different initial values must be provided.

Q7. There is a four-digit number $N_1N_2N_3C$ that is used for Customer Account Number (CAN). The right most digit "C" can be calculated as follows:
$$C = (N_1*3 + N_2*5 + N_3*7) \bmod 10$$
Which of the following is a correct CAN? Here, $x \bmod y$ returns the remainder when x is divided by y.

a) 7714   b) 7715   c) 9690   d) 9695

Q8. Two players, X and Y play a dice game. A pair of dice is tossed. If the sum of the dice is 2, 4, or 6, X wins the game. Otherwise, Y wins. What is the probability that Y wins the game?

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

Q9. There are a total of 1,900 students in a school, 553 of whom are taking a course in computer science, 667 of whom are in mathematics, and 290 of whom are in both computer science and mathematics. How many students are not taking a course in either computer science or in mathematics?

a) 680   b) 930   c) 970   d) 1260

Q10. Which of the following is equivalent to the logical expression $A \bullet B + B \bullet C \bullet (B + C)$? Here, "$\bullet$" is the logical product, and "$+$" is the logical sum.

a) $A \bullet B + A \bullet C$ b) $A \bullet C + B$
c) $B \bullet (A + C)$ d) $B + A \bullet C$

Q11. There are three 7-bit character codes: 30, 3F, and 7A. When an even parity bit is added to the front of each character code, which of the following shows the correct result? Here, the character codes are expressed in hexadecimal.

a) 30, 3F, 7A   b) 30, 3F, FA
c) B0, 3F, FA   d) B0, BF, 7A

Q12. Which of the following data structures uses the LIFO (Last In First Out) method in order to manage data?

a) Array   b) Linked list   c) Queue   d) Stack

Q13. In a microprocessor, there are two general registers: GRi and GRj (hereinafter referred to as GRx instead of GRi or GRj).   PUSH GRx is used for adding the contents of GRx to the top of a stack.   POP GRx is for removing the current top data of the stack and storing it to GRx.   Which of the following operations can exchange the contents of GRi and GRj?

a) PUSH GRi
    POP GRj
    PUSH GRj
    POP GRi

b) PUSH GRj
    POP GRi
    PUSH GRi
    POP GRj

c) PUSH GRi
    PUSH GRj
    POP GRi
    POP GRj

d) PUSH GRi
   PUSH GRj
    POP GRj
    POP GRi

Q14. Which of the following is the appropriate statement concerning data sorting methods?

a) The "bubble sort" method determines an intermediate reference value and divides the elements into two groups of "larger" values and "smaller" values. This operation is then repeated recursively on these two groups.

b) The "heap sort" method builds an ordered tree from the unsorted portion of the elements, extracts the maximum or minimum value from this ordered tree, and moves it to the sorted portion. This operational sequence is then repeated to gradually shrink the unsorted portion.

c) The "quick sort" method sorts each substring composed of elements extracted at regular intervals, and then the interval is further decreased and the same operation is performed again. This operation is repeated until the interval becomes 1.

d) The "shell sort" method repeatedly compares two adjacent elements and swaps them if the first element is larger than the second.

Q15. A binary tree is said to be perfect, if all its leaves are at the same depth and every internal node has two children. Which of the following is correct about the perfect binary tree? Here, n is the number of nodes, and h is the height of the perfect binary tree.

a) $h = \log_2(n+1)$

b) If every proper subtree of a binary tree is perfect, then the tree itself must also be perfect.

c) $n = 2^{h+1} - 1$

d) The number of internal nodes is 2^h.

Q16. A depth-first search (DFS) visits all the vertices in a graph. When an edge to be explored next is chosen, this algorithm always chooses to go "deeper" into the graph. That is, it will pick the next adjacent unvisited vertex until reaching a vertex that has no unvisited adjacent vertices. The algorithm will then backtrack to the previous vertex and continue along any as-yet unexplored edges from that vertex. After DFS has visited all the reachable vertices from a particular source vertex, it chooses one of the remaining undiscovered vertices and continues the search. Which of the following is <u>not a valid order</u> in which the vertices of the graph below can be marked as "visited" during a DFS?
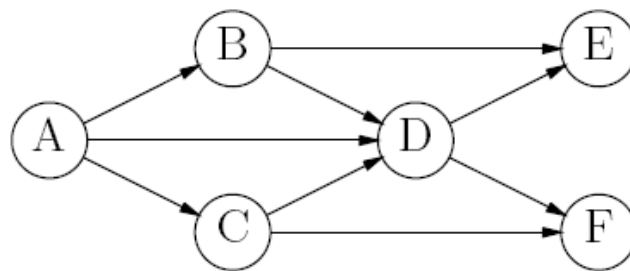
a) ABCDEF

b) ABDFEC

c) ABEDFC

d) ADEFCB

Q17. Which of the following equations holds well in the postfix notation (or Reverse Polish Notation)?   Here, x, y, and z are variables.

a) $x\,y + z -\ =\ x\,y\,z + -$

b) $x\,y - z +\ =\ x\,y\,z - +$

c) $x\,y - z +\ =\ x\,y\,z - -$
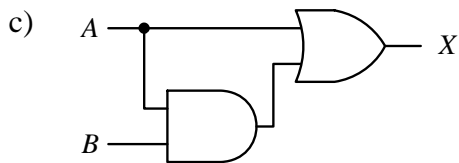
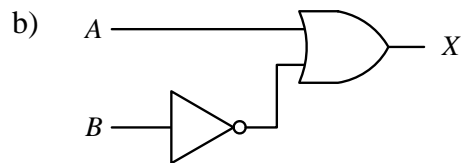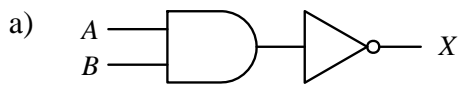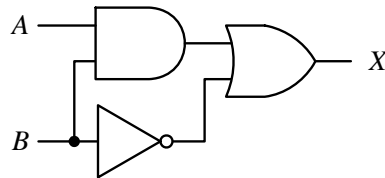d) $x\,y - z -\ =\ x\,y\,z - -$

Q18. The following function $f(n, k)$ exists:

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

What is the value of $f(4, 2)$?

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

Q19. Which of the following logic circuits generates the same output as the logic circuit shown in the figure below? Here, ⟆, ⟆, and ⟆ represent the logical product, the logical sum, and the logical negation respectively.

a)

b)

c)

d)
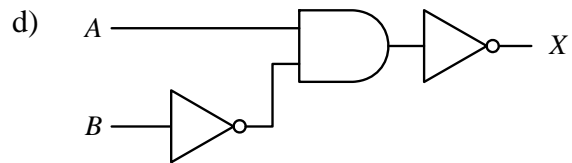
Q20. Which of the following leads to the von Neumann bottleneck?

   a) Capacity of main memory
   b) CPU performance
   c) Data transfer speed between CPU and I/O devices
   d) Data transfer speed between CPU and main memory

Q21. Which of the following is the highest priority process just after execution of each instruction on CPU?

   a) Check if there are any instructions waiting
   b) Check if there are any interrupts waiting
   c) Fetch the next instruction
   d) Transfer to an interrupt-handling program

Q22. The instruction pipeline is a technique used in order to improve the CPU performance. Instructions are divided into stages and moved through the processor. An RISC processor has five-stage pipeline (Instruction fetch, Instruction decode, Execute, Memory access, Register write back) and can accept a new instruction at every clock cycle. How many clock cycles does this processor take for completion of the execution of 10 instructions? Here, there are no pipeline stalls, such as branch stall, load stall, and so on.

a) 13   b) 14   c) 15   d) 16

Q23. There is a processor with a clock frequency of 1 GHz. When the instruction set of this processor is composed of two types of commands as shown in the table below, what is the approximate processing performance in MIPS?

Command type	Execution time (clocks)	Execution frequency (%)
Command 1	10	60
Command 2	5	40

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

Q24. Which of the following is classified as an external interrupt?

a) An interrupt which is caused by overflow in floating point operations
b) An interrupt which is generated when a request for a service, such as a demand for input/output, is issued to OS
c) An interrupt which occurs when a page not existing in the main memory is to be accessed
d) An interrupt which takes place when hardware detects malfunctions

Q25. A CPU has four blocks of cache memory. Using the LRU (Least Recently Used) replacement algorithm, which memory blocks are stored in the cache memory after the execution of the following sequence of access to memory blocks: 1 2 3 4 5 2 5 4 1 5 2 3? Here, at the start of the memory access, the four cache blocks are empty and used in sequence until all the blocks are occupied. In other words, the cache blocks contain memory blocks "1 2 3 4" after access to the first four memory blocks.

a) 1 2 3 5   b) 1 5 2 3   c) 3 2 5 1   d) 5 2 1 3

Q26. Which of the following appropriately describes the purpose of the cache memory used by processors?

a) To compensate for the difference between the main memory access speed and the processor speed
b) To manage frequently-used programs on a resident basis
c) To perform virtual memory address conversion at high speed
d) To perform virtual memory paging process at high speed

Q27. Which of the following appropriately describes "memory interleaving" that is one of the high-speed computer technologies?

a) It is a method for bridging the gap between register and main memory access speeds by copying a part of the main memory data to the cache.
b) It is a method for dividing the memory into multiple independently-operating groups and accessing each group in parallel.
c) It is a method for transferring data directly between the main memory and an I/O device or between main memories without passing through the CPU.
d) It is a method for writing data to the cache or writing data to the main memory if the cache overflows, when sending data to the main memory.

Q28. How many tracks are required to store a sequentially organized data file including a total of 10,000 records on the hard disk drive under the following conditions? Here, each track can contain multiple blocks, but each block cannot be stored across multiple tracks.

[Conditions]

Record length:	300 bytes/record
Track capacity:	30,000 bytes/track
Inter-block gap:	400 bytes
Blocking factor:	20 records/block

a) 100   b) 106   c) 107   d) 125

Q29. The head of a hard disk drive is currently positioned at cylinder number 100, and the cylinder numbers 120, 90, 70, 80, 140, 110, and 60 are lined up in the I/O request queue. What is the total number of cylinders that the head moves under the following conditions?

[Conditions]
(1) The seek optimization method reorders the I/O requests so that the head can move as much as possible in a single direction, and the requests are processed in order of cylinder number.
(2) The requests so far are in the direction where the cylinder numbers increase.
(3) When there are no more requests in the current direction, the direction of head movement is reversed.
(4) The results are unaffected by the processing order of the requests.
(5) New requests do not occur during the process.

a) 80   b) 120   c) 160   d) 220

Q30. Which of the following technologies is used to divide each data file into blocks at constant length and to store them across multiple hard disks that can be accessed in parallel, thereby speeding up file access?

a) Disk at once   b) Disk cache
c) Disk mirroring   d) Disk striping

Q31. Which of the following appropriately describes a method of recording data on CD-R?

a) A two-layer structure is provided in which two disks are bonded together. The recording layer is subjected to phase changes by means of laser beams, thereby recording the data.

b) Laser beams are radiated on the magnetized disk recording film to heat the film and to change the magnetization direction by means of a magnetic head, thereby recording the data.

c) Laser beams are radiated onto an organic dye layer in a disk. As a result, a series of burned spots called pits are created on that layer, thereby recording the data.

d) The magnetization direction of the magnetic substance applied to a disk is changed by means of a magnetic head, thereby recording the data.

Q32. Which of the following is a method whereby the relevant program is read into main memory and the CPU reads out and executes it sequentially?

a) Addressing method
b) Direct program control method
c) Stored program method
d) Virtual memory method

Q33. Which of the following functions is a part of OS task management?

a) CPU allocation
b) File protection
c) I/O execution
d) Spool control

Q34. When variables shared among tasks are updated, an unexpected result may occur if synchronous control among tasks is not performed. When the initial value of the variable x shared among tasks is 3, the final value of x is expected to be 12 if task A executes the assignment statement "$x = x + x$" and if task B executes the assignment statement "$x = x \times x$." Which of the following is the appropriate execution sequence that can return the expected result? Here, each assignment statement is executed by being divided into four portions as shown below.

Task A ($x = x + x$)	Task B ($x = x \times x$)
a1: The value of x is referred to and is saved as e.	b1: The value of x is referred to and is saved as h.
a2: The value of x is referred to and is saved as f.	b2: The value of x is referred to and is saved as i.
a3: $e + f$ is computed and is saved as g.	b3: $h \times i$ is computed and is saved as j.
a4: The value of x is updated by means of g.	b4: The value of x is updated by means of j.

a) a1 → a2 → b1 → b2 → a3 → a4 → b3 → b4

b) a1 → b1 → b2 → b3 → b4 → a2 → a3 → a4

c) b1 → a1 → a2 → a3 → a4 → b2 → b3 → b4

d) b1 → b2 → b3 → a1 → a2 → a3 → a4 → b4

Q35. Which of the following has the feature whereby only minimally limited OS functions, such as memory management and process management, are supported and other OS functions, such as the file system, are implemented as server processes?

a) Microkernel

b) Monolithic kernel

c) Multithread

d) Single user mode

Q36. Which of the following is the appropriate statement concerning client/server architecture?

a) It divides a series of processes into two groups by means of an inter-process communication mechanism; one group includes processes that request services, and the other consists of processes that execute the requested services.

b) It is mainly aimed at achieving horizontal load sharing by connecting terminals to multiple workstations replacing the host computer.

c) It is mainly aimed at achieving load sharing by distributing, among the terminals, part of functions and data files to be processed by the host computer.

d) It is the generic term for a system configuration in which a PC is connected to a workstation via LAN. The PC and workstation are called a client and a server, respectively.

Q37. Which of the following is the primary purpose to use RAID?

a) To achieve a lower hardware cost

b) To ensure higher reliability and/or performance

c) To improve data security

d) To simplify the hardware configuration for a quick and easy installation

Q38. There is an RAID5 disk array system that is composed of 10 hard disk drives, and each disk capacity is 100Gbytes.   What is the approximate maximum capacity (in Gbytes) that can be used to store user data and/or programs on this system?

a) 450   b) 500   c) 900   d) 1,000

Q39. In some systems, the system manually or automatically determines memory blocks which are no longer referenced by a program and reorganizes the memory space so that it can be available for subsequent allocation.   What is this process called?

a) Fragmentation   b) Garbage collection
c) Swapping   d) Thrashing

Q40. Which of the following is the appropriate description concerning the performance evaluation of a computer system?

a) At a stage where the system is not in actual operation, it is possible to predict the performance of the computer system by running experimental simulations using a hardware monitor.

b) In case that it is planned to enhance computer system resources, the performance, as it will be when the whole system is operating, can be confirmed by means of a prototype model based on load forecasting.

c) In the case of a system in operation, a software monitor can be used to collect and analyze statistical data, thereby permitting performance-related problems to be grasped.

d) Since a benchmark program for measuring CPU performance covers a wide range of applications, it can be used for performance prediction at stages ranging from the computer installation to the system enhancement planning.

Q41. Which of the following appropriately describes a dual system?

a) Processor, memory, channel, power supply system, and so on are duplicated. If a fault occurs in any one of the pairs of equipment, the other is used to continue the processing.

b) The active system performs online processing, and a standby system stands by performing batch processing, etc. If a fault occurs in the active system, the standby system takes over and continues the online processing.

c) The online processing program of the active system is loaded in the standby system. If a fault occurs in the active system, the standby system immediately takes over and continues the processing.

d) Two systems perform the same processing, and the processed results are collated to confirm the correctness of the processing. If a fault occurs in either system, processing continues in degraded operation.

Q42. When the operational model of a system is shown in the figure below, which of the following represents the correct combination of MTBF and MTTR of the system? Here, t_i ($i = 1, 2, ..., n$) denotes the operating time of the system, and r_i ($i = 1, 2, ..., n$) denotes the repair time of the system.
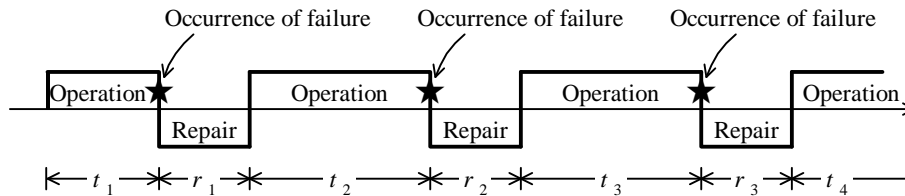
	MTBF	MTTR
a)	$\dfrac{1}{n}\sum\limits_{i=1}^{n} r_i$	$\dfrac{1}{n}\sum\limits_{i=1}^{n} t_i$
b)	$\dfrac{1}{n}\sum\limits_{i=1}^{n} t_i$	$\dfrac{1}{n}\sum\limits_{i=1}^{n} r_i$
c)	$\dfrac{1}{n}\sum\limits_{i=1}^{n} t_i$	$\dfrac{1}{n}\sum\limits_{i=1}^{n} (t_i + r_i)$
d)	$\dfrac{1}{n}\sum\limits_{i=1}^{n} (t_i + r_i)$	$\dfrac{1}{n}\sum\limits_{i=1}^{n} r_i$

Q43. Which of the following shows the system configuration that can operate with an overall system availability of $(1-(1-A)^2)^2$? Here, the element X is a processor with an availability of A. Also, the segment connected in parallel is considered operating if either of the two processors is operating. However, the segment connected in series is considered operating only when both processors are operating.

a)

b)

c)

d)
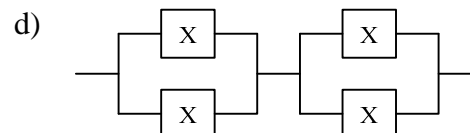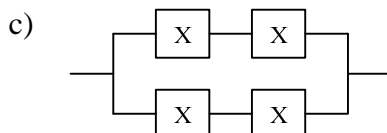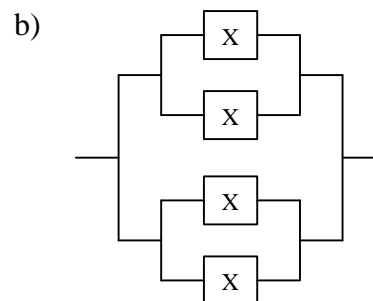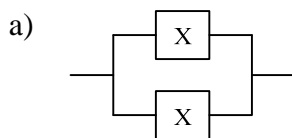
Q44. In some circumstances, a program may be still running when it is called again by another program. Which of the following is the appropriate characteristic that should be implemented to execute this program correctly?

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

Q45. Which of the following is the language processing program that generates, on a certain computer, object programs that can be executed on another computer that has a different instruction set?

a) Cross compiler   b) Emulator
c) Generator   d) Optimizing compiler

Q46. Which of the following is the standardized document description language that prescribes methods, as an international standard, for describing the logical structures and attributes of documents using tags and facilitates the management and exchange of electronic documents?

a) DML   b) HTML   c) SGML   d) STEP

Q47. Which of the following is the appropriate combination of basic concepts of object-oriented approach?

a) Abstraction, encapsulation, inheritance, and class
b) Instantiation, Structuralization, sequence, and class
c) Normalization, encapsulation, division, and class
d) Virtualization, Structuralization, projection, and class

Q48. Which of the following is the appropriate characteristic of "data oriented design" as compared with "process oriented design?"

a) Data modeling is performed prior to the modeling of business operations.
b) Data oriented design is effective for building a specific business application system in a short period of time.
c) It is possible to consider data as shared resources and to manage it in a unified manner.
d) It is possible to create data structures combined with business processes.

Q49. Which of the following is the appropriate program that supports dynamic processing in a Web environment and runs only on a Web server?

a) Java applet
b) JavaScript
c) Java servlet
d) VBScript

Q50. When the data model is represented to conform to the notational convention shown below, which of the following statements appropriately interprets the designated E-R diagram?

[Notational convention]
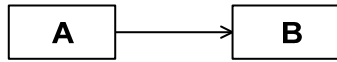
One of the data in entity **A** corresponds to "n" ($n>=0$) pieces of the data in entity **B**, and one of the data in entity **B** corresponds to one of the data in entity **A**.
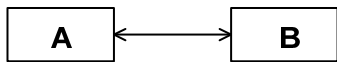
One of the data in entity **A** corresponds to "n" ($n>=0$) pieces of the data in entity **B**, and one of the data in entity **B** corresponds to "m" ($m>=0$) pieces of the data in entity **A**.

[E-R diagram]
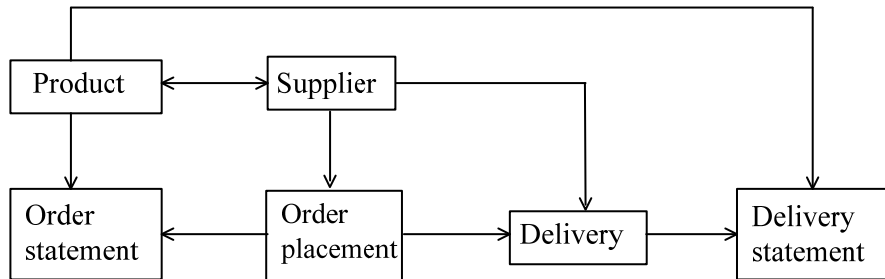
a) A single product is supplied by a single supplier.
b) It doe not occur that a single order placement is given for multiple types of products.
c) It does not occur that a single order placement is given to multiple suppliers.
d) Order statements and delivery statements have a one-to-one correspondence.

Q51. Which of the following design tasks is performed from the standpoint of the system developer, based on the deliverables of external design and in consideration of the implementation method and processing efficiency?

a) Code design
b) Functional decomposition and structured design
c) Logical data design
d) Screen flow design

Q52. Which of the following is the appropriate sequence of DB application development activities?

    a) Conceptual design → Database planning → Data conversion → Physical design
    b) Conceptual design → Database planning → Physical design → Data conversion
    c) Database planning → Conceptual design → Physical design → Data conversion
    d) Database planning → Physical design → Conceptual design → Data conversion

Q53. Which of the following is the appropriate statement concerning how to illustrate data flows (arrows) in DFD?

    a) Each data store must be connected to another data store with at least one data flow.
    b) Each data store must have at least one data flow in and one data flow out.
    c) Each external entity must be connected to another external entity with at least one data flow.
    d) Each process must have at least one data flow in and one data flow out.

Q54. Which of the following is the appropriate description concerning the functions of "driver" or "stub" used in the module test?

    a) "Driver" calls the module to be tested while passing arguments to it.
    b) "Driver" is a module that is called from the module to be tested.
    c) "Stub" displays and prints the value returned by the module to be tested.
    d) "Stub" is a module that calls the module to be tested.

Q55. Which of the following is the appropriate description concerning black box testing?

    a) Attention is focused on the internal structures of programs, and verification is made as to whether necessary portions are executed.
    b) Even if any redundant code exists in a tested program, it cannot be detected.
    c) If branch instructions and modules increase in number, the amount of test data also leaps upward.
    d) The test case coverage is used as criteria for preparing test data.

Q56. Which of the following appropriately describes the purpose of using WBS (Work Breakdown Structure) in software development?

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

Q57. Which of the following appropriately explains the function point method, which is one of the estimation methods used in system development?

a) It is a method for estimating the person-hours and time period for development on the assumption that the scale of development is figured out. This method can be applicable not only to business area but also to all areas.
b) It is a method for estimating the system size by evaluating system functions quantitatively on the basis of the amount of input/output data, the number of files, etc. and by making proper adjustments based on the complexity and characteristics of the application.
c) It is a method for looking into the differences among systems on the basis of the data of similar systems experienced in the past and estimating the size and person-hours by using the past data for the similar portions and the empirically predicted data for the different portions.
d) It is a method for predetermining the reference values per unit of workload, dividing all the work items into the unit work items, and thereby estimating the total workload by making up all of them.

Q58. Which of the following appropriately describes the purpose of using a check digit?

    a) To detect an error of the inputted code value
    b) To detect an error of the number of inputted code digits
    c) To detect an error that alphabetic characters and/or symbols are mixed in data inputted into the numerical item
    d) To detect an error that the inputted data value is out of the predefined range

Q59. How many magnetic tapes are required to create and manage backup copies of server files under the following conditions?

[Processing conditions]
    (1) A full backup copy is made at the beginning (on the first day) of each month. One magnetic tape is required per full backup.
    (2) An incremental backup copy is made each day between the day following the day when a full backup copy is made and the day when the next full backup copy is made. An incremental backup copy is added to a separate magnetic tape dedicated to incremental backups. All the incremental backup copies made during a one-month period can be recorded on a single magnetic tape.
    (3) It is guaranteed that any file can always be restored to the state of any specified day with respect to any data for any day not earlier than this day six months ago. Here, if this day of the month did not exist six months ago, it is guaranteed that any file can be restored to the state of any specified day with respect to any data for any day not earlier than the last day six months ago. (For example, if the current day is October 31, it is guaranteed that any file can be restored to the state of any specified day with respect to any data for any day not earlier than April 30.)

    a) 12   b) 13   c) 14   d) 15

Q60. Which of the following subnet masks provides the minimum number of IP addresses available in the subnet to assign to devices that request a connection?

    a) 255.255.255.0   b) 255.255.255.248
    c) 255.255.255.252   d) 255.255.255.254

Q61. In the OSI basic reference model, which of the following layers provides a set of rules for establishing and terminating the connection between applications on computer systems?

a) Data link layer
b) Network layer
c) Session layer
d) Transport layer

Q62. Which of the following protocols is used on the transport layer of OSI basic reference model?

a) FTP
b) PPP
c) SNMP
d) UDP

Q63. Which of the following is the appropriate technology that is used to establish a private or secure network connection within a public IP network, such as the Internet, and to give the company the same capabilities at much lower cost by using the shared public infrastructure rather than a private one?

a) Firewall
b) PAT
c) RPC
d) VPN

Q64. Which of the following IP addresses can be used to connect a computer directly to the Internet?

a) 10.10.11.88
b) 127.0.0.1
c) 172.16.255.255
d) 203.162.1.160

Q65. Which of the following is the appropriate specifications concerning 100Base-T?

	Transmission media	Network topology	Maximum length of one segment (unit: meter)
a)	Coaxial cable	Bus	500
b)	Coaxial cable	Star	100
c)	Twisted pair cable	Bus	500
d)	Twisted pair cable	Star	100

Q66. Which of the following is the correct table that is created by the "natural join" operation of two tables T_1 and T_2?

T_1

A	B	C
a_1	b_1	c_1
a_2	b_1	c_1
a_3	b_2	c_1

T_2

B	C	D
b_1	c_1	d_1
b_1	c_2	d_2
b_2	c_2	d_3

a)

A	B	C	D
a_1	b_1	c_1	d_1

b)

A	B	C	D
a_1	b_1	c_1	d_1
a_2	b_1	c_1	d_1

c)

A	B	C	B	C	D
a_1	b_1	c_1	b_1	c_1	d_1
a_2	b_1	c_1	b_1	c_1	d_1

d)

A	B	C	D
a_1	b_1	c_1	d_1
a_2	b_1	c_1	d_2
a_3	b_2	c_1	d_3

Q67. Which of the following is the appropriate description of a lock that is the exclusive control of a database?

a) If a lock is used, deadlock cannot occur.
b) Locks come in two types: shared locks, used while reading, and exclusive locks, used during a change.
c) The coarser the level of granularity of locked data is, the more concurrent transactions can be executed.
d) When deadlock occurs, the lock rolls back the transaction on both sides.

Q68. In a database system employing incremental log with immediate updates, information in the log is used in restoring the state of the system to a previous consistent state when a crash occurs. A log record is generated upon execution of a write operation. Each log record consists of the transaction name T_i, the data item name, the old value of the data item, and the new value of the data item. The log record shown below is the normal transaction sequence after the last checkpoint. Which of the following recovery actions should be performed after a restart of the system if a crash occurs just after $< T_2 , C, 3000, 3500>$ and before $< T_2 , \text{commit}>$?

[Log records]
  $<T_1 , \text{start}>$
  $<T_1 , A, 1000, 900>$
  $<T_1 , B, 2000, 2100>$
  $<T_1 , \text{commit}>$
  $<T_2 , \text{start}>$
  $<T_2 , C, 3000, 3500>$
  $<T_2 , \text{commit}>$

a) Roll back both T_1 and T_2
b) Roll back T_1 and roll forward T_2
c) Roll forward both T_1 and T_2
d) Roll forward T_1 and roll back T_2

Q69. Which of the following is the appropriate SQL statement that is used to create Table A from Persons Table?

Persons Table

name	age	gender	country
Honey	23	F	Korea
Jun	24	M	Japan
Mark	22	M	Korea
Rey	27	M	Philippines
Rob	26	M	Philippines
Sakura	27	F	Japan

Table A

name
Honey
Rob

a) `SELECT name FROM Persons WHERE country LIKE '%Korea%'`
`AND gender = 'F' AND age = 26`

b) `SELECT name FROM Persons WHERE country LIKE '%Korea%'`
`AND gender = 'F' OR age = 26`

c) `SELECT name FROM Persons WHERE country LIKE '%Korea%'`
`OR gender = 'F' AND age = 26`

d) `SELECT name FROM Persons WHERE country LIKE '%Korea%'`
`OR gender = 'F' OR age = 26`

Q70. Which of the following is the major impact of a Denial of Service (DoS) attack?

a) An increased volume of spam e-mails
b) Degradation of service due to network traffic congestion
c) Falsification of database and/or website
d) Leakage of user ID and password

Q71. Which of the following is the appropriate method that supports both private key cryptography and public key cryptography, enables users to securely exchange e-mail messages, and to secure files, disk volumes, and network connections with both privacy and strong authentication?

a) DES (Data Encryption Standard)
b) DSA(Digital Signature Algorithm)
c) PGP (Pretty Good Privacy)
d) RSA (Rivest, Shamir, and Adleman)

Q72. Port scanning is the process of sending packets to check every port on each target system to see which ports are open and which ports are locked.   Which of the following information can be identified by port scanning?

a) Computer viruses in activity
b) Hardware configuration and compatibility
c) Network and application services currently available
d) Operating system in execution

Q73. Which of the following appropriately explains benchmarking used in business management?

a) It is to make comparisons with the strongest competitors or advanced companies in order to scope out best practices for setting business goals, and to gain an understanding of products, services, and practical methods qualitatively and quantitatively.
b) It is to pick out company's own skills and technologies that are profitable and superior to those of other companies.
c) It is to promote quality control in all departments in an integrated manner for the purpose of quality improvement, to check up the degrees of improvement in the quality of in-house products, and to make comparisons with the quality of competitors' products.
d) It is to redesign business processes, to make full use of information technologies, and to transform the existing constitution and structures fundamentally.

Q74. Which of the following appropriately describes a cause-and-effect diagram?

   a) It classifies the collected data into a few categories, draws the number of data for each category as a bar graph, and captures variance in quality.
   b) It classifies the data into a few categories, sorts the categories from the largest to the smallest as a bar graph along the horizontal axis, draws the cumulative values as a line graph, and sorts out problems.
   c) It expresses variance of time series data as a line graph and achieves an objectively controlled state by using control limit lines.
   d) It systematically arranges the relation between cause and effect in a fishbone format and clarifies which causes are related to particular effects.

Q75. Which of the following is the appropriate statement concerning how to use management science methodology?

   a) PERT is used to perform machine reliability analysis.
   b) The queuing model is used to perform financial analysis.
   c) The simplex method is used for product quality control.
   d) The time-series analysis method is used to forecast product sales in the market.

Q76. The selling price per unit of product Z is set to $250, and sales for the coming year are expected to be 500 units. If the company requires a return of 15% in the coming year on its investment of $250,000 in product Z, what is the target variable cost per unit for the coming year? Here, the fixed cost is $10,000 per annum.

   a) $145   b) $155   c) $165   d) $175

Q77. When the moving average method is applied to the receipt/shipment ledger shown below, how much in dollars is the closing inventory value of August?

[Receipt/shipment ledger]

Date	Transaction	Quantity	Unit price ($)
August 1	Beginning inventory	100	10
August 5	Purchased	100	12
August 15	Sold	50	
August 18	Sold	100	
August 20	Purchased	50	15
August 31	Ending inventory	100	

a) 1,180   b) 1,250   c) 1,300   d) 1,350

Q78. In a production process of 1,000 units of product X, "material cost" incurred is $10,000, and "direct labor cost" is $20,000. "Production overhead" is 100% of direct labor cost. "Selling and distribution cost" is $10,000. How much in dollars is the unit cost of product X?

a) 10   b) 30   c) 50   d) 60

Q79. The following table shows the duration for the optimistic, most likely, and pessimistic scenarios in a program development. How many hours are required to complete all the activities on a "three point estimate" basis?

Development activities	Estimated duration (hours)		
	Optimistic	Most likely	Pessimistic
Requirement understanding	1.0	1.5	2.0
Design	2.0	2.5	3.0
Coding	4.5	6.5	7.0
Testing	2.5	4.5	5.0

a) 14   b) 14.5   c) 15   d) 17

Q80. Which of the following is the appropriate combination of processing modes in banking activities?

	Deposit	Interest calculation	Withdrawal	Posting to account
a)	Batch	Batch	Batch	Online
b)	Batch	Online	Online	Batch
c)	Online	Batch	Online	Batch
d)	Online	Online	Online	Online