October 2011

Applied 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 Applied 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]

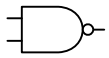
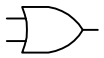
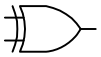
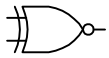
Q1	Ⓐ	●	Ⓒ	Ⓓ

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 following graphic symbols are used for logic gates and circuit components.

I. Logic Circuit

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.

II. Circuit symbol

Graphic symbol	Explanation
	Resistor
	Earth (Ground)

Q1. Which of the following is the reason for using 2's complement in binary representation?

a) Bit errors can be detected by counting the number of "1" bits.
b) Division can be performed by using a combination of subtractions.
c) Negative numbers can be calculated by inverting bits.
d) Subtraction can be performed by creating negative numbers and adding them.

Q2. In a certain company, three types of cell phones, *A*, *B*, and *C*, are used for business purposes. Fifty (50) employees in the company use at least one, but not more than three cell phones. Sixteen (16) of them use three cell phones, five (5) use only one *A*-type cell phone, and seven (7) use only one *B*-type, and nineteen (19) use only one *C*-type. How many cell phones are used in the company?

a) 79 b) 82 c) 85 d) 98

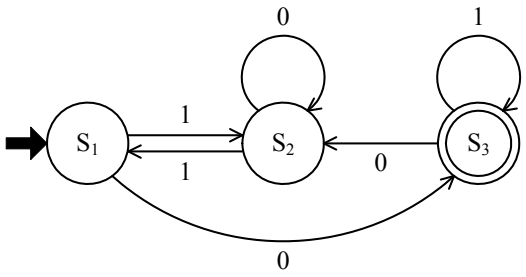
Q3. A data center distributes network requests between the two separate instances of the database with a service capacity of 80 requests per second each. During peak hours, requests to the databases are uneven; one has a utilization rate of 95% and the other has 60%. When a load balancer is installed to have requests equally distributed and the M/M/1 queuing model can be applied, what is the approximate average time in milliseconds a request waits in the queue during peak hours?

a) 10.8 b) 17.9 c) 21.5 d) 35.8

Q4. According to the sampling theorem, the sample rate must be at least two times higher than the highest frequency of analog audio signal. What is the maximum sampling cycle (in microseconds) required to convert an audio signal with a bandwidth of 0 through 20 kHz into a digital signal in accordance with the sampling theorem?

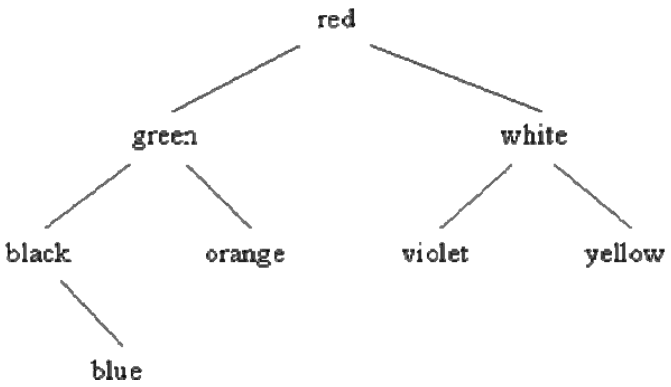
a) 2.5 b) 5.0 c) 25.0 d) 50.0

Q5. Which of the following is the input string accepted by the finite automaton shown below? Here, S_1 represents the initial state, and S_3 represents the acceptance state.



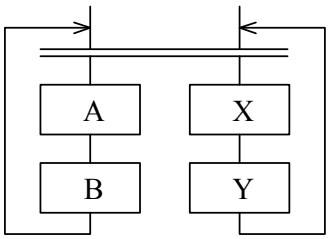
a) 1011 b) 1100 c) 1101 d) 1110

Q6. When a set of English words is ordered alphabetically in a binary search tree as shown below, which of the following traversal methods can be used to obtain the words in alphabetical order?



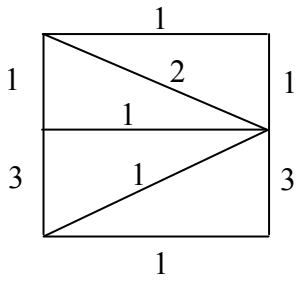
a) Breadth-first order
b) In-order
c) Post-order
d) Pre-order

Q7. When the processing shown in the flowchart below is executed several times, which of the following is the execution sequence that can appear? Here, a double line refers to the synchronization of parallel processing.



a) B→A→B→A
b) B→X→A→Y
c) X→B→A→Y
d) Y→X→B→A

Q8. In the graph shown below, what is the aggregate weight of edges for a minimum spanning tree? Here, the minimum spanning tree is a spanning tree organized so that the total edge weight between nodes can be minimized. Each weight is shown beside an edge of the graph.



a) 3
b) 5
c) 7
d) 13

Q9. JavaScript is used in a variety of Web pages to add functionality, validate forms, calculate data, and much more. Which of the following cannot be implemented with HTML alone, but can be implemented with JavaScript on the browser side?

a) Checking of input data
b) Data transmission to a server
c) Display of an image
d) Use of an applet

Q10. Which of the following is the condition under which a well-formed XML document is valid?

a) It can be used with entity references.
b) It conforms to DTD or XML schema as an alternate to DTD.
c) It conforms to the syntax rules for describing XML data.
d) It contains a complete XML declaration.

Q11. When pipeline depth is "*D*" and pipeline pitch is "*P*" seconds, which of the following is the expression that represents the time required to execute "*I*" instructions in the pipeline? Here, each stage of the pipeline is executed in one pitch, and pipeline hazards can be ignored.

a) $(I + D) \times P$
b) $(I + D - 1) \times P$
c) $(I \times D) + P$
d) $(I \times D - 1) + P$

Q12. Which of the following can cause an external interrupt?

a) A machine check exception generated by a hardware failure
b) A page fault generated when a non-existent page is accessed under virtual memory management
c) A privileged instruction violation generated when a system management instruction is executed in the general user mode
d) An operation exception such as an overflow generated by a floating-point operation instruction

Q13. Which of the following is an explanation of memory interleave?

a) It speeds up hard disk access by using semiconductor memory as a data buffer between CPU and hard disk drives.
b) It speeds up main memory access by dividing main memory into two or more independent groups which are accessed one after the other.
c) It speeds up main memory access by proceeding to the next memory access request after completing the access request, data read/write process, and its post-processing.
d) It speeds up memory access by copying some of the data on main memory to cache memory and narrowing the gap in access speed between CPU and main memory.

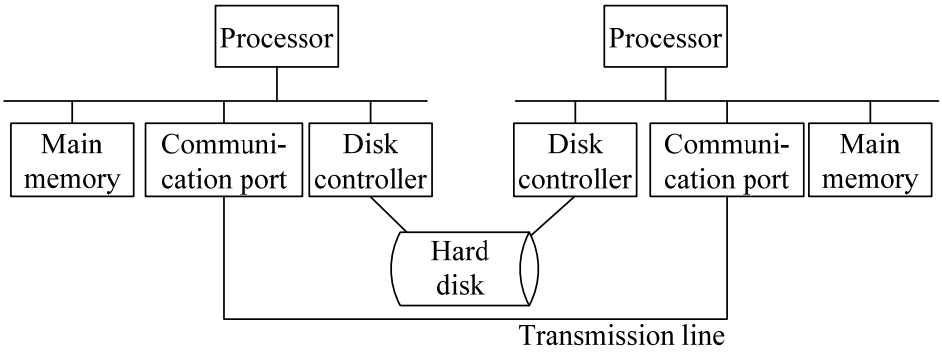
Q14. When the access time of cache memory is 10 nanoseconds, the access time of main memory is 60 nanoseconds, and the hit ratio of cache memory is 90%, what is the effective access time in nanoseconds?

a) 15 b) 25 c) 35 d) 55

Q15. Which of the following is an appropriate characteristic of liquid crystal display?

a) Electron beams emitted by an electron gun hit phosphors and produce luminescence.
b) It controls light transmittance for each pixel and uses color filter to present colors.
c) It uses an organic compound that emits light when voltage is applied.
d) It uses ultraviolet rays generated by electric discharge and phosphors.

Q16. Which of the following refers to the system that is composed of two processors shown in the figure below?



a) Array processor system
b) Loosely coupled multiprocessor system
c) Slave system
d) Tightly coupled multiprocessor system

Q17. In a client/server system, which of the following is the function that enables a client to call a procedure stored on the remote server as if it were on the client itself?

a) ACID b) NFS c) RPC d) TCP/IP

Q18. When the configuration of the current HPC (High Performance Computing) machine is upgraded under the conditions below, which of the following is an appropriate combination of the number of nodes and the total theoretical peak performance after the upgrade? Here, the total theoretical peak performance is proportional to the number of cores.

[Current configuration]

(1) The theoretical peak performance of a core is 10 GFLOPS.
(2) A node has eight cores.
(3) The number of nodes is 1,000.

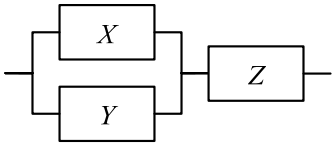
[Upgrade conditions]

(1) The theoretical peak performance of a core should be twice that of the current core.
(2) The number of cores in a node is doubled.
(3) The total number of cores is quadrupled.

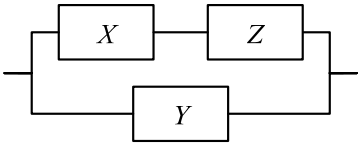
	Number of nodes	Total theoretical peak performance (TFLOPS)
a)	2,000	320
b)	2,000	640
c)	4,000	320
d)	4,000	640

Q19. When two systems *A* and *B* consisting of three devices *X*, *Y*, and *Z* are configured as shown below, which of the following is the appropriate description of the availability? Here, the availability of each device is larger than 0 and smaller than 1.

A



B



a) *A* always has a higher availability.
b) *A* and *B* always have the same availability.
c) *B* always has a higher availability.
d) Either *A* or *B* has a higher availability, depending on the availability of each device.

Q20. In comparison with a configuration with multiple servers that are physically independent, which of the following is the appropriate combination of characteristics of multiple servers integrated into a single server through virtualization? Here, physical resources include components of a computer, such as the CPU, main memory, and hard disks.

	Operations management of physical resources	Utilization of physical resources	Load caused by overhead
a)	Complicated	High	Heavy
b)	Complicated	Low	Light
c)	Simple	High	Heavy
d)	Simple	Low	Light

Q21. A certain computer system runs in a multi-programming environment using a non-preemptive "shortest job first" algorithm. In this system, as shown in the table below, five CPU-bound jobs *A* through *E* arrive at the job queue every 1 hour in order of "*A* and *E*", "*B* and *D*", and then *C*. Jobs *A* and *E* as well as *B* and *D* arrive at the same time; in those cases, priority is given in alphabetical order. When 3.5 hours elapse after the arrival of the first jobs *A* and *E*, which of the following shows the content of the job queue? Here, the job queue is empty at the beginning, so the first job can be executed immediately after its arrival.

Job name	Execution time (Hours)	Arrival time (hh:mm)
A	3	1:00
B	2	2:00
C	1	3:00
D	2	2:00
E	3	1:00

a) *B*, *D*, *E*
b) *C*, *B*, *D*, *E*
c) *D*, *E*
d) *E*

Q22. Four blocks of cache memory C0 through C3 are in the status shown in the table below. When the content of another block needs to be loaded into the cache memory, which of the following is the algorithm where the content of C2 is subject to replacement?

Cache memory	Load time (mm:ss)	Last reference time (mm:ss)	Reference count
C0	0:00	0:08	10
C1	0:03	0:06	1
C2	0:04	0:05	3
C3	0:05	0:10	5

a) FIFO b) LFU c) LIFO d) LRU

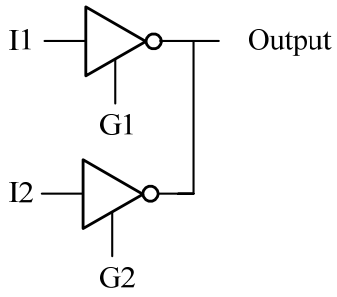
Q23. Which of the following is an appropriate explanation concerning the function of a programming tool?

a) The browser is helpful to edit the source code of a program through the use of features such as character insertion, deletion, and replacement.
b) The inspector is used to display the content of a data structure for the purpose of debugging when a program is executed.
c) The simulator is used to record and display the execution path information within a program or between programs.
d) The tracer makes it easier to find functional explanations and data definitions on a program-by-program basis.

Q24. When Apache, open source-based Web server software, is modified to create and distribute a new product, which of the following should be done?

a) Appending a notification of the modification to the modified files
b) Appending the copyright notice of one's company to the modified files
c) Changing the license text and attaching it to the product
d) Using the name of Apache as the product name

Q25. When the logical circuit with three-state (or tri-state) buffers is used as shown below, which of the following is the appropriate combination of states to be inserted into blanks *A* through *D* of the truth table below?



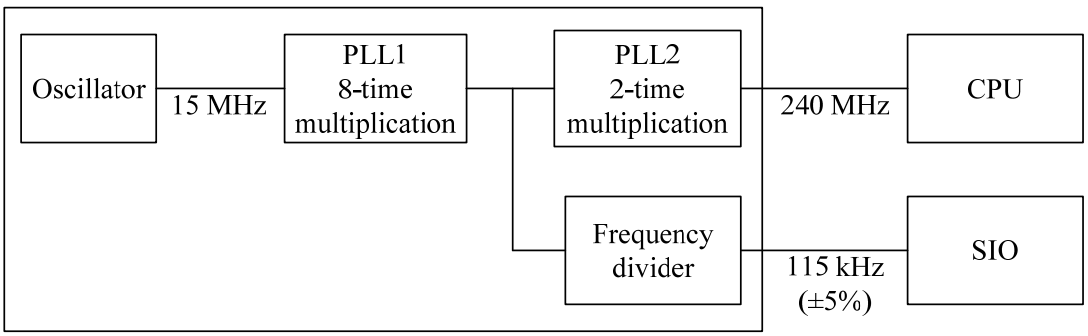
I1	I2	G1	G2	Output
0	0	0	0	High impedance state
0	0	0	1	1
0	0	1	0	1
0	0	1	1	Not allowed
0	1	0	0	High impedance state
0	1	0	1	*A*
0	1	1	0	1
0	1	1	1	*B*
1	0	0	0	High impedance state
1	0	0	1	*C*
1	0	1	0	0
1	0	1	1	Not allowed
1	1	0	0	*D*
1	1	0	1	0
1	1	1	0	0
1	1	1	1	Not allowed

	A	*B*	*C*	*D*
a)	0	High impedance state	0	Not allowed
b)	0	Not allowed	1	High impedance state
c)	1	Not allowed	0	High impedance state
d)	High impedance state	0	1	Not allowed

Q26. An 8-bit D/A converter is used to generate a voltage. In the D/A converter, the voltage changes by 10 millivolts (mV) as the lowest-order bit changes. When 0 is given as data, the output is 0 mV. When the hexadecimal number 82 is given as data, what is the output voltage in mV?

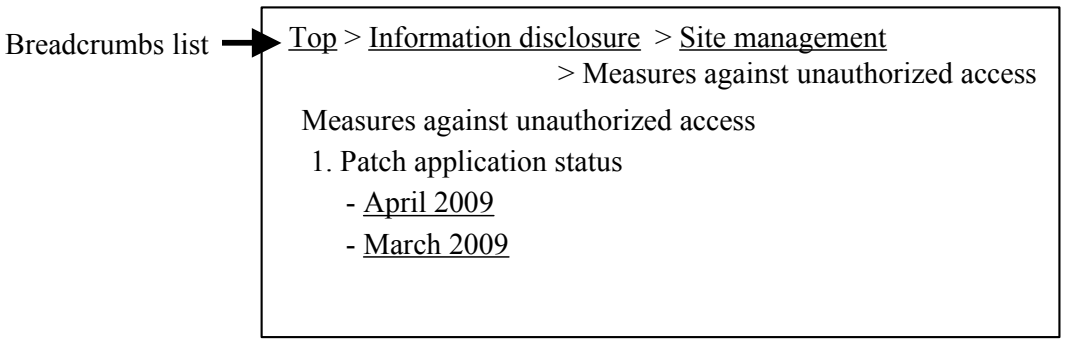
a) 820 b) 1,024 c) 1,300 d) 1,312

Q27. The figure below shows a block diagram of an internal clock generator in a one-chip microcomputer. When a 15 MHz oscillator, two internal PLLs (PLL1 and PLL2), and a frequency divider are combined to supply a clock signal of 240 MHz ($15 \times 8 \times 2 = 240$) to the CPU and a clock signal of 115 kHz to the SIO (Serial Input/Output), which of the following is the value of the frequency divider? Here, the accuracy of the clock for the SIO should be within ±5%.



a) $\frac{1}{2^4}$ b) $\frac{1}{2^6}$ c) $\frac{1}{2^8}$ d) $\frac{1}{2^{10}}$

Q28. Which of the following is the purpose of displaying such information as "topic path" or "breadcrumbs list" on a Web page?



a) To display a history of measures taken against unauthorized access, so as to promote the Web site as being safe and secure
b) To display a list of information provided on the Web site, so as to make it easier for the users to find the information they need
c) To display the location of the current page within the Web site, so as to make it easier for the users to navigate the Web site
d) To display the update history and user notifications in date order, so as to provide information on various updates in an easy-to-understand manner, and to publicize that the Web site is active and frequently updated

Q29. Which of the following is an appropriate explanation concerning basic terms of computer graphics?

a) Anti-aliasing is a phenomenon caused by insufficient image sampling.
b) Ray tracing is to represent a curved surface by using shades.
c) Rendering is to cut out the graphics outside a window to display only the inside.
d) Wire frame representation is to represent a three-dimensional shape using only lines.

Q30. Customers generally put money in several banks, and the relationship between customers and banks is represented by an E-R diagram as shown below. When this model is implemented as three tables "Bank", "Account", and "Customer" in a relational database, which of the following is an appropriate description?

a) The "Account" table has two or more foreign keys.
b) The "Bank" table has a foreign key on which a referential constraint is imposed.
c) The cardinality from the "Account" table to the "Customer" table is one-to-many.
d) The cardinality from the "Bank" table to the "Account" table is many-to-one.

Q31. Which of the following is an appropriate description of data normalization?

a) Normalization is performed to improve the efficiency of access to relational databases.
b) Relational operations such as selection and projection cannot be performed on a table in unnormalized form.
c) When normalization is fully performed, the same attribute is not contained redundantly in two or more tables.
d) When normalization is performed, an attribute composed of multiple items is decomposed into attributes that have a single item.

Q32. In a relational database, which of the following is an appropriate description concerning a referential constraint that is set from the "Order" table to the "Product" table?

a) A tuple for the "Product" table and a tuple for the "Order" table exist independently of each other.
b) When a tuple for the "Order" table disappears, the corresponding tuple for the "Product" table also disappears.
c) When a tuple for the "Order" table exists, the corresponding tuple for the "Product" table exists.
d) When a tuple for the "Product" table exists, a corresponding tuple for the "Order" table exists.

Q33. When the select and cross join operations are performed in a relational database, which of the following is the appropriate combination of orders of time complexity? Here, n is the number of tuples in each table, and there is no index table available in the database.

	Select	Cross Join
a)	$O(n)$	$O(n^2)$
b)	$O(n^2)$	$O(n)$
c)	$O(n\log n)$	$O(n)$
d)	$O(n\log n)$	$O(n^2)$

Q34. When two tables "Member" and "VIP" are defined as shown below, which of the following is an appropriate SELECT statement that can be used to retrieve information about members who are registered in the "Member" table but **not** in the "VIP" table? Here, an underline indicates a primary key.

Member

MemberNo	MemberName

VIP

MemberNo

a)
```
SELECT MemberNo, MemberName FROM Member FULL JOIN VIP
      ON Member.MemberNo = VIP.MemberNo
      WHERE VIP.MemberNo IS NULL
```

b)
```
SELECT MemberNo, MemberName FROM Member INNER JOIN VIP
      ON Member.MemberNo = VIP.MemberNo
      WHERE VIP.MemberNo IS NULL
```

c)
```
SELECT MemberNo, MemberName FROM Member LEFT OUTER JOIN VIP
      ON Member.MemberNo = VIP.MemberNo
      WHERE VIP.MemberNo IS NULL
```

d)
```
SELECT MemberNo, MemberName FROM Member RIGHT OUTER JOIN VIP
      ON Member.MemberNo = VIP.MemberNo
      WHERE VIP.MemberNo IS NULL
```

Q35. In two realational database tables *R* and *S* shown below, when a division operation $R \div S$ is performed, which of the following is the appropriate resulting table?

R

R1	RS
CR56	PA14
CR76	PG4
CR56	PG4
CR62	PA14
CR56	PG36

S

RS
PG4
PG36

a)

R1
CR56

b)

R1
CR76

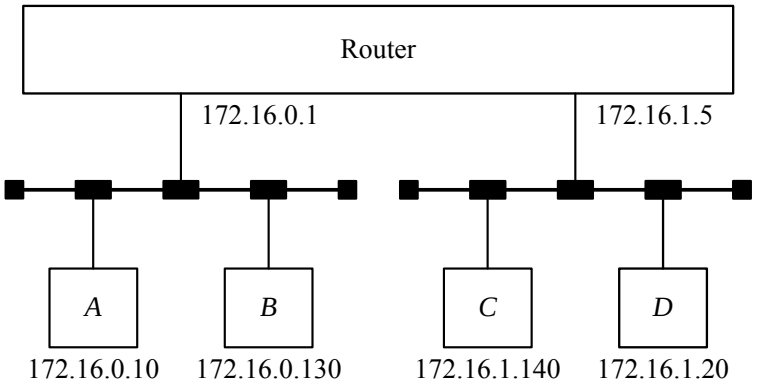
c)

R1
CR56
CR62

d)

R1
CR56
CR76

Q36. In an IP network, two LAN segments are connected through a router. The IP addresses for router ports and terminals are configured as shown in the diagram below. Here, the subnet mask 255.255.255.128 is used for the entire network. When the address configuration for each router port is correct, which of the following is the combination of terminals with correct IP addresses?



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

Q37. Which of the following is an appropriate protocol that is used on top of UDP for delivering real-time audio and video streams over the Internet?

a) FTP b) HTTP c) ICMP d) RTP

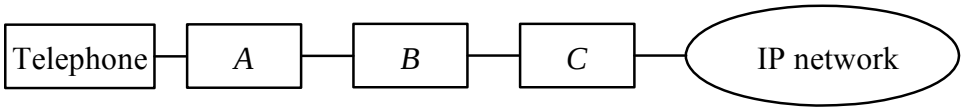
Q38. Which of the following is a relatively old protocol that is used in small, homogeneous TCP/IP networks in order to allow a router to periodically exchange the entire routing information with other routers?

a) BGP b) OSPF c) RARP d) RIP

Q39. In a TCP/IP-based Ethernet system, which of the following is the appropriate command used for displaying the association between the IP address and its MAC address, adding an entry into the table that resolves the Mac Address to the IP Address, or deleting the specified entry from the table?

a) ARP b) NETSTAT c) NSLOOKUP d) PING

Q40. The figure below illustrates the connection configuration for integrating a telephone set or line into an IP network. When a VoIP gateway is used to connect an in-house PBX network consisting of existing telephone sets to the network, which of the following is the appropriate combination of equipment to be inserted into blanks *A* through *C*?



	A	*B*	*C*
a)	PBX	Router	VoIP gateway
b)	PBX	VoIP gateway	Router
c)	VoIP gateway	PBX	Router
d)	VoIP gateway	Router	PBX

Q41. From a viewpoint of information security management, which of the following is an attack that threatens integrity?

a) DoS attack aimed at the overload of systems
b) Falsification of Web pages
c) Unauthorized copying of data stored in systems for taking the data out
d) Wiretapping of communication

Q42. SSL communication between a client and a Web server is described by procedures (1) through (5) below. Which of the following is the appropriate combination of phrases to be inserted into blanks *A* and *B*? Here, some procedures are simplified or omitted.

(1) In response to an SSL connection request from a client, the Web server sends its server certificate to the client.
(2) The client checks the validity of the sever certificate by using the [A] that it possesses.
(3) The client prepares data for common key generation, encrypts the data by using the [*B*] that was attached to the server certificate, and sends the encrypted data to the Web server.
(4) When the Web server receives the data, it decrypts the encrypted data for common key generation by using its own private key.
(5) Both the client and the Web server generate the common key based on the identical data for common key generation. From then on, their communication is encrypted using this common key.

	A	*B*
a)	certificate authority's public key	Web server's private key
b)	certificate authority's public key	Web server's public key
c)	client's private key	Web server's public key
d)	client's public key	Web server's private key

Q43. In an intranet information network or a server, which of the following is installed by a malicious intruder in order to perform unauthorized activities through an irregular access path?

a) Back door
b) Digital forensics
c) Steganography
d) Strict routing

Q44. In a wireless LAN, which of the following is a technique to block access from terminals other than those registered with access points in advance?

a) AES
b) IEEE 802.11b
c) MAC address filtering
d) TKIP

Q45. Which of the following is a typical example of directory traversal attack?

a) The attacker directly specifies unexpected file names on the server, and gains unauthorized access to restricted files.
b) The attacker enters database command statements as input data for a Web application, and executes unexpected SQL statements.
c) The attacker guides 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 illegally obtains the session ID for a user, who logs in to the session managed by the session ID, and has access by spoofing the identity of the user.

Q46. Supply chain networks are discrete and dynamic event systems consisting of suppliers, manufacturers, distributors, and customers. The network requirement includes parallelism in events and synchronization of functions. Which of the following is the most appropriate model that can be used for illustrating this type of supply chain management?

a) Control flow model
b) Data flow model
c) Data-oriented model
d) Petri net model

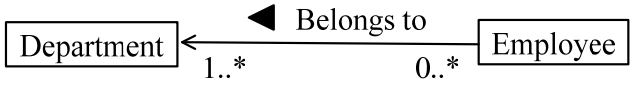
Q47. According to the OMG UML 2.0 Superstructure Specification, which of the following is an appropriate relationship that signifies that a single or a set of model elements requires other model elements for their specification or implementation?

a) Aggregation
b) Association
c) Dependency
d) Generalization

Q48. A use case defines the interactions between a user and a system as a means of clarifying functional requirements for the system. Which of the following is an appropriate example that can be modeled with a use case?

a) Construction work on the air-conditioning equipment in a computer room
b) Planning of a new IT service using the Internet
c) Use of a parallel processor to reduce the processing time
d) Withdrawing of cash by a depositor from an ATM

Q49. Which of the following is the appropriate interpretation of the conceptual data model shown below? Here, the data model is described using UML.



a) A department cannot exist without an employee.
b) An employee can belong to multiple departments at the same time.
c) An employee does not always have to belong to a department.
d) Referential integrity is maintained even if a department with an employee is deleted.

Q50. Which of the following is a module with the weakest module coupling?

a) A module that passes along a single data item as an argument
b) A module that passes along a single data item as global data
c) A module that passes along data structures as arguments
d) A module that passes along data structures as global data

Q51. Among the six software quality characteristics adopted by ISO/IEC 9126, which of the following is the quality characteristic where sub-characteristics such as suitability, accuracy, interoperability, and security are included?

a) Efficiency
b) Functionality
c) Maintainability
d) Reliability

Q52. Which of the following is a theory-based team-oriented process or model that is used for development of highly reliable software with focus on defect prevention rather than defect removal and with emphasis on rigorous engineering principles described below?

- Development based on formal methods
- Iterative and incremental methods under statistical quality control
- Verification with statistical, usage-based testing

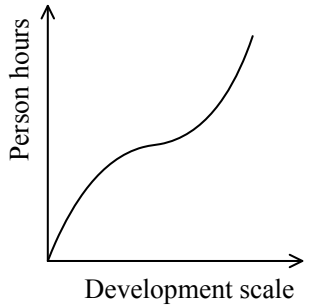
a) Agile process
b) Cleanroom process
c) Evolutional model
d) Spiral model

Q53. A mashup is a web site or a web application that seamlessly combines content, such as data and code, from multiple different data sources into an integrated experience for a user. Which of the following is a typical example of displaying Web pages by using a mashup?

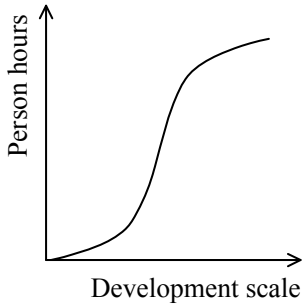
a) Links to relevant railroad company Web sites are displayed on the search resulting page for a train route search.
b) Map data provided by another site is displayed on a shop's information page.
c) The screen is scrolled without switching pages as the cursor is moved on a map.
d) While a user is entering search keywords, keyword candidates are retrieved from the server and displayed on the screen.

Q54. Which of the following is a typical graph showing the relationship between software development scale and person hours?

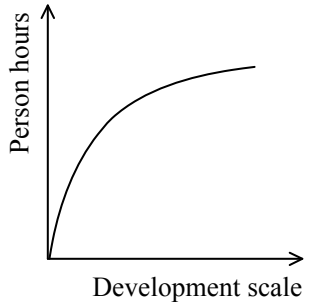
a)



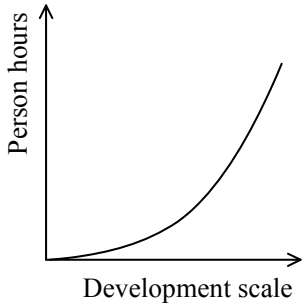
b)



c)



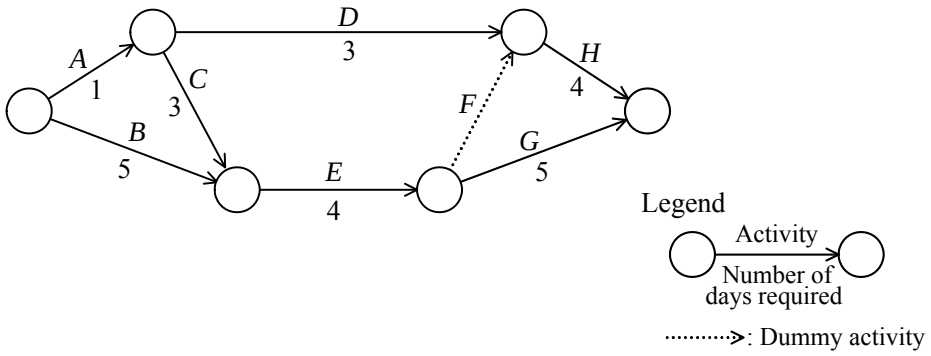
d)



Q55. Which of the following is a common characteristic of many project life cycles?

a) At the start of a project, there is the highest degree of uncertainty; that is, there is the highest risk that the project goal cannot be achieved.
b) In the final phase of a project, stakeholders have the greatest impact on the costs to successfully complete the project.
c) The highest costs for making changes and correcting errors are incurred in the early phase of a project.
d) The largest number of project staff members is always needed at the start of the project.

Q56. In the arrow diagram below created for project time management, which of the following is the critical path?



a) $A \rightarrow C \rightarrow E \rightarrow G$
b) $A \rightarrow D \rightarrow H$
c) $B \rightarrow E \rightarrow F \rightarrow H$
d) $B \rightarrow E \rightarrow G$

Q57. Which of the following is an appropriate description concerning COCOMO used for estimating software development?

a) The method is used to estimate the period of software development based on the number of lines of source programs in consideration of the complexity of algorithms.
b) The method is used to estimate the person-hours and costs for software development based on the scale of the software by using the correction coefficient representing the effect factor.
c) The method is used to estimate the quality of software by predicting the number of potential bugs per unit scale.
d) The method is used to estimate the scale of software based on data such as the number of forms, the number of screens, and the number of files in consideration of the system characteristics.

Q58. Which of the following descriptions about system migration methods is an appropriate explanation of the pilot migration method?

a) Although the migration period can be shortened in comparison with other migration methods, a detailed plan must be created among all departments in advance, and furthermore a high degree of reliability is required in the new system.
b) Each functionally-closed subsystem is migrated in succession within a short period of time, so fewer burdens are placed on the operations department, and even if there is a problem, it can be contained within the relevant subsystem.
c) Resources are prepared for both new and old systems and both systems run in parallel, and therefore if there is a problem in the new system, the impact on business operations can be minimized.
d) The new system is installed and observed in limited departments before migration of all other departments, and therefore if there is a problem relating to the migration, the scope of the impact can be localized.

Q59. There is a database on which data additions, changes, and deletions are made infrequently but periodically. The time interval at which a full backup of this database is created on magnetic tape is changed to twice as much. In this case, which of the following is an appropriate description concerning the backup or recovery operation of the database?

a) It takes about twice as much time on average to create a full backup.
b) It takes about twice as much time on average to restore from journal information.
c) The amount of magnetic tape used per full backup decreases by about half.
d) The amount of magnetic tape used per full backup increases by about twice.

Q60. Which of the following is the goal of the problem management process in ITIL v3?

a) To change existing IT services and introduce new services for incidents efficiently and securely
b) To identify and eliminate the root causes of incidents and take preventive action to reduce incidents
c) To provide users with a single point of contact, minimize the impact on their business, and help them return to their normal service
d) To restore an IT service interrupted by an incident within a previously agreed time period

Q61. The goal of capacity management in ITIL is to ensure that the IT service is planned to provide capacity to meet the current and projected demands in a timely and effective manner. Which of the following is an item to be monitored in capacity management of ITIL?

a) Disk usage rate
b) Mean time between failures
c) Number of incidents
d) Number of operators

Q62. Which of the following is the system audit trail concerning system operations?

a) Programs to print proof lists used for input check on source forms
b) Records relating to the error status of output information
c) Specifications of application programs
d) Test results concerning operational performance of programs

Q63. Which of the following is the key point of a system audit that checks the appropriateness of the acceptance test conducted on a deliverable that the company (outsourcee) to which system development is outsourced delivers to the company (outsourcer) that outsources the work?

a) An auditor prepares an acceptance test plan for the deliverable delivered by the outsourcee.
b) The outsourcee conducts the acceptance test on the deliverable in accordance with an acceptance test plan documented by the outsourcer.
c) The outsourcee delivers a documented acceptance test plan together with the deliverable.
d) The outsourcer conducts the acceptance test on the deliverable delivered by the outsourcee.

Q64. Which of the following is an explanation of the application architecture that constitutes the enterprise architecture?

a) It systematically describes the business processes and the flow of information required for business strategies.
b) It systematically describes the details of data required for business, and the relationships and structures between data.
c) It systematically describes the functions and configuration of systems which support business processes.
d) It systematically describes the technical components required to build and operate information systems.

Q65. Which of the following is the deliverable that defines the business architecture, one of the four architectures that constitute the enterprise architecture?

a) Entity-relationship diagram
b) Information system relationship diagram
c) Software configuration diagram
d) Workflow diagram

Q66. When an information strategy is developed, which of the following is an item with which consistency should be ensured?

a) Annual plan of the information systems department
b) Medium- and long-term management plan
c) Modification plan of the mission-critical system
d) Newly emerged information technology

Q67. The table below shows the result of analyzing the activities of a sales representative on a particular day. By installing SFA (Sales Force Automation), preparation time for customer visits can be reduced by 0.1 hours per customer visit. In order to increase the number of customer visits to six per day without changing the total working hours and the hours per customer visit, how many hours must be reduced from "Other jobs"?

Time analysis of the working hours for a day

Total working hours					Number of customer visits per day
	Customer visits	Office work			
			Preparation for customer visits	Other jobs	
8.0	5.0	3.0	1.5	1.5	5

a) 0.3 b) 0.5 c) 0.7 d) 1.0

Q68. Which of the following is an appropriate explanation of SaaS?

a) It is a software package that manages mission-critical business in an integrated manner to ensure effective use of company's management resources.
b) It is a service that provides users with the function of application software via the Internet only when they need the function.
c) It is a written agreement between the ordering party and the service provider regarding details of service quality.
d) It is to fundamentally review the existing organization and business processes and to redesign the jobs, workflows, management mechanisms, and information systems.

Q69. Which of the following is an explanation of RFI that is an effective way for an organization to determine its needs?

a) It is a contract document between service providers and customers which predefines the scope of assurances and penalties concerning the details and quality of services to be provided.
b) It is a document in which clients present technical requirements or service level requirements to vendors and ask for a proposal of an effective implementation plan to be provided within a specified period of time, prior to purchasing a system.
c) It is a document which asks vendors to provide information about implementation methods, such as currently available technologies and products and vendors' past implementation experiences, in order to achieve user requirements.
d) It is a document which provides a business process overview, input/output information lists, and data flow, in order to make them consistent with requirements definition and to share them among the users, developers, and operation staff.

Q70. Which of the following is an explanation of "star" in PPM (Product Portfolio Management)?

a) It is a product with high market growth rate and high market share. Its cash generating effect is not always large because it requires investment as it grows.
b) It is a product with high market growth rate and low market share. Although long-term market potential can be expected, its cash generating effect is unknown.
c) It is a product with low market growth rate and high market share. It has a large cash generating effect and is a bread-and-butter capital source for companies.
d) It is a product with low market growth rate and low market share. Its cash generating effect and cash loss are small.

Q71. Which of the following is the analysis technique that classifies 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 value for customers?

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

Q72. Which of the following is an appropriate term that is used for businesses specializing in designing and manufacturing electronic equipment as a service to other companies?

a) 3PL b) ASP c) EMS d) SCM

Q73. Which of the following is an appropriate explanation of the "technology S curve"?

a) It represents how the level of expectation for a technology changes. This is classified into the early period, prevailing period, reaction period, recovery period, and stabilized period.
b) It represents the failure trend of an industrial product. The failure rate is high in the early failure period, but is low in the succeeding random failure period. In the wear-out failure period, the failure rate increases.
c) It represents the progress of technology. Technology advances slowly at the beginning and then advances rapidly, and once technology reaches maturity, its progress becomes stagnant.
d) It represents the relationship between the production volume and productivity of an industrial product. Productivity tends to improve as the cumulative volume of production increases.

Q74. An ERP (Enterprise Resource Planning) package is a suite of fully integrated software applications that are used to perform administrative business processes such as financial management, procurement, personnel, and payroll administration. When a mission-critical business system is reconstructed effectively and efficiently by installing such an ERP package, which of the following is the significant point to be emphasized?

a) It is important to install and operate all of the necessary business systems simultaneously, not in incremental steps.
b) It is important to install the accounting system first, followed by the other business systems.
c) It is important to standardize the business processes across the entire company, with consideration for the business model on which the ERP package is based.
d) It is important to respect the opinions of the actual users and to customize the ERP package to match the current business processes.

Q75. Which of the following can take advantage of the cell production system where production is grouped into cells with each cell taking responsibility for the production of each product?

a) Products that require mass production to increase productivity
b) Products that require standardization, simplification, and specialization
c) Products that require wide variation and flexible manufacturing
d) Products with specifications that do not change over the long term

Q76. Which of the following is the characteristic of an IC tag (RFID)?

a) It displays the information on the position and attributes received from orbiting GPS satellites.
b) It handles a large amount of information, so it uses an external storage device to store information.
c) It is dirt-resistant and enables recorded information to be read even from the outside of a package.
d) It is embedded in a plastic card, which is used inserting into a specially-designed reader.

Q77. Which of the following represents the relationship between the quality and the probability of accepting the lot in a sampling inspection with the percent defective of the lot on the horizontal axis and the probability of accepting the lot on the vertical axis?

a) Bathtub curve
b) Normal distribution
c) OC (Operating Characteristic) curve
d) Poisson distribution

Q78. When ROE (Return On Equity) is calculated using the expression shown below, which of the following should be inserted into blank *A*?

$$\text{ROE (\%)} = \frac{\text{Net income}}{\boxed{A}} \times 100$$

a) Borrowed capital
b) Capital
c) Gross capital
d) Self-owned capital

Q79. Company *X* uses the calculation method described below to determine the replenishment quantity for its inventory. When the quantity of inventory at the end of the *n*-th week is B[*n*] and the quantity of sales for the *n*-th week is C[*n*], which of the following is the expression for calculating the replenishment quantity to be ordered at the end of the *n*-th week? Here, *n* is greater than or equal to 3.

[Calculation method for replenishment quantity]

(1) The replenishment quantity is calculated and ordered at the end of each week. The inventory is replenished on the Monday of the following week.
(2) The replenishment quantity is calculated by subtracting the current inventory quantity from the predicted sales quantity for the following week, and then adding the safety inventory quantity.
(3) The estimated sales quantity for the following week is calculated as the average of the sales quantities for the previous week and the current week.
(4) The safety inventory quantity is calculated as 10% of the estimated sales quantity for the following week.

a) $(C[n-1]+C[n])/2 \times 1.1 - B[n]$
b) $(C[n-1]+C[n])/2 \times 1.1 - B[n-1]$
c) $(C[n-1]+C[n])/2 + C[n] \times 0.1 - B[n]$
d) $(C[n-2]+C[n-1])/2 + C[n] \times 0.1 - B[n]$

Q80. Which of the following is **not** protected by copyright laws and international copyright treaty provisions?

a) Database
b) Free software published on the Internet
c) Program language and its conventions
d) Software operation manual