October 2013

Fundamental IT Engineer Examination (Morning)

Questions must be answered in accordance with the following:

Question Nos.	Q1 – Q80
Question Selection	All questions are compulsory.
Examination Time	9:30 – 12:00 (150 minutes)

Instructions:

1. Use a pencil. If you need to change an answer, erase your previous answer completely and neatly. Wipe away any eraser debris.

2. Mark your examinee information and your answers in accordance with the instructions below. Your answer will not be graded if you do not mark properly. Do not mark nor write on the answer sheet outside of the prescribed places.

   (1) **Examinee Number**

   Write your examinee number in the space provided, and mark the appropriate space below each digit.

   (2) **Date of Birth**

   Write your date of birth (in numbers) exactly as it is printed on your examination admission card, and mark the appropriate space below each digit.

   (3) **Answers**

   Select one answer (a through d) for each question.

   Mark your answers as shown in the following sample question.

   [Sample Question]

   Q1. In which month is the autumn Fundamental IT Engineer Examination conducted?

   a) September   b) October   c) November   d) December

   Since the correct answer is "b)" (October), mark your answer sheet as follows:

   [Sample Answer]

Q1	ⓐ	●	ⓒ	ⓓ

Do not open the exam booklet until instructed to do so.

Inquiries about the exam questions will not be answered.

Symbols commonly used in questions

Unless otherwise noted in each question, the logic gate symbols are applied as shown in the table below.

Graphic symbol	Explanation
	AND gate
	NAND gate
	OR gate
	NOR gate
	Exclusive OR (XOR) gate
	Exclusive NOR gate
	Buffer
	NOT gate
	Three-state buffer (or tri-state buffer)

Note: The small circle or "bubble" on either the input or output terminal shows inversion or negation of the logic state.

Q1. When the hexadecimal value 2A is stored in an 8-bit register and is logically shifted left three bits, which of the following is the resulting value in decimal? Here, the bit positions vacated on the right are filled with zeros, and bits shifted out on the left are discarded.

a) 2   b) 5   c) 80   d) 160

Q2. When two logical variables "p" and "q" are given, which of the following is a logical expression that is equivalent to the XOR (exclusive OR) operation? Here, "$\vee$", "$\wedge$", and "$\neg$" represent the logical "OR", "AND", and "NOT" operations respectively.

a) $\neg p \vee q$ b) $(p \vee q) \wedge \neg (p \wedge q)$

c) $\neg(p \vee q) \vee (p \wedge q)$ d) $(p \wedge \neg q) \vee \neg (q \wedge p)$

Q3. A chemical manufacturer has a plan to deliver 500 liters of a 24% acid solution. However, the manufacturer has only two types of acid solutions available in its stock, which are 40% (Type A) and 20% (Type B). How many liters of each acid solution must be mixed to make 500 liters of a 24% acid solution?

UNIT: liter

	Type A	Type B
a)	100	400
b)	200	300
c)	300	200
d)	400	100

Q4. Which of the following is the graph that is represented by the adjacency matrix A shown below?   Here, an adjacency matrix is an $n \times n$ matrix in which both the element of row i and column j and another element of row j and column i become "1" when an edge joining the vertices V_i and V_j of a graph consisting of the "n" number of vertices is present, and "0" when the edge is not present.

[Adjacency matrix A]

$$\begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

a)

b)

c)

d)
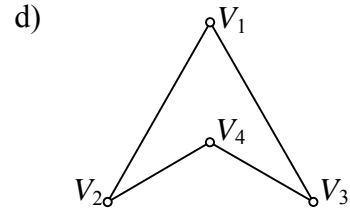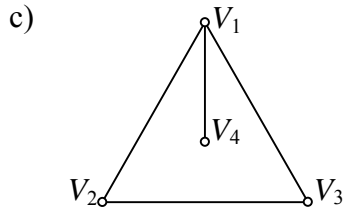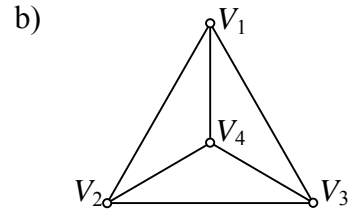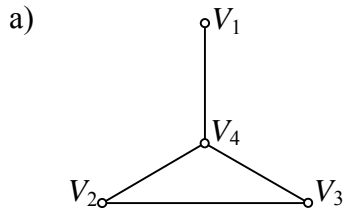
Q5. When $F(v, w)$ is defined using standard predicate logic as shown below, which of the following is the correct meaning of $F(v, w)$?   Here, $P(x, y)$ means "x is a parent of y", and $W(x)$ means "x is a female".   In addition, "$\exists x \exists y P(x,y)$" means that there exist x and y such that $P(x, y)$ is true.

$$F(v,w) = W(v) \cap \exists x \exists y (P(x,y) \cap P(x,v) \cap (y \neq v) \cap (P(y,w)))$$

a) v is a grandmother of w.

b) v is a niece of w.

c) v is a sister of w.

d) v is an aunt of w.

Q6. Each character in a text file is encoded as a double-byte character, and then the file is transmitted with 4 KB header information through a serial communication interface at a speed of 1,000 bps. When a text file consists of 100,000 characters, how long in seconds does it take to continuously transmit the file and its header? Here, 1 KB is 1,000 bytes.

   a) 104   b) 204   c) 832   d) 1632

Q7. There is a three-dimensional array A starting with $A[1, 1, 1]$ and ending with $A[3, 5, 7]$, and consecutive integers starting with 0 are stored in ascending order. What is the maximum value (in hexadecimal) of the integers that can be stored in the array? Here, each number in the answer list is written in radix notation.

   a) 68_{16} b) 69_{16} c) 104_{16} d) 105_{16}

Q8. Which of the following is an appropriate set of sorting algorithms that are based on the divide-and-conquer strategy?

   a) Bubble sort, merge sort   b) Heap sort, insertion sort
   c) Merge sort, quick sort   d) Quick sort, shell sort

Q9. When a series of data shown below is searched using the binary search algorithm, what is the minimum number of comparisons needed to find a value of 5?

       2, 5, 15, 16, 27, 27, 28, 40, 41, 51, 52, 55, 55, 57, 67, 79

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

Q10. The flowchart below shows the algorithm that generates and prints a 4-digit decimal number where each digit is randomly generated and has a different decimal number. Which of the following is the correct combination of expressions that can be inserted into blanks A and B in the flowchart?   Here, the function "random$(0,9)$" is used to generate a random decimal integer from 0 through 9.   The one-dimensional array "d" consists of 10 elements d[0] through d[9].

Start

i = 1

Loop
j: 0, 1, 9

d[j] = 0

Loop

Note: The loop condition shows "variable name: initial value, increment, final value".

A No

Yes

End

k = random$(0,9)$

i = i + 1

No   d[k]=0

Yes

Print k

B
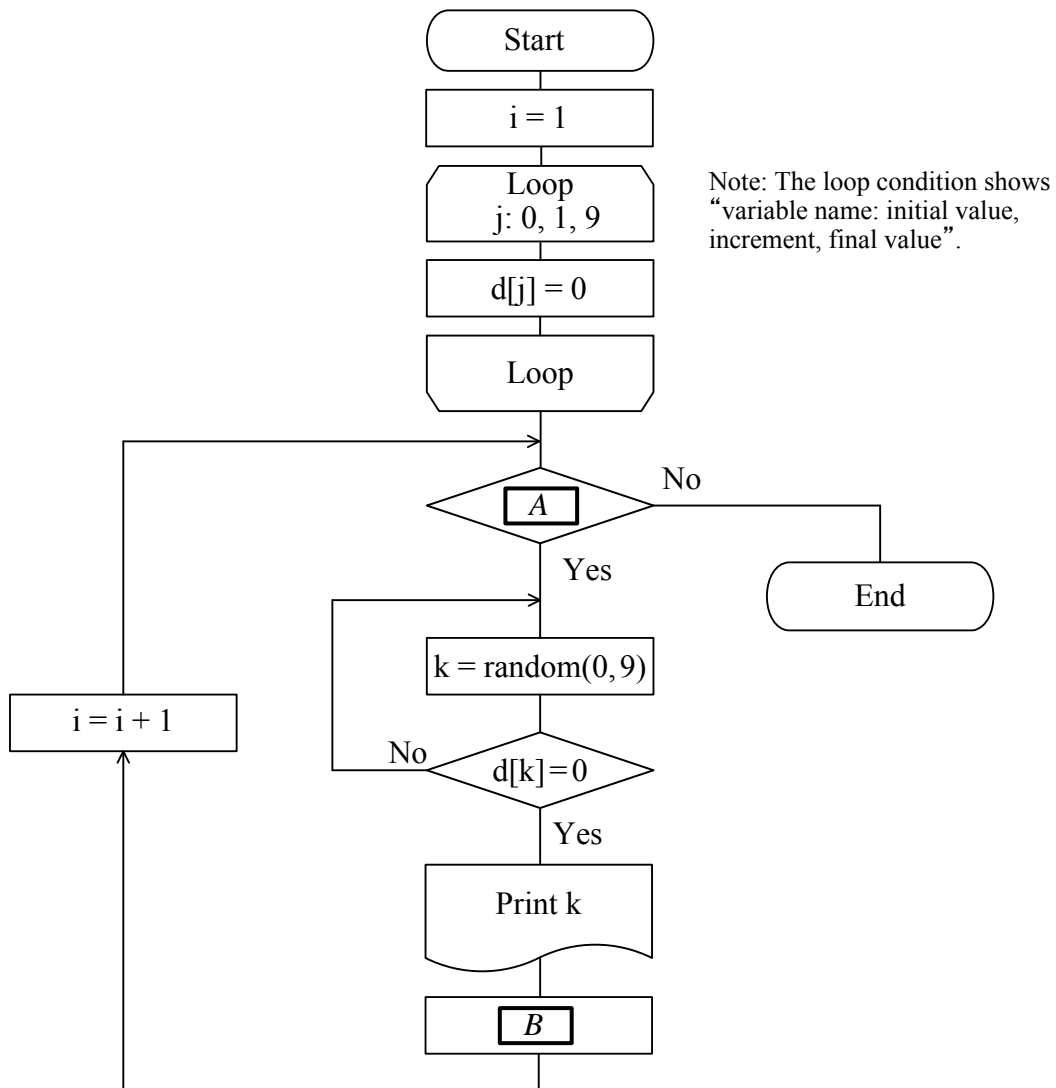
	A	B
a)	i < 4	d[k] = 0
b)	i < 4	d[k] = i
c)	i < 5	d[k] = 0
d)	i < 5	d[k] = i

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Q11. Which of the following is the most appropriate characteristic of XML?

    a) XML can define any tag in order to make it easy to exchange data between information systems over the network.

    b) XML can use the same style languages, such as XSL and CSS, as those used in HTML.

    c) XML has some functions added to HTML for the primary purpose of improving the display performance of a Web page.

    d) XML is different from HTML developed on the basis of SGML, and is based on its own unique specifications.

Q12. Which of the following is the appropriate course of actions to be taken by a processor at the occurrence of an interrupt?

    (1) Saving of the program register (i.e., program counter)
    (2) Transition from the user mode to the privilege mode
    (3) Determination of the start address of the interrupt processing routine
    (4) Execution of the interrupt processing routine

    a) $1 \rightarrow 3 \rightarrow 4 \rightarrow 2$ b) $1 \rightarrow 4 \rightarrow 2 \rightarrow 3$
    c) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$ d) $2 \rightarrow 3 \rightarrow 4 \rightarrow 1$

Q13. Which of the following is the appropriate combination of characteristics of SRAM in comparison with DRAM?

	Integration degree	Access speed	Usage	Circuit component
a)	higher	faster	Cache memory	Condensers and transistors
b)	higher	slower	Main memory	Flip-flops
c)	lower	faster	Cache memory	Flip-flops
d)	lower	slower	Main memory	Condensers and transistors

Q14. Which of the following is an appropriate description concerning cache memory?

a) Cache can be accessed at a high speed, so it is used in the same way as a general-purpose register.

b) If a cache-miss occurs, the entire cache is erased all at once, and then the latest data is transferred from main memory.

c) In machines with the large time gap between access to main memory and instruction execution, the effective access time can be shortened by multi-level cache.

d) When the transfer block size of cache is set to the same size as that of virtual memory, the execution efficiency of a program is enhanced.

Q15. Which of the following is an explanation of USB?

a) A serial interface to connect devices in a tree topology via hubs

b) A serial interface to transfer data to devices such as printers by using infrared rays

c) A parallel interface to connect CD-ROM or DVD drives housed in PCs

d) A parallel interface to connect hard disks or printers in a daisy chain topology

Q16. Which of the following is an appropriate explanation of a plasma display?

a) It consists of many tiny cells between two glass panels containing a mixture of noble gases with a phosphor coating, and displays images by using a gas discharge.

b) It displays images by making an electron beam discharged from an electron gun hit against the fluorescent material on the surface of the tube to emit light.

c) It displays images by making use of the fact that light is emitted when a voltage is applied to an organic compound sandwiched between electrodes.

d) It does not emit light by itself, so the backlight is used to enhance the visibility of images to be displayed.

Q17. Which of the following is a technique of dividing the data of each file into blocks of a fixed size, distributing and deploying those data blocks on multiple hard disks that can be accessed in parallel, and thereby improving the file access speed?

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

Q18. Which of the following is an appropriate characteristic of a Web system that is implemented using the configuration of a three-tier client/server system?

a) A business process is executed on the server side, and the client software displays the result on a screen according to the HTML coding.
b) A program written in HTML is run on the server side, and the client software displays the result on a screen.
c) It is necessary for the client terminals to have a resident service waiting to receive an HTTP request from the server side.
d) Whenever a business process is changed, a business application for operating the Web system must be distributed and installed on the client terminals.

Q19. Which of the following is the appropriate combination of indexes or indicators concerning RAS (Reliability, Availability, and Serviceability)?

	Reliability	Availability	Serviceability
a)	MTBF	MTTR	$\dfrac{\text{MTBF}}{\text{MTBF}+\text{MTTR}}$
b)	MTBF	$\dfrac{\text{MTBF}}{\text{MTBF}+\text{MTTR}}$	MTTR
c)	MTTR	$\dfrac{\text{MTBF}}{\text{MTBF}+\text{MTTR}}$	MTBF
d)	$\dfrac{\text{MTBF}}{\text{MTBF}+\text{MTTR}}$	MTBF	MTTR

Q20. Which of the following is an appropriate expression for calculating the server processing time T_s when the response time T_r, line transmission time T_l, and client processing time T_p can be measured at the client side for one transaction of the online real time processing?　Here, all other overheads are ignored.

a)　$T_s = T_r + T_l + T_p$　　　　　　　　b)　$T_s = T_r + T_l - T_p$
c)　$T_s = T_r - T_l + T_p$　　　　　　　　d)　$T_s = T_r - T_l - T_p$

Q21. A certain computer system runs in a multi-programming environment using a non-preemptive "shortest job first" algorithm.　In this system, when four CPU-bound jobs P_1 through P_4 arrive at the job queue as shown in the table below, what is the average waiting time (in minutes) of the four jobs in the queue?　Here, the job queue is empty at the beginning, so the first job can be executed immediately after its arrival.

Job	Execution time (minutes)	Arrival time (hh:mm)
P_1	7	1:00
P_2	4	1:02
P_3	1	1:04
P_4	4	1:05

a)　3.0　　　　　　　b)　4.0　　　　　　　c)　4.75　　　　　　　d)　5.3

Q22. There are cases where the unused storage space is divided into lots of small and isolated areas because of repeated allocation and release of storage area by an OS. Which of the following is the terminology applicable to such cases?

a)　Fragmentation　　　　　　　　b)　Partitioning
c)　Segmentation　　　　　　　　d)　Swapping

Q23. Which of the following is the virtual storage technique that can resolve external fragmentation rather than internal fragmentation by dividing virtual address space into fixed-length areas?

a) Framing
b) Interleaving
c) Paging
d) Thrashing

Q24. Which of the following is an appropriate explanation of a benchmark test for computer systems?

a) The operating state of each system and the status of resources are measured by a monitoring and calculation program, and data on system configuration and response performance is obtained.
b) The relative processing power of each system is measured and evaluated by executing a computer program, a set of programs, or other operations selected in accordance with the purpose of usage.
c) When evaluation is performed with the inclusion of the future estimates, the performance of each system is evaluated using a program that is tested in a simulated manner by creating a model.
d) Without executing a program, the processing of each system is analyzed theoretically, and the processing time is estimated from the predicted value of the occurrence frequency and execution frequency of each instruction to evaluate the performance.

Q25. Which of the following is a technique that binds the modules constituting a program at the time of executing the program?

a) Dynamic linking
b) Interpreter
c) Overlay
d) Static linking

**Q26.** Which of the following is an OSS tool that is provided as the IDE (Integrated Development Environment) of software?

a) Apache
b) Eclipse
c) Linux
d) Mozilla

Q27. Which of the following is a sequential circuit that is capable of exhibiting either of two stable states and switching between them?

    a) Accumulator   b) Condenser

    c) Flip-flop   d) NAND gate

Q28. In an LED lighting circuit with seven segments and one dot as shown below, when 6D in hexadecimal is written out to the output port, which of the following is displayed? Here, P7 is the most significant bit, P0 is the least significant bit, and each segment or a small dot of the LED lights up only when the corresponding bit is 1.
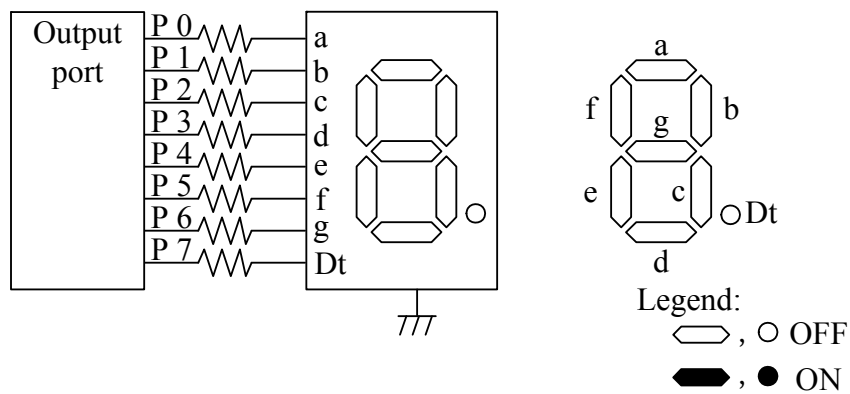
a)

b)

c)

d)

Q29. Which of the following is an appropriate combination of Boolean expressions that are logically equivalent to the logic circuit shown below? Here, "$\cdot$" , "+", and "$\oplus$" represent the logical product, logical sum, and exclusive logical sum operations respectively, and "$\overline{X}$" is the logical negation of "X".
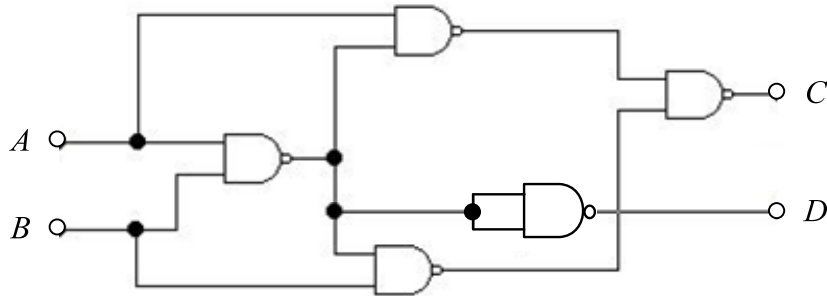
	C	D
a)	$A \oplus B$	$A + B$
b)	$A \oplus B$	$A \cdot B$
c)	$\overline{A \oplus B}$	$A + B$
d)	$\overline{A \oplus B}$	$A \cdot B$

Q30. According to ISO 9241-210: 2010, which of the following is defined as the "extent to which a system, product, or service can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use"?

a) Accessibility
b) Adaptability
c) Availability
d) Usability

Q31. Which of the following is an explanation of clipping in 3D graphics processing?

a) It is the process of defining a window within an image display area and removing objects or parts of objects that lie outside the window.
b) It is the process of imaging the data of an object in the final stage of CG image creation so that the data can be rendered on the display.
c) It is the process of pasting a pattern on the surface of a modeled object for achieving realism in computer graphics..
d) It is the process of shading the surface of an object to provide a three-dimensional appearance.

Q32. Which of the following is the form of normalization into which the relational database table below is classified?

Employee number	Employee name	Year of employment	Position	Position allowance
12345	John Smith	1981	Manager	900
12346	Tom Stewart	1995	Assistant manager	500
12347	Paul Douglas	1997	Assistant manager	500

a) Second normal form
b) Third normal form
c) Fourth normal form
d) Unnormalized form

Q33. In a relational database, which of the following is an appropriate purpose of defining a foreign key?

a) To prevent fragmentation of the record storage area because of the repeated deletion and addition of records
b) To provide a constraint to maintain referential consistency between the records of related tables
c) To restore as many records as possible that are damaged by a failure, based on the mutual relationship between tables
d) To speed up the searching and updating of related tables by storing them closer together

Q34. The sales record for salespersons in a certain financial year at a company is shown in the table below.   Which of the following is an appropriate SQL statement that retrieves the name of the salesperson with average sales of $400,000 or higher for the year from the 1st quarter (1Q) through the 4th quarter (4Q) and $300,000 or higher in sales for each individual quarter?   Here, the unit for the amounts in this table is 1,000 dollars.

Sales_record

Number	Name	1Q	2Q	3Q	4Q
123	Ichiro Yamada	296	319	366	415
594	Taro Suzuki	435	453	304	464
612	Hanako Sato	496	394	423	511
⋮	⋮	⋮	⋮	⋮	⋮

a) SELECT Name FROM Sales_record
    WHERE (1Q+2Q+3Q+4Q)/4 >= 400 OR
        1Q >= 300 OR 2Q >= 300 OR
        3Q >= 300 OR 4Q >= 300

b) SELECT Name FROM Sales_record
    WHERE (1Q+2Q+3Q+4Q) >= 400 AND
        1Q >= 300 AND 2Q >= 300 AND
        3Q >= 300 AND 4Q >= 300

c) SELECT Name FROM Sales_record
    WHERE 1Q > 400 OR 2Q > 400 OR
        3Q >= 400 OR 4Q >= 400 AND
        1Q >= 300 OR 2Q >= 300 OR
        3Q >= 300 OR 4Q >= 300

d) SELECT Name FROM Sales_record
    WHERE (1Q+2Q+3Q+4Q) >= 1600 AND
        1Q >= 300 AND 2Q >= 300 AND
        3Q >= 300 AND 4Q >= 300

Q35. Which of the following is the unit of atomicity that a DBMS must guarantee for the update of a database?

a) From a checkpoint to the next checkpoint
b) From the acquisition of backup data to the occurrence of a media failure
c) From the start of a transaction to its commit or rollback operation
d) From the start-up to the shutdown of the database system

Q36. Which of the following is an appropriate explanation of data warehouse?

a) A logically interrelated collection of shared data that is physically distributed over a computer network
b) A subject-oriented, integrated, time-variant, and non-volatile collection of data in support of management's decision-making process
c) The dynamic synthesis, analysis, and consolidation of large volumes of multi-dimensional data
d) The process of finding correlations or patterns among dozens of fields in large existing databases by using statistical methods

Q37. Which of the following is the unit of transmission that is handled in the data link layer of the OSI basic reference model and includes a header (and possibly a trailer) along with some number of units of upper-layer data?

a) Datagram   b) Frame   c) Message   d) Segment

Q38. In the traditional IPv4 addressing scheme, which of the following is the private IP address range that is reserved for Class B?

a) 10.0.0.0 through 10.255.255.255
b) 169.254.0.0 through 169.254.255.255
c) 172.16.0.0 through 172.31.255.255
d) 192.168.0.0 through 192.168.255.255

Q39. In a local area network using CSMA/CD as its access method, which of the following is an appropriate description concerning the transmission operation performed by a network node?

a) All nodes are connected in a ring topology, and a special frame is sent around to control a transmission right.   Only the node that receives it can transmit data.
b) Each node checks if the transmission medium is in use, and can transmit data if not in use.   If a conflict is detected, retransmission is done after a random time interval.
c) Each node is assigned a logical priority, and a transmission right is passed along in order of priority.   Only the node with the right can transmit data.
d) Only nodes that have been assigned a time slot for transmitting data can transmit data.

Q40. In the OSI basic reference model, which of the following is the appropriate layer that uses some common network programs and their corresponding protocols, such as HTTP, DHCP, and DNS?

a) Application layer
b) Network layer
c) Session layer
d) Transport layer

Q41. In a TCP/IP network environment, which of the following is the most appropriate information used by a router in order to determine the routing path of a packet?

a) Destination IP address
b) Destination MAC address
c) Source IP address
d) Source MAC address

Q42. Which of the following is the attack where malicious input data is given to a Web application to construct a database query or other data manipulation statements with the aim of falsifying data or illegally acquiring information?

a) Cross site scripting
b) Directory traversal
c) Session hijacking
d) SQL injection

Q43. Which of the following is an appropriate description of a directory traversal attack?

a) The attacker enters database command statements as input data for a Web application, and executes unexpected SQL statements.
b) The attacker illegally obtains the session ID of a user, who has logged into the session, and has access to the server by spoofing the identity of the user.
c) The attacker leads a user to a Web site where vulnerability in input data processing is exploited, and executes a malicious script on the user's browser.
d) The attacker specifies files on the server by using a path that is unexpected by an administrator, and gains unauthorized access to classified files.

Q44. Which of the following is the most appropriate term that refers to the way in which a company collects any personal information about users via the company's website and also the way in which the company uses and protects such personal information?

a) Acceptable use policy
b) Human resources policy
c) Privacy policy
d) Security policy

Q45. Which of the following is the most appropriate method of determining whether to enable or disable communication that can be achieved by using the ARP mechanism for a PC in which communication is requested?

a) The MAC address of the PC is checked, and communication is permitted only when the MAC address has been registered beforehand.
b) The patch application status in the OS of the PC is checked, and communication is permitted only when the latest patch has been applied.
c) The programs installed in the PC are checked, and communication is permitted when only the registered programs have been installed.
d) The signature file for the anti-malware program of the PC is checked, and communication is permitted only when the latest file has been installed.

Q46. Which of the following is the most effective method for detecting the falsification of content on a Web server?

a) The entire communication with the Web server is monitored to ensure that there is no communication other than HTTP and HTTPS.
b) The hash value of each file containing the content of the Web server is stored and is periodically compared with the hash value generated from each file.
c) The memory utilization of the Web server is checked periodically to ensure that there is no occurrence of a buffer overflow.
d) The updated date of each file containing the content of the Web server is stored and is periodically compared with the updated date of each file in the directory.

Q47. In a UML class diagram, which of the following is a direct relationship between one object in a class and another object in another class and is graphically represented as a solid line with or without an arrow?

a) Association   b) Dependency   c) Inheritance   d) Realization

Q48. Which of the following is an **invalid** data flow in the DFD shown below?
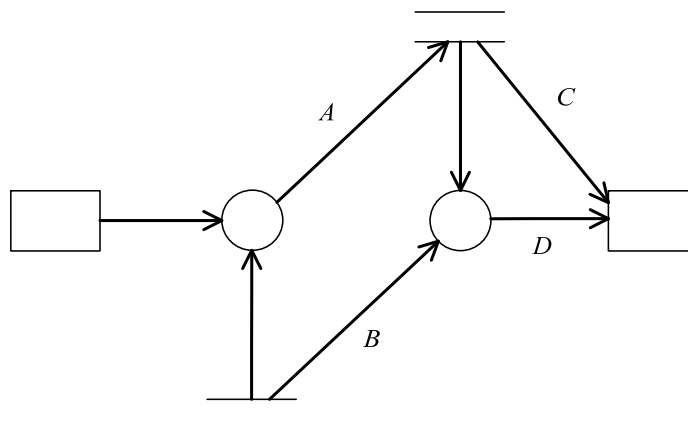
a) *A*   b) *B*   c) *C*   d) *D*

Q49. Which of the following is an appropriate description concerning test data for a white box test?

a) Test data is created on the basis of external specifications.
b) Test data is created on the basis of internal structures.
c) Test data is created on the basis of the relationships between input and output.
d) Test data is created using equivalence partitioning.

Q50. When the quality of a software product is evaluated using the ISO/IEC 25000 series of standards, which of the following is an appropriate quality characteristic that means the capability of the software product to maintain a specified level of performance when it is used under specified conditions?

a) Functional suitability
b) Maintainability
c) Performance efficiency
d) Reliability

Q51. Which of the following is a type of integration test in which all the related program modules are combined and tested at once regardless of the hierarchical structure after the unit test for each module is completed?

a) Big bang test
b) Bottom-up test
c) Sandwich test
d) Top-down test

Q52. Among the maintenance activities of a system, which of the following is an appropriate description of adaptive maintenance?

a) Existing issues or defects are identified and corrected on an as-needed basis.
b) New features are added to an existing system, or existing features are improved.
c) Periodic monitoring or inspection is performed to prevent service interruptions.
d) The system is modified to cope with changes in the external environments.

Q53. Which of the following is an explanation of reverse engineering of software?

a) The existing software is analyzed, and its specification and internal structure are clarified.

b) The internal structure of software is changed without changing the behavior seen from the outside.

c) The new software is developed on the basis of the in-depth analysis of the existing software.

d) The source code is automatically generated from the design information by using a CASE tool.

Q54. As shown in the arrow diagram below, there exists a project consisting of nine activities *A* through *I*.   When the number of days required for activity *E* is shortened from 9 days to 6 days, by how many days can the minimum number of days required for this project be shortened?
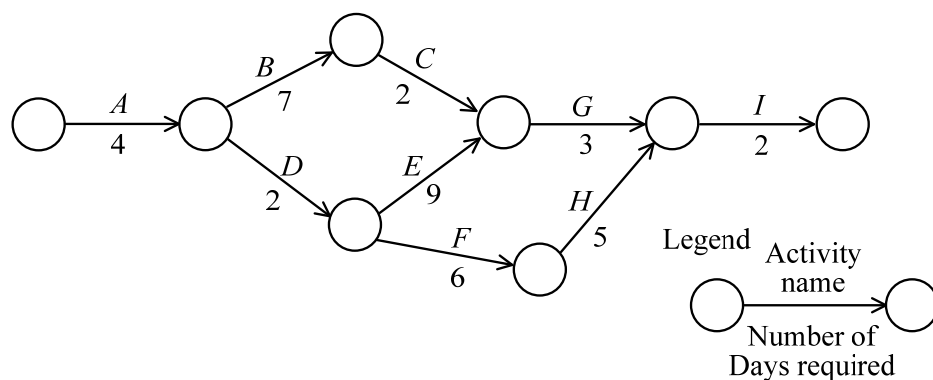
a) 0 (Cannot be reduced)   b) 1
c) 2   d) 3

Q55. A chart or a diagram is created to resolve a quality problem.   After the trends of factors are analyzed, it is determined whether more than 80% of all the factors belong to a small group of factors.   Which of the following is effective for this purpose?

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

Q56. Which of the following is an appropriate description of how to estimate person-months in software development?

a) In COCOMO, person-hours are estimated in units of deliverables or processes on the basis of the WBS (Work Breakdown Structure) and then accumulated in a bottom-up approach.

b) In LOC method, when the development conditions are similar to those used for the previous software development, person-hours are estimated on the basis of the previous record.

c) In the function point method, the function points are defined and classified on the basis of external input, external output, internal logical file, external interface file, and external inquiry.

d) In the standard task method, the number of program steps is estimated, and the person-hours required for development are calculated on the basis of the estimated program steps.

Q57. Which of the following is an appropriate inspection item that should be included in an operational test?

a) Ensuring that the algorithm used in each software item is reasonably acceptable

b) Ensuring that the consistency of the interfaces between software units is maintained

c) Ensuring that the specifications are met for each software unit

d) Ensuring that the system satisfies the requirements from the user's viewpoint

Q58. Which of the following is a characteristic of the one-time (or big bang) migration method that is one of the system migration methods?

a) A problem during migration has a very large impact on the new system.

b) Additional operational costs are incurred because of parallel operations.

c) An application program is required to connect the new and old systems.

d) Migration is planned after the short-term parallel use of the new and old systems.

Q59. Which of the following is the primary purpose of the problem management process that is defined by ITIL v3?

a) To effectively and safely perform the change to an existing IT service or the installation of a new service as a solution to the incident
b) To provide a single point of contact to the users and also to provide support for returning to the normal service with the minimum impact on business
c) To recover an IT service suspended because of an incident within the agreed time period
d) To trace and eliminate the root cause of an incident, and to prevent the recurrence of the incident

Q60. An IT service is provided under the conditions described below. In order to meet the SLA, which of the following is the maximum allowable downtime (in hours) per month during service hours? Here, the number of business days in a month is 30.

[Conditions of the SLA]
- Service hours: 8 a.m. to 10 p.m. on business days
- Availability: 99.5% or more

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

Q61. When a version control system for source code is installed, which of the following is an appropriate item that should be added to system audit processes in order to check the confidentiality of the source code?

a) The access control of the version control system must be set appropriately.
b) The content in the version control system must be approved by the person in charge.
c) The installation cost of the version control system must be at an acceptable level.
d) The version control system must be selected by the development department.

Q62. Which of the following is an appropriate way of selecting systems that are subject to an audit based on risk assessment?

a) All systems are subject to the audit in the order of the start date and time of operations.
b) Based on the implementation structure of an audit, systems for which the audit can actually be carried out are subject to the audit.
c) Systems that are randomly selected from all systems without any preconditions attached are subject to the audit.
d) Systems that have a high possibility of occurrence of a problem and are significantly affected by the problem are subject to the audit.

Q63. Which of the following is a management approach or technique that can be used for redesigning and restructuring the value-creating processes in an organization in order to gain significant benefits in productivity, profitability, service, and quality through maximizing the potential of individuals and teams?

a) BPA   b) BPM   c) BPO   d) BPR

Q64. Which of the following is an explanation of SaaS?

a) It is a service where the user can use the functions of application software via the Internet only when necessary.
b) It is a software package for managing mission-critical business operations in an integrated way in order to effectively use the management resources of a company.
c) It is to fundamentally review the existing organization and its business process, and to redesign duties, business flow, management mechanism, and information systems.
d) It refers to a document of consent concerning the content of service quality between the ordering party and the service provider.

Q65. Among the costs related to computerization, which of the following is included in the running cost?

a) Consulting cost of information systems strategy planning
b) Cost of systems engineers performing requirements definition
c) Initial installation cost of software packages
d) Maintenance cost of information equipment such as servers

Q66. Which of the following is an explanation of the digital divide?

a) It refers to an environment provided in such a way that anybody can use information and communication so that the difficulty experienced by elderly persons and disabled persons in the use of information and communication does not lead to a social and economic gap.
b) It refers to persons for whom acquisition of information is difficult because they do not understand the method of using information and communication devices such as PCs, or because they do not have information and communication devices.
c) It refers to the social or economic gap that occurs depending on the level of information literacy and also on the differences in the usage environment of information technology.
d) It refers to whether all persons including elderly persons and disabled persons can use information and communication systems including hardware and software, as well as information services, and whether these things are easy to use.

Q67. According to Michael Porter, who is the author of "Competitive Strategy", which of the following is the tool that is used to classify a company's business activities into main activities and supporting activities on a function-by-function basis in order to identify key activities that generate the profit for the company and the possible benefit for customers?

a) 3C analysis
b) Five forces analysis
c) SWOT analysis
d) Value chain analysis

Q68. Among the four stages, introduction, growth, maturity, and decline in the product life cycle, which of the following is a characteristic of the growth stage?

a) Customers are aware of product, and as a result, sales increase. However, profits might sometimes decline for the company that first introduced the product, because competitors enter the market.

b) Demand is weak and limited, and the exploitation of new demands is the key to success. The company needs to sell the product to specific prospective customers with conviction.

c) Demand reaches a peak, and the differentiation of the product and the segmentation of the market become clear. The competition between companies increases, and the company needs to create a new variety of products and reduce costs.

d) Some companies withdraw from the market because of a downturn in demand. In this stage, the company decides if it can maintain its competitive advantage and considers the possibility of entering alternative markets.

Q69. Which of the following is an example of the strategic target and key performance indicator of a balanced score card from the viewpoint of customers?

a) Since the target is to continue to promote a balanced and sustainable growth, the backlog of orders is the indicator.

b) Since the target is to establish a close and continuing relationship with the major customers, the number of complaints is the indicator.

c) Since the target is to improve product development capabilities, the time of attending classes for the training of product development is the indicator.

d) Since the target is to keep the delivery date of the product, the number of days by which the manufacturing period is shortened is the indicator.

Q70. Which of the following is a pricing method that is based on the cost plus method?

a) Deciding the price by adding a margin from the very beginning with the prerequisite of offering a discount to the customer

b) Deciding the price by incorporating the desired margin in addition to the manufacturing costs and business expenses

c) Deciding the price on a level that can be expected to reasonably compete in the marketplace

d) Deciding the price step-by-step in view of maximum profits and minimum risks through price analysis

Q71. As shown in the tables below, the 5-year investment effects of IT investment plans *A* through *D* are evaluated on the basis of ROI (Return on Investment).   Which of the following has the highest effect?   Here, the internal rate of return (IRR) is 0, and ROI is calculated by dividing the total profit for the period by the amount of investment.

A

Year	0	1	2	3	4	5
Profit		15	30	45	30	15
Amount of investment	100					

B

Year	0	1	2	3	4	5
Profit		105	75	45	15	0
Amount of investment	200					

C

Year	0	1	2	3	4	5
Profit		60	75	90	75	60
Amount of investment	300					

D

Year	0	1	2	3	4	5
Profit		105	105	105	105	105
Amount of investment	400					

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

Q72. Which of the following is a characteristic of an IC tag (i.e., RFID)?

    a) An IC tag handles a large amount of information, so it uses an external storage device for storing information.

    b) An IC tag is resistant to dirt, and the recorded information is accessible from outside the packaging

    c) An IC tag must be swiped through a dedicated magnetic reader, making physical contact with the tag.

    d) An IC tag uses GPS to display the positional information and attribute information of the receiving location.

Q73. Which of the following is the appropriate term applicable to the description below?

It is used to describe the economic concept or strategy of a certain Internet-based business targeting less-competitive niche markets, which enables the business to gain significant profit in selling small volumes of hard-to-find items to many customers, instead of selling large volumes of reduced number of popular items.

    a) Affiliate   b) Drop shipping

    c) Long tail   d) Opt-in

Q74. Which of the following is applicable to "*A*" in the comparison table below that shows the characteristics of each production system of continuous production, individual production, lot production, and process production?

Production system	*A*	*B*	*C*	*D*
Production quantity	Small	Medium	Large	Large
Form of Main production	Build-to-order	Build-to-order/ build-to-stock	Build-to-stock	Build-to-order/ build-to-stock
Type of product	Many	Some	Few	Few
Frequency of arrangements	High	Medium	Low	Very low
Processing (example)	Assembly	Assembly	Assembly	Chemical

    a) Continuous production   b) Individual production

    c) Lot production   d) Process production

Q75. Which of the following is the methodology that performs both production scheduling and inventory control on the basis of steps (1) through (3) described below?

(1) Based on the types and quantities as well as the component list of the product planned to be manufactured during a fixed period of time in the future, the required quantity of components is calculated.

(2) The net order quantity of each component is calculated from the amount of inventory that can be allocated.

(3) The ordering point of each component is determined in consideration of the manufacturing or procurement lead time.

a) CAM   b) FMS   c) JIT   d) MRP

Q76. Which of the following is an appropriate reason for using a flash memory device as a built-in memory feature of a one-chip microcomputer?

a) The code size of the program can be reduced.
b) The processing capability of the microcomputer is enhanced.
c) The program can be rewritten after the microcomputer is shipped.
d) The reliability is improved in comparison with a mask ROM.

Q77. Which of the following is a specialization-oriented organization that is divided into groups, such as research and development, manufacturing, sales, human resources, general affairs, and accounting, according to the type of work performed?

a) Divisional organization   b) Functional organization
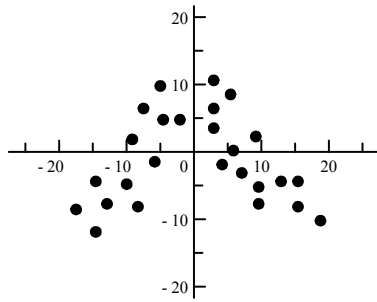c) Matrix organization   d) Project organization

Q78. As shown in the table below, there are four tours provided by a tour company. The table also shows the expected profit for each tour with accidents or without accidents. Which of the following is the tour that is expected to make the highest profit according to the expected value principle?

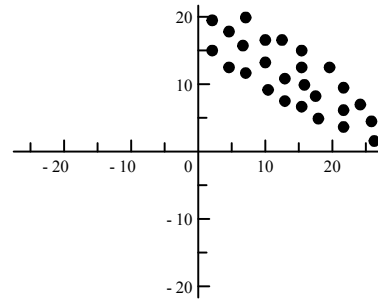| Tour options	Without accidents		With accidents	
	Profit ($)	Probability (%)	Profit ($)	Probability (%)
Mountain biking	400	95	200	5
River rafting	600	90	−400	10
Bungee jumping	300	97	250	3
Scuba diving	900	80	−1,000	20

a) Bungee jumping
b) Mountain biking
c) River rafting
d) Scuba diving

Q79. In the $\overline{X}$-R control chart that is used to determine whether a process is in control or out of control, which of the following is a case where a cause of out-of-control plots should be investigated on the basis of the "Rule of Seven"?

a) When a total of seven plots are above the center line
b) When a total of seven plots are out of the upper or lower control limit
c) When at least seven consecutive plots are above or below the center line
d) When at least seven consecutive plots are out of the upper or lower control limit

Q80. Which of the following is the scatter diagram that shows a "negative correlation"?
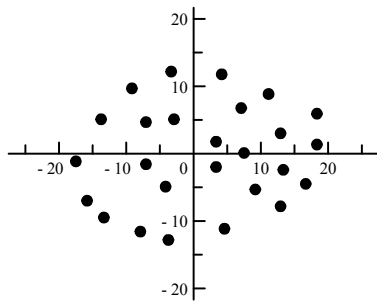
a)

b)

c)

d)