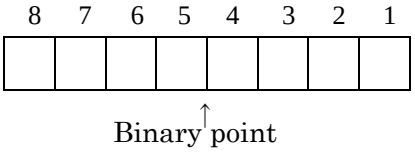
Q1. Which of the following is a decimal number expression of the result of adding together the binary numbers 1.1011 and 1.1101?

a) 3.1 b) 3.375 c) 3.5 d) 3.8

Q2. How is the decimal number –5.625 expressed as an 8-bit fixed-point binary number? Assume that the binary point is located between bits 4 and 5, and that two's complement is used to represent a negative number.



a) 01001100 b) 10100101 c) 10100110 d) 11010011

Q3. Which of the following expressions obtains *–n* for an 8-digit binary number *n* when a negative number is expressed as the two's complement? Here, + indicates addition, while OR and XOR indicate, respectively, the logical sum and exclusive logical sum of the bits.

a) (*n* OR 10000000) + 00000001 b) (*n* OR 11111110) + 11111111
c) (*n* XOR 10000000) + 11111111 d) (*n* XOR 11111111) + 00000001

Q4. When using a computer to add and subtract integers, overflow can occur. In the answer group below, which combination contains all the operations that may cause overflow?

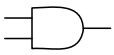
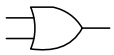
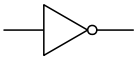
	Operation	Operand x	Operand y
a	x+y	Positive	Positive
b	x+y	Positive	Negative
c	x+y	Negative	Positive
d	x+y	Negative	Negative
e	x–y	Positive	Positive
f	x–y	Positive	Negative
g	x–y	Negative	Positive
h	x–y	Negative	Negative

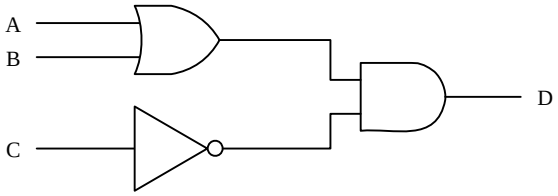
a) a, d, f, g b) b, c, e, h c) b, e d) c, e, h

Q5. The function f(x) has real arguments and returned values. Consider the procedure consisting of steps ① ~ ⑤ as shown below using this function. After starting execution and repeating the procedure a sufficient number of times, y in step ③ stops changing. Which of the following expressions holds at this point?

① x ← a
② y ← f(x)
③ Display value of y
④ x ← y
⑤ Return to ②

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

Q6. Which logic equation matches the logic circuit diagram shown below? Here,  is the AND gate,  the OR gate, and  the NOT gate. Also, • is the logical AND, + the logical OR, and $\overline{X}$ the negative of X.



a) (A+B) • C = D
b) (A+B) • $\overline{C}$ = D
c) (A • B) + C = D
d) (A • B) + $\overline{C}$ = D

Q7. Which logic equation matches the truth table shown below? Here, • is the logical AND, + the logical OR, and $\overline{A}$ the negative of A.

x	*y*	Result
0	0	0
0	1	0
1	0	1
1	1	0

a) $x + \overline{y}$ b) $\overline{x} + y$ c) $x \cdot \overline{y}$ d) $\overline{x} \cdot y$

Q8. In an 8-bit code, how many cases are there where the number of 0 bits equals the number of 1 bits?

a) 16 b) 24 c) 70 d) 128

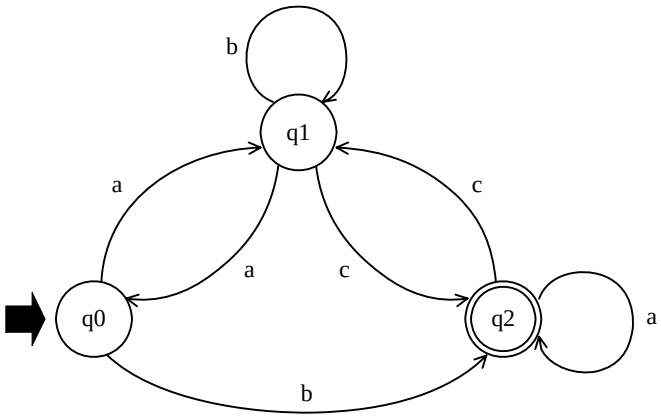
Q9. When a one-bit even parity bit is attached to the head of a 7-bit character code, which of the following is the result of adding the parity bit to each of character codes 30, 3F 7A? Here, a character code is shown in the hexadecimal representation.

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

Q10. Given the bit strings x = 1100 and y = 1010, what operation yields the string 1011? Here, "AND," "OR" and "$\overline{Z}$" refer to logical product, logical sum, and negation of Z, respectively.

a) x AND $\overline{y}$ b) $\overline{x}$ AND y c) x OR $\overline{y}$ d) $\overline{x}$ OR y

Q11. A given character string is tested by a finite automaton model. If q0 is the starting point and q2 is the end point, which character string is not accepted?

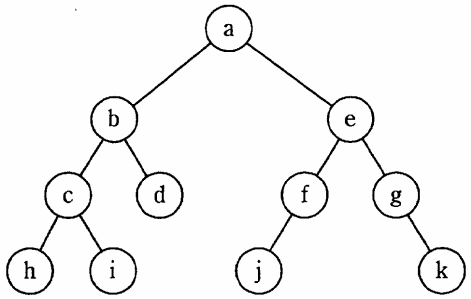


a) abab b) acac c) accc d) bcbc

Q12. Binary tree scanning is performed in the following three ways depending on the sequence.

(1) Forward: Scans in the order of node >> left subtree >> right subtree.
(2) In-between: Scans in the order of left subtree >> node >> right subtree.
(3) Backward: Scans in the order of left subtree >> right subtree >> node.

Which of the following answers indicates the output node values that result when the binary tree in the figure below is forward scanned?



a) abchidefjgk b) abechidfjgk c) hcibdajfegk d) hicdbjfkgea

Q13. There are two data structures—a stack and a queue. Which data is assigned to the variable *x* when the procedure below is executed in sequence? The terms in the procedure have the following meanings.

push(a): This means that data a is inserted into the stack.
pop(): This means that data is taken out from the stack.
enq(a): This means that data a is inserted into the queue.
deq(): This means that data is taken out from the queue.

push(a):
push(b):
enq(pop())
enq(c)
push(d)
push(deq())
χ←pop()

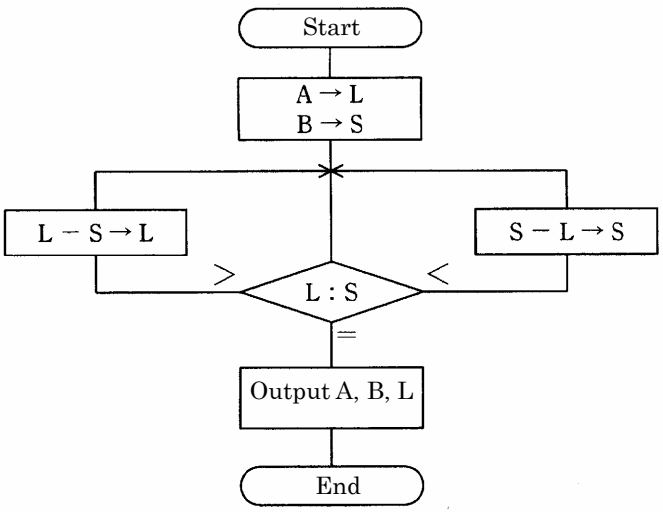
a) a b) b c) c d) d

Q14. The decision table below expresses the conditions for creating ledgers from employee files. Which of the following statements can be deduced from this decision table?

Age 30 and under	Y	Y	N	N
Male	Y	N	Y	N
Married	N	Y	Y	N
Output Report 1	–	X	–	–
Output Report 2	–	–	–	X
Output Report 3	X	–	–	–
Output Report 4	–	–	X	–

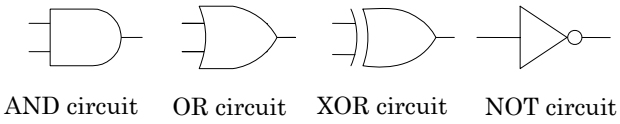
a) Report 1 contains the contents of Report 4 excluding data on men age 30 and over.
b) Report 2 contains all unmarried men.
c) Men in Report 3 are also included in Report 2.
d) Persons included in Report 4 are not included in any of the other reports.

Q15. The flowchart below illustrates the Euclidean algorithm for obtaining the greatest common divisor of numbers A and B, by repeated subtraction. After how many comparisons does processing end when A is 876 and B is 204?



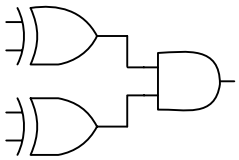
a) 4 b) 9 c) 10 d) 11

Q16. In which of the following circuits is it true that when four bits of data are inputted "The output is '1' if the number of '1' inputs is zero or even-numbered, and the output is '0' if the number of '1' inputs is odd-numbered." In this example, the following graphic symbols depict the various circuits.

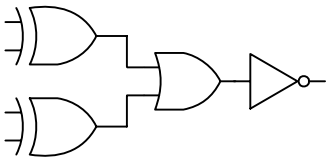


AND circuit OR circuit XOR circuit NOT circuit

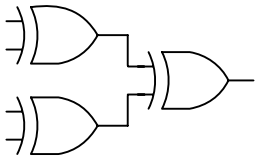
a)



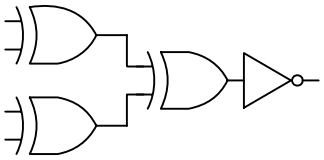
b)



c)



d)



Q17. Select the correct description of DRAM from the answer group below.

a) In DRAM, one bit is the electrically charged state of a capacitor. DRAM is usually used as main memory.
b) Data is written into DRAM during production. DRAM is used to store a microprogram.
c) Data can be written using a special piece of equipment. Written data can be erased by irradiating ultraviolet rays.
d) DRAM is a flip-flop storage medium. It is fast in speed but high in production cost. It is usually used as cache memory.

Q18. Which of the following correctly describes the features of RISC in comparison to CISC?

	Instruction length	Hardware control	Operation target
a)	Fixed	Mainly macro code control	Memory, registers
b)	Fixed	Wired logic control	Registers
c)	Variable	Mainly macro code control	Registers
d)	Variable	Wired logic control	Memory, registers

Q19. Which of the following is a method that specifies the effective address in the operand part of an instruction, as a displacement from the program counter value using this value as the base?

a) Index address specification
b) Absolute address specification
c) Relative address specification
d) Base address specification

Q20. Which of the following is a correct description of cache memory?

a) Even when cache memory access time equals that of the main memory, it improves main memory effective access time.
b) Cache memory capacity is inversely proportional to main memory effective access time.
c) Cache memory is used as an alternative to processor internal registers.
d) Cache memory effectiveness decreases in the case where programs randomly access all areas of the main memory.

Q21. In a certain on-line system, 36,000 transactions per hour must be processed using a CPU of 100 MIPS. If the upper limit of the CPU utilization factor is 80%, what is the average upper-limit number of instructions per transaction? Select the correct answer from the answers given below in thousands.

a) 2 b) 8,000 c) 10,000 d) 12,500

Q22. Which of the following is the correct ascending order of the effective memory access times in ns?

	Cache memory			Main memory
	Exists?	Access time (ns)	Hit rate (%)	Access time (ns)
A	No	–	–	15
B	No	–	–	30
C	Yes	20	60	70
D	Yes	10	90	80

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

Q23. Two software packages must be stored on a magnetic disk in a PC. What is the minimum space in Mbytes needed on the magnetic disk to store and to execute the software? The space needed on the magnetic disk to store each of the software packages is indicated in the following table. Software package 1 and software package 2 are never used at the same time.

Unit: Mbyte

	OS	Software 1	Software 2
Space required to store software package	80	60	120
Space required as temporary work area for execution	40	40	50

a) 260 b) 310 c) 350 d) 390

Q24. The speed of access to the main memory unit is slower than the operation speed of the processing unit. Which of the following is the high-speed memory unit that should be placed between the processing unit and the main memory unit to make up the speed difference?

a) VLIW
b) Cache memory
c) Disk cache
d) Pipeline

Q25. Which of the following is an appropriate description of the characteristics of a RAID configuration?

a) The data transfer speed of each hard disk device is increased.
b) It is possible to obtain a capacity much larger than the total capacity of the individual hard disk devices.
c) Because numerous hard disk devices must be accessed, data access time is increased.
d) Improved disk-system performance and reliability can be anticipated due to the combination of multiple hard disk devices.

Q26. Which of the following descriptions of RAID 0 is correct?

a) A RAID 0 array consists of multiple, expensive but highly reliable disks, and is intended primarily for having a large storage capacity.
b) The purpose of a RAID 0 array is to improve transfer rate by subdividing data and performing cyclically parallel I/O on multiple magnetic disks.
c) A RAID 0 array performs CRC error correction on each block without requiring redundant magnetic disks.
d) A RAID 0 array consists of multiple, inexpensive magnetic disks under the control of the OS in order to provide reliability and higher performance.

Q27. An ink-jet color printer uses three colors. Select the correct combination of colors from the answer group below.

a) Cyan, magenta, yellow
b) Cyan, magenta, black
c) Red, green, yellow
d) Red, green, blue

Q28. A color video is played back at 30 frame/sec using a full-screen PC monitor having a H640 × V480 dot display and 256 colors capability. Which is the closest amount of image data (byte) that can be displayed per 1 minute? Here, data is not compressed.

a) 300k
b) 1M
c) 550M
d) 133G

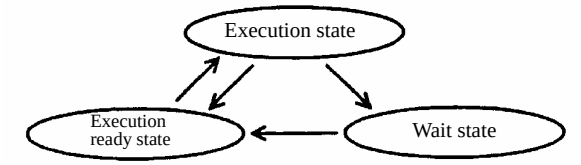
Q29. This device which is a computer component retrieves an instruction, decodes it, instruct other devices to execute the instruction, and determines the address of the next instruction to be executed. What is the name of this device? Select the correct answer from the answer group below.

a) Arithmetic device
b) Storage device
c) Control device
d) Input-output device

Q30. Page-swapping algorithms used in virtual storage systems include FIFO and LRU. Which of the following is appropriate as the basic concept behind these page-swapping algorithms?

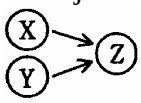
a) They predict which page will be referenced with the highest frequency after the given point in time.
b) They predict which page will be referenced with the lowest frequency after the given point in time.
c) They predict which page will be referenced the soonest in the future after the given point in time.
d) They predict which page will not be referenced for the longest time into the future after the given point in time.

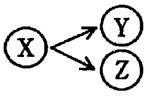
Q31. The state transition diagram below shows task (process) state transition on a multitasking computer. When does the task change from execution state to execution ready state?



a) When a task the priority of which is higher than its own changes to the execution ready state.
b) When a task is created by the job scheduler.
c) When an I/O operation ends.
d) When an I/O operation is requested.

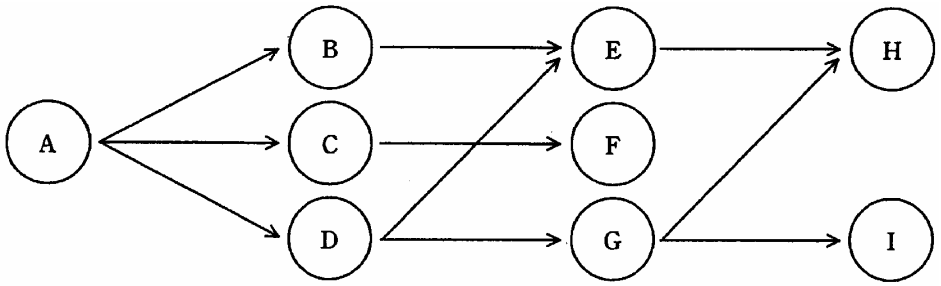
Q32. If a job network is executed under the following conditions, what is the shortest amount of time in hours required to complete processing?

[Conditions]
(1) Job execution multiplicity is 2.
(2) Processing time per job is 1 hour and other jobs do not affect this.
(3) Each job is scheduled in order of activation.
(4) 

indicates that Z starts when both X and Y end.
(5) 

indicates that Y and Z start in this sequence when X ends.
(6) Assume that OS overhead can be ignored.

[Job network]



a) 4 b) 5 c) 6 d) 7

Q33. There is a system that outputs to the printer using a spooling function. In order to satisfy the following conditions, how big must the spooling file be in Mbytes?

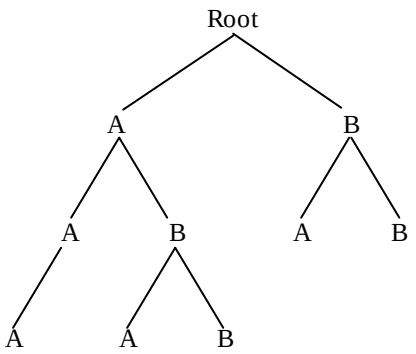
[Conditions]
(1) There are 2 Mbytes of print data per job.
(2) Data is compressed 50% in the spooling file.
(3) 100 jobs are processed per hour and processing variations can be ignored.
(4) A maximum of 5 hours of print data can be spooled.

a) 100 b) 250 c) 500 d) 1,000

Q34. Which of the following is an appropriate description of file organization?

a) Partitioned organization files consist of directories and members, and cannot be updated in member increments.
b) Indexed organization files permit both direct access and sequential access. Access efficiency and recording efficiency are not lowered by record deletions or insertions.
c) Sequential organization files simply consist of records recorded in sequence. They do not permit access using keys, but their recording efficiency is high.
d) Direct organization files have a constant access time regardless of key value distribution, and their recording efficiency is high.

Q35. The structure shown in the following figure is for managing multiple directories having directory names A and B.



If the current directory is moved in the order of \A\B, .., ..\B, and .\A, where is the final current directory? Here, the method for specifying directories is as follows:

[Method for specifying directories]

(1) Like "directory_name_1\directory_name_2," directories on the path are specified using "\" as a delimiter.
(2) If a directory name begins with "\," a route at the left end is assumed to have been specified.
(3) The current directory is indicated with ".".
(4) A directory one-level higher is indicated with "..".

a) \A b) \A\A c) \A\B\A d) \B\A

Q36. Which of the following descriptions of a computer system configuration explains a tightly coupled multiprocessor system?

a) The multiple processors share a magnetic disk, while each is controlled by its own OS. Processing performance is improved by distributing workload on a per-job basis.

b) The multiple processors share a main memory and are controlled by a single OS. In principle, a task in the system can be executed by any of the processors, therefore processing performance is improved by distributing workload in small pieces.

c) Normally, one of the processors is in the standby state. When a failure occurs in the active system, processing is continued by switching over to the standby processor.

d) Two parallel connected processors simultaneously perform the same processing and compare their results with one another. If one of the processors fails, it is removed and processing is continued.

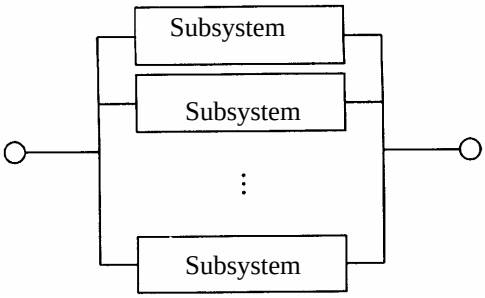
Q37. In a certain transaction processing system, file Y is updated after file X is referenced for each transaction. Files X and Y are stored in separate volumes, and data can be transferred in parallel. However, file Y cannot be simultaneously updated by multiple transactions. What is the approximate maximum number of transactions that can be processed by this system per hour? In this example, the average time required to reference file X is 40 ms; the average time required to update file Y is 60 ms; and transaction processing time by the CPU and operating system overhead may be ignored.

a) 36,000 b) 60,000 c) 90,000 d) 180,000

Q38. Which of the following is the most appropriate description of a system performance evaluation?

a) All data required for performance evaluation can be measured by calling the supervisor function built into the system.
b) Analytical techniques and simulation are methods to evaluate system performance by using models.
c) When monitoring is done for performance evaluation, software monitoring is favorable to hardware monitoring since the impact made to the system being measured is smaller.
d) ISO has established specifications for programs used in benchmark tests. Programs satisfying these specifications can be used to conduct fair tests.

Q39. What is the minimum number of subsystems that need to be configured in parallel in order to increase the availability of the entire system to 99% or more, if the availability of each subsystem in the parallel system shown below is 70%? Assume that the entire system is running as long as one subsystem is running.



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

Q40. Which of the following is a language used to write hypertext documents that can be viewed with a browser?

a) HTML b) HTTP c) Java d) URL

Q41. A program whose execution has not completed yet may be called again by another program. What characteristic must the former have so that it can be executed correctly? Select the term for this characteristic from the answer group below.

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

Q42. Which is an appropriate definition of a "data warehouse"?

a) A data warehouse manages data used by information systems. By eliminating the unnecessary duplication of data and by centrally managing data handled separately by department, data resources can be obtained easily.
b) A data warehouse is technology for reducing the volume of data by limiting redundancy of data. This technology is required in image processing because the volume of data handled is excessively large.
c) A data warehouse is a collection of chronologically ordered data that has been compiled depending on the purpose of use. It is useful for decision support, because it allows the utilization and analysis of information from various angles.
d) A data warehouse is software which allows communication among users and the sharing of information among them to make group works efficient.

Q43. Which of the following statements describes a dynamic linking function?

a) When the program is executed, it loads modules from the shared library and system library.
b) When the program is executed, it loads the object program into the appropriate addresses.
c) When the program is executed, it converts the logical address of the loaded page into a physical address.
d) Before the program is executed, it link-edits multiple object programs.

Q44. A graph for sales from January through December, the yearly moving cumulative total, and the sales cumulative total needs to be created using spreadsheet software graphing functions. In this example, which of the following is appropriate as a description of the formulas to be entered in cells D2 through D13?

See the end of this booklet for information on spreadsheet software functions and terms.

	A	B	C	D
1	Month	Sales	Yearly moving cumulative total	Sales cumulative total
2	1			
3	2			
4	3			
5	4			
6	5			
7	6			
8	7			
9	8			
10	9			
11	10			
12	11			
13	12			

a) Enter the formula “B2” in cell D2, and enter the formula “B3+D2” in cell D3. Next, copy cell D3 to cells D4 through D13.

b) Enter the formula “SUM (C$2~C2)” in cell D2, and copy it to cells D3 through D13.

c) Enter the formula “SUM (B$2~B13)” in cell D13. Next, enter the formula “D13–C13” in cell D12, and copy cell D12 to cells D2 through D11.

d) Enter the formula “SUM (C$2~C13)” in cell D13. Next, copy cell D13 to cells D2 through D12.

Q45. Which of the following is an appropriate description of software in the middleware category?

a) It is software for supporting the rationalization of business processes in departments such as accounting and personnel.
b) It is software designed to enable basic processing functions, which are commonly used by numerous application software programs, to be usable by application software through a standardized interface.
c) It is software that constantly monitors the status of hardware resources so as to enable efficient use of computer systems.
d) It is software that monitors usage of each page in memory, and performs page swapping so as to enable highly efficient processing.

Q46. Classes such as “circle” and “square” are generalized as a super class, “figure”. In this case, what is the relationship of the “circle” and “square” to the “figure” called?

a) Aggregation
b) Disseminated
c) Generalization
d) Role

Q47. Which of the following is a correct description concerning object orientation?

a) In an object-oriented model, object operations to be abstracted must be specified beforehand.
b) Mutual dependency between objects can be increased by means of encapsulation.
c) When a class is changed, all the classes above that class must be changed.
d) When expanding or changing a model, the changed portion can be localized through the concept of inheritance.

Q48. Which of the following describes characteristics pertaining to the data-oriented analysis and design technique, which is one among various software analysis and design techniques?

a) Specification changes after system development can be done relatively easily through localized changes or additions to data structures and procedures.
b) The modeling of a targeted business process domain areas focuses on the most stable information resources.
c) Designing data structures so that they can be accessed by programs most efficiently.
d) Refining functions by dividing a program in such a way that the independence of the modules is strong.

Q49. Which of the answers below is obtained by adding a check digit, obtained using the following method, to a data value? In this case, the data value is 7394, the weighting constant is 1234, and the base is 11.

[Method]
(1) Calculate the product of each digit in the data and the corresponding digit in the weighting constant, then calculate the sum of the products.
(2) Divide the sum by the base to obtain the remainder.
(3) Subtract the remainder from the base, and add the one's place of the result to the end of the data value as a check digit.

a) 73940 b) 73941 c) 73944 d) 73947

Q50. In GUI design, which of the following components is used to select just one item from a number of exclusive items?

a) Scrollbar b) Slider
c) Check box d) Radio button

Q51. Which of the following is a correct statement concerning the characteristics of a Gantt chart which is used in progress control?

a) It can clearly show the effects of work delays to other tasks.
b) It can clearly show task sequences.
c) It can clarify critical paths which are key points for progress control.
d) It can compare the planned schedule and results.

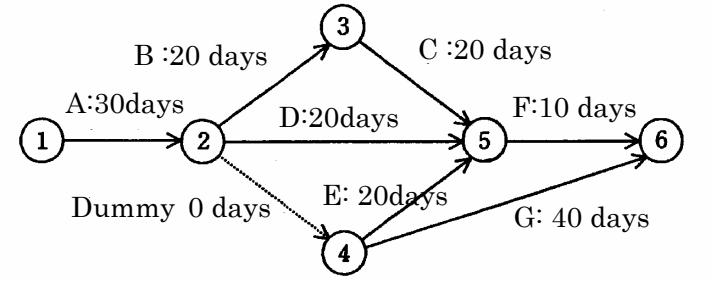
Q52. What is the objective of a design review?

a) To review and modify a development schedule so as to make the schedule feasible.
b) To discover defects or mistakes in specifications at an early stage of development and minimize the amount of backtracking.
c) To improve development efficiency by preventing mistakes from being inserted in the design process and by simplifying tests.
d) To improve the accuracy of development estimates by improving design quality.

Q53. Which of the following prepares a test case for use in a white box test?

a) Cause-effect graphing
b) Design of experiments
c) Condition coverage
d) Equivalence class partitioning

Q54. The following arrow diagram was drawn up at the start of a system development project. The progress for the first 50 days was found as shown in the table below. If the remaining work progresses at the pace originally estimated, in how many days will the project be completed at the earliest?



Work	Progress for first 50 days.
A	Finished on day 31.
B	Underway. One (1) day required for remaining work.
C, F	Not yet started. Can start work as soon as work in previous process is completed.
D, G	Not yet started, but can start work anytime.
E	Underway. Ten (10) days required for remaining work.

a) 80 b) 81 c) 90 d) 100

Q55. Which of the following is an appropriate description of the function point method, which is used to provide software development estimates?

a) Estimate the software development time based on the lines of code in the software program and taking into account algorithm complexity.
b) Estimate the amount of software development effort based on the size of the software, using correction coefficients that express influential factors.
c) Estimate the software quality by estimating the number of latent bugs per unit size.
d) Estimate the software size by quantifying the software's functions based on the number of reports, number of screens, number of files, and the like.

Q56. Which of the following is a correct description concerning data backup operations?

a) Differential backup is the most effective way to shorten the time for restoration by loading a backup file.
b) Placing backup data in the same storage media is the most effective way to minimize backup operation time.
c) To ensure that backup processing ends normally, backup processing should be scheduled so as not to overlap with application processing.
d) A backup media that allows random access, such as magnetic tape, should be used.

Q57. A certain store has established customer segments based on annual purchase records, and sets discount rates according to these customer segments. Annual sales amounts are stored as records in the format shown below, in the order of sales dates. At the end of the fiscal year, the customer segments are reviewed based on this file. Which of the following is an appropriate method for creating the report required for doing this?

Sales date	Customer ID	Customer segment	Discount rate	Product ID	Suggested list price	Sales quantity	Suggested list price total	Sales amount

Notes: Suggested list price total = Suggested list price × Sales quantity.
Sales amount = Suggested list price total × (1 – discount rate).

a) Total the sales amounts using the sales date as a group key, and print the sales amounts in descending order in the report.
b) Total the suggested list price totals using the customer segment as a group key, and print the total value of the suggested list price totals in descending order in the report.
c) Total the suggested list price totals using the customer ID as a group key, and print the total value of the suggested list price totals in descending order in the report.
d) Total the sales amounts using the sales amount as a group key, and print the total value of the sales amounts in descending order in the report.

Q58. Which of the following is a correct statement in regard to recovery from database failure?

a) Always keeping the contents from the previous generation is an effective measure against system failure in order to increase database reliability, rather than keeping an identical copy
b) For recording purposes, the data after an update should be stored in the log files and journal files instead of the data prior to the database update.
c) Rollback refers to the process of restoring the database to the status immediately before the start of the transaction when a failure occurs during OLTP execution, etc.
d) Roll-forward restores the database by restoring the periodically acquired database dumps, so while a part of the update data at the time of failure occurred is not reflected, speedy recovery can be expected.

Q59. If a network is constructed in a TCP/IP environment, the more clients there are, the more complex it is to manage the related IP addresses. Which of the following protocols simplifies IP address management by dynamically assigning an IP address at the request of a client?

a) DHCP b) HTTP c) LDAP d) SNMP

Q60. Which of the following is suitable as a description of software "corrective maintenance"?

a) Corrective maintenance is done not to fix errors, but to improve the degree of software completeness, such as by employing better algorithms and enhancing output messages.
b) Corrective maintenance is done to make changes in business requirements, as well as to process environment changes such as hardware and operating system upgrades.
c) Corrective maintenance is done to prevent difficulties arising from problems that are anticipated during operations after a system enters full operation mode.
d) Corrective maintenance is done to correct inconsistencies with function specifications so that business processes will not be impeded in cases where the required functions are not achieved.

Q61. The character "T" (ASCII 7-bit code 1010100) was sent in a data transfer using start-stop synchronization with even-parity error detection. If the character is received correctly, what will be the bit string that is received? Assume that the bits are sent in the following order: start bit (0); the character code, from least significant bit to most significant bit; parity bit; and stop bit (1). The bits are written in the sequence in which they are received, starting from the left.

a) 0001010101 b) 0001010111 c) 1001010110 d) 1001010111

Q62. 80 characters, each 7 bits long, are transmitted as one block in a start-stop synchronous system with longitudinal and vertical parities. (A start signal is a bit "1" and a stop signal is also a bit "1".) If 800 characters are transmitted, how many bits are transmitted? Select the correct answer from the answer group below.

a) 5,600 b) 6,400 c) 6,480 d) 8,100

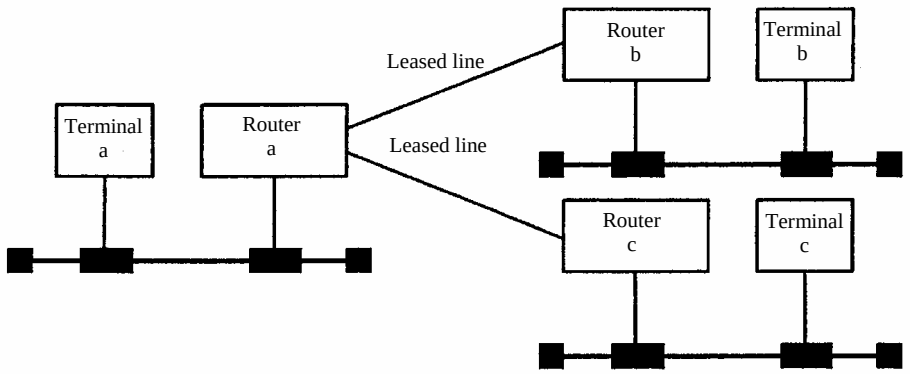
Q63. Audio is sampled 11,000 times per second and sampled values are each recorded as 8-bit data. In this kind of system, how many seconds of audio can be recorded on a floppy disk whose capacity is 1.4×10^6 bytes?

a) 15 b) 127 c) 159 d) 1,272

Q64. Which of the following LAN medium access control methods is a method with functions to detect data frame collisions on the transmission medium?

a) CSMA/CA
b) CSMA/CD
c) Token passing bus
d) Token passing ring

Q65. Three IP routers are connected by leased lines as shown in the figure below. Which of the following statements correctly describes the operation of router a in relaying a TCP/IP packet from terminal a to terminal b?

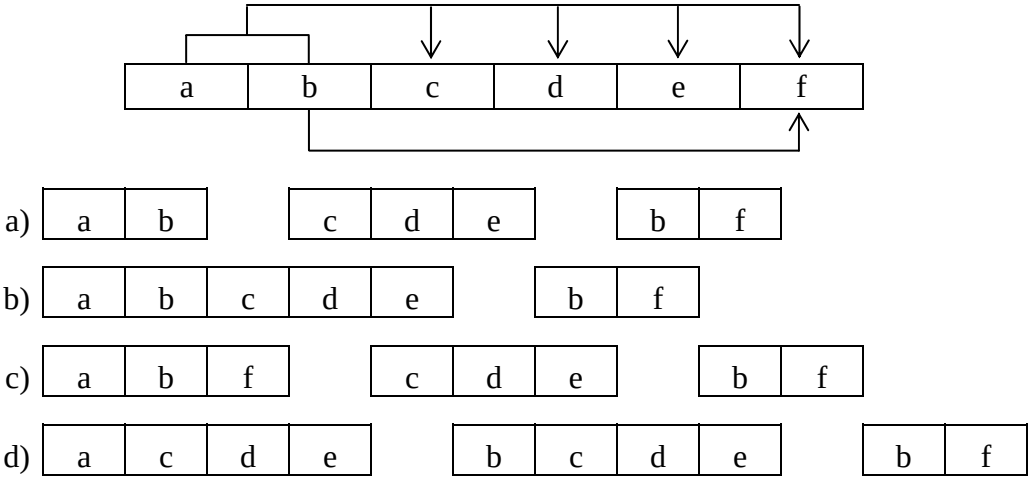


a) Router a relays all packets to both router b and router c.
b) Router a relays packets to router b only according to the relay router specified in the packet.
c) Router a relays packets to router b only based on the destination IP address in the packet.
d) Router a learns the location of terminal b from the MAC address of the destination in the packet and relays the packets to router b only.

Q66. Which of the following descriptions concerning the projection which is a relational operation is correct?

a) A new table is created from a table by selecting the tuples which match the given conditions.
b) A new table is created by extracting only the specified attributes from a table.
c) A new table is created by selecting the tuples which are common to two tables.
d) A new table is created from a pair of tables by linking the tuples which match the given conditions.

Q67. A certain record consists of items a through f. The combination of items a and b is the primary key for this record. Moreover, item f can be specified by item b. Which of the following combinations is the 3rd normal form of this record?



Q68. Given the "Products" table shown below, what will be the results produced by the following SQL statement?

```
SELECT product_number FROM product
      WHERE product_name LIKE "%pen"
         AND unit_price < 330
```

Product

Product number	Product name	Unit price
100	Color pencil	305
130	Ball point pen	285
205	Fountain pen	700
267	Note book	300
307	Marking pen	350
390	Ruler	400
401	Eraser	320
420	Chalk	298

a)

Product number
100
130

b)

Product number
100
130
267
420

c)

Product number
130

d)

Product number
130
267

Q69. Which of the update procedures below decreases the number of rows appearing in a "Profitable Product" table that is displayed by [View definition], when data in the "Product" table is as follows?

Product

Product code	Product name	Model	Sales price	Purchase price
S001	PC T	T2003	150,000	100,000
S003	PC S	S2003	200,000	170,000
S005	PC R	R2003	140,000	80,000

[View definition]

```
CREATE VIEW  Profitable_Product
     AS SELECT * FROM Product
          WHERE Sales_price – Purchase_price >= 40000
```

a) Updating the sales price of model R2003 to 130,000
b) Updating the purchase price of model R2003 to 90,000
c) Updating the purchase price of model S2003 to 150,000
d) Updating the sales price of model T2003 to 130,000

Q70. Which of the following encryption methods is classified as a common key cryptograph method?

a) DES
b) RSA
c) ElGamal cryptograph
d) Elliptic curve cryptosystem

Q71. Which of the following is an appropriate description of user IDs?

a) Users participating in the same project all use the same user ID.
b) A user with multiple user IDs sets the same password for all IDs.
c) In cases where privileges are set on a user ID, the privileges are kept to the minimum required.
d) A registered user ID should be deleted, when a sufficient period of time has passed after a deletion notice is sent.

Q72. Which of the following is a correct statement concerning security technology?

a) Dual systems made up of fault-tolerant computers are effective against earthquakes and fires.
b) A disk array system or firewall is effective against physical theft and destruction of data.
c) CRC in the HDLC protocol is effective against unauthorized access to data during transmission.
d) A digital signature that utilizes a public key cryptosystem is effective against illegal access by falsified messages or posing.

Q73. ISO/IEC12207 (software life cycle processes) prescribes not only the responsibilities of suppliers in software transactions, but also the responsibilities of purchasers. Which of the following is a responsibility of purchasers?

a) Clarifying acceptance criteria and procedures
b) System operation
c) Correcting product defects
d) Performing internal quality audits

Q74. A data warehouse that stores sales information for an entire company went on-line, but it could not be used as planned. After talking with the employees, it was determined that the user skill level was lower than anticipated. Which of the following improvement efforts would be the correct way to promote its use?

a) Send through managers an instruction to the employees for promoting its use.
b) Prepare standardized templates based on data sampling and analysis patterns.
c) Provide more real time data and improve accuracy of the data.
d) Add information requested by users.

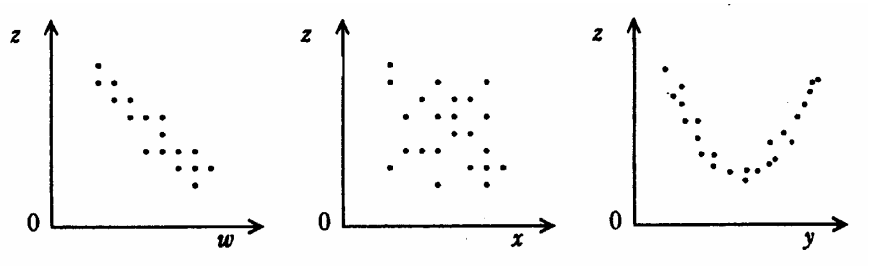
Q75. What is the cost of goods sold in dollars, assuming the following? The beginning goods inventory is $20,000; the quantity of goods laid in during the current period is $100,000; the ending goods inventory is $30,000.

a) $50,000 b) $90,000 c) $110,000 d) $150,000

Q76. Which of the following descriptions concerning the application of management science techniques is proper?

a) The PERT technique is used to conduct reliability analysis of machinery.
b) The queuing model is used to analyze a business using financial statements.
c) Time-series analysis is used to forecast product sales in the market.
d) The simplex method is used for product quality control.

Q77. The graphs shown below plot relationships between product quality z and manufacturing factors w, x and y. Which of the following is a correct statement concerning these graphs?



a) The correlation between w, x, y and z is not recognized; therefore, w, x and y cannot be used as quality control items.
b) w and z have a negative correlation; therefore, w can be used as a quality control item.
c) The change in x greatly affects z; therefore, x can be used as a quality control item.
d) z is nearly a second degree function of y; therefore, y cannot be used as a quality control item.

Q78. Which of the following services allows companies to connect their computers and PCs to the computer center of a bank and use the online services offered by the bank?

a) Firm banking
b) Home banking
c) Wholesale banking
d) Retail banking

Q79. In order to compare last year's entrance examination with this year's, a large number of employees in a company agreed to take both examinations. The correlation coefficient and regression line were obtained by plotting the scores from last year's exam as the x-coordinates and the scores from this year's exam as the y-coordinates. Which of the following statements correctly interprets the results indicated below?

[Results]

The correlation coefficient was 0.8.

The slope of the regression line was 1.1.

The value of the y section of the regression line was 10.

a) From the value of the y section of the regression line, it is understood that a person whose score on this year's exam was 0 could score 10 on last year's exam.

b) From the slope of the regression line, it is understood that the average score on this year's exam was 10% greater than last year's average score.

c) From the slope of the regression line and the value of the y section of the regression line, it is understood that this year's exam was easier than last year's exam.

d) From the slope of the regression line and the correlation coefficient, it is understood that this year's exam scores were good.

Q80. The estimated profits by installing production facilities are shown in the table below. If the expected value principle is used, which of the facility plans A through D is likely to yield the maximum expected profit?

Unit: 1 thousand dollars

		Assumption of economic condition			
		Condition 1	Condition 2	Condition 3	Condition 4
Probability		0.2	0.3	0.4	0.1
Facility plan	A	40	10	0	-6
	B	7	18	10	-10
	C	8	18	12	-5
	D	2	4	12	30

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