1 . The \_\_\_\_\_\_\_ model is the basis for today's computers!  
a. Leibnitz  
b. von Neumann  
c. Pascal  
d. Charles Babbage

9. A 17th-century computing machine that could perform addition and  
subtraction was the \_\_\_\_\_\_\_.  
a. Pascaline  
b. Jacquard loom  
c. Analytical Engine  
d. Babbage machine

11. \_\_\_\_\_\_\_ is the design and writing of a program in structured form.  
a. Software engineering  
b. Hardware engineering  
c. Algorithm development  
d. Instructional architecture

1. A byte consists of \_\_\_\_\_\_\_ bits.  
a. 2  
b. 4  
c. 8  
d. 16

2. In a set of 64 symbols, each symbol requires a bit pattern length of  
\_\_\_\_\_\_\_ bits.  
a. 4  
b. 5  
c. 6  
d. 7

3. How many symbols can be represented by a bit pattern with ten bits?  
a. 128  
b. 256  
c. 512  
d. 1024

4. If the ASCII code for E is 1000101, then the ASCII code for e is  
\_\_\_\_\_\_\_. Answer the question without consulting the ASCII table.  
a. 1000110  
b. 1000111  
c. 0000110  
d. 1100101

5. A 32-bit code called \_\_\_\_\_\_\_ represents symbols in all languages.  
a. ANSI  
b. Unicode  
c. EBCDIC  
d. Extended ASCII

10. When we want to store music in a computer, the audio signal must be  
\_\_\_\_\_\_\_.  
a. sampled only  
b. quantized only  
c. coded only  
d. sampled, quantized, and coded

11. A floating-point value after normalization is (1.0101) × 2−4. What is  
the value of exponent section in the Excess-127 representation?  
a. 4  
b. -4  
c. 127  
d. 123

12. Assume a new Excess system uses 17 bits to represent the exponent  
section. What is he bias value in this system?  
a. 17  
b. 16  
c. 65535  
d. 65536

14. The first computing machine to use the idea of storage and program-  
ming was called \_\_\_\_\_\_\_.  
a. the Madeline  
b. EDVAC  
c. the Babbage machine  
d. the Jacquard loom

14. In an Excess conversion, we \_\_\_\_\_\_\_ the number to be converted.  
a. add the bias number to  
b. subtract the bias number from  
c. multiply the bias number by  
d. divide the bias number by

15. When a fractional part is normalized, the computer stores the  
\_\_\_\_\_\_\_.  
a. only the sign  
b. only the exponent  
c. only the mantissa  
d. the sign, exponent, and mantissa

16. The precision of the fractional part of a number stored in a computer  
is defined by the \_\_\_\_\_\_\_.  
a. sign  
b. exponent  
c. mantissa  
d. last digit

15. \_\_\_\_\_\_\_ separated the programming task from computer operation  
tasks.  
a. Algorithms  
b. Data processors  
c. High-level programming languages  
d. Operating systems

9. If the exponent in Excess\_127 is binary 10000101, the exponent in  
decimal is \_\_\_\_\_\_\_.  
a. 6  
b. 7  
c. 8  
d. 9

10. If we are adding two numbers, one of which has an exponent value  
of 7 and the other an exponent value of 9, we need to shift the deci-  
mal point of the smaller number \_\_\_\_\_\_\_.  
a. one place to the left  
b. one place to the right  
c. two places to the left  
d. two places to the right

17. We use a bit pattern called a \_\_\_\_\_\_\_ to modify another bit pattern.  
a. mask  
b. carry  
c. float  
d. byte

4. A register in a CPU can hold \_\_\_\_\_\_\_.  
a. only data  
b. only instructions  
c. only program counter values  
d. data, instruction, or program counter values

5. A control unit with five wires can define up to \_\_\_\_\_\_\_ operations.  
a. 5  
b. 10  
c. 16  
d. 32

6. A word can be \_\_\_\_\_\_\_ bits.  
a. only 8  
b. only 16  
c. only 32  
d. 8, or 16, or 32

7. If the memory address space is 16 MB and the word size is 8 bits,  
then \_\_\_\_\_\_\_ bits are needed to access each word.  
a. 8  
b. 16  
c. 24  
d. 3

11. There are \_\_\_\_\_\_\_ bytes in 16 Terabytes.  
a. 216  
b. 240  
c. 244  
d. 256

14. Main memory in a computer usually consists of large amounts of  
\_\_\_\_\_\_ speed memory.  
a. high  
b. medium  
c. low  
d. very high speed

17. The smallest storage area on a magnetic disk that can be accessed at  
one time is a \_\_\_\_\_\_\_.  
a. track  
b. sector  
c. frame  
d. head

18. If the memory has 232 words, the address bus needs to have \_\_\_\_\_\_\_  
wires.  
a. 8  
b. 16  
c. 32  
d. 64

19. A control bus with eight wires can define \_\_\_\_\_\_\_ operations.  
a. 8  
b. 16  
c. 256  
d. 512

20. A \_\_\_\_\_\_\_ controller is a high-speed serial interface that transfers  
data in packets.  
a. SCSI  
b. USB  
c. FireWire  
d. USB and FireWire

21. The three steps in the running of a program on a computer are per-  
formed in the specific order \_\_\_\_\_\_\_.  
a. fetch, execute, and decode  
b. decode, execute, and fetch  
c. fetch, decode, and execute  
d. decode, fetch, and execute

1. The TCP/IP model has \_\_\_\_\_\_\_ layers.  
a. five  
b. six  
c. seven  
d. eight

6. What is the domain name in the e-mail address kayla@nasa.gov?  
a. kayla  
b. kayla@nasa.gov  
c. nasa.gov  
d. gov

7. Which physical topology uses a hub or switch?  
a. bus  
b. ring  
c. star  
d. bus and ring

8. IP addresses are currently \_\_\_\_\_\_\_ bits in length.  
a. 4  
b. 8  
c. 32  
d. 40

11. A process in the \_\_\_\_\_\_\_ state can go to either the ready, terminated,  
or waiting states.  
a. hold  
b. virtual  
c. running  
d. hold or running

12. A process in the ready state goes to the running state when \_\_\_\_\_\_\_.  
a. it enters memory  
b. it requests I/O  
c. it gets access to the CPU  
d. it finishes running

1. \_\_\_\_\_\_\_ is a step-by-step method for solving a problem or doing a  
task.  
a. A construct  
b. A recursion  
c. An iteration  
d. An algorithm

2. There are \_\_\_\_\_\_ basic constructs in computer -science.  
a. one  
b. two  
c. three  
d. four

11. The items are divided into two lists (sorted and unsorted) \_\_\_\_\_ sort.  
a. only in a selection  
b. only in a bubble  
c. only in an insertion  
d. in selection, bubble, or insertion

5. Testing a software system can involve \_\_\_\_\_\_\_ testing.  
a. black-box  
b. glass-box  
c. neither black-box nor glass-box  
d. both black-box and glass-box

1. A data structure can be \_\_\_\_\_\_\_.  
a. only an array  
b. only a record  
c. only a linked list  
d. an array, a record, or a linked list

2. An array that consists of just rows and columns is a \_\_\_\_\_\_\_ array.  
a. one-dimensional  
b. two-dimensional  
c. three-dimensional  
d. multidimensional

3. Each element in a record is called \_\_\_\_\_\_\_.  
a. a variable  
b. an index  
c. a field  
d. a node

4. All the members of a record must be \_\_\_\_\_\_\_.  
a. the same type  
b. related types  
c. integer type  
d. character type

5. \_\_\_\_\_\_\_ is an ordered collection of data in which each element con-  
tains the location of the next element.  
a. An array  
b. A record  
c. A linked list  
d. A file

6. In a linked list, each element contains \_\_\_\_\_\_\_.  
a. only data  
b. only a link  
c. neither data nor a link  
d. data and a link

7. The \_\_\_\_\_\_\_ is a pointer that identifies the next element in the  
linked list.  
a. link  
b. node  
c. array  
d. data

8. Given a linked list called children, the pointer variable children iden-  
tifies \_\_\_\_\_\_\_\_ element of the linked list.  
a. the first  
b. the second  
c. the last  
d. any

9. An empty linked list consists of \_\_\_\_\_\_\_.  
a. a node  
b. two nodes  
c. data and a link  
d. a null head pointer

10. To traverse a list, you need a \_\_\_\_\_\_\_ pointer.  
a. null  
b. walking  
c. beginning  
d. insertion

1. In an abstract data type, \_\_\_\_\_\_\_.  
a. the ADT implementation is known  
b. the ADT implementation is hidden  
c. the ADT public operations are hidden  
d. Nothing is hidden

8. In a binary tree, each node has \_\_\_\_\_\_\_ two subtrees.  
a. more than  
b. less than  
c. at most  
d. at least

9. In preorder traversal of a binary tree, the \_\_\_\_\_\_.  
a. left subtree is processed first  
b. right subtree is processed first  
c. root is processed first  
d. the root is never processed

9. An indexed file consists of \_\_\_\_\_\_\_.  
a. only a sequential data file  
b. only an index  
c. only a random data file  
d. an index and random data file

10. The index of an indexed file has \_\_\_\_\_\_\_ fields.  
a. two  
b. three  
c. four  
d. any number of

18. In the \_\_\_\_\_\_ collision resolution method, we try to put data that can-  
not be placed in location 123 into location 124.  
a. open addressing  
b. linked list  
c. bucket hashing  
d. random hashing

1. Three security goals are \_\_\_\_\_.  
a. confidentiality, cryptography, and nonrepudiation  
b. confidentiality, encryption, and decryption  
c. confidentiality, integrity, and availability  
d. confidentiality, denial of service, and masquerading

2. Which of the following attacks is threatening integrity?  
a. Masquerading  
b. Traffic Analysis  
c. Denial of service  
d. Encoding

3. Which of the following attacks is threatening availability?  
a. Replaying  
b. Modification  
c. Denial of service  
d. Decoding

12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ can provide authentication, integrity, and nonrepu-  
diation for a message.  
a. Encryption/decryption  
b. Digital signature  
c. Compression  
d. Key-exchange

13. In \_\_\_\_\_\_\_\_\_\_\_, the identity of a party is verified once for the entire  
duration of system access.  
a. entity authentication  
b. message integrity  
c. message authentication  
d. message encryption

15. In the asymmetric-key method used for confidentiality, which key(s)  
is (are) publicly known?  
a. encryption key only  
b. decryption key only  
c. both encryption and decryption keys  
d. neither encryption key nor decryption key

17. In RSA, if user A wants to send an encrypted message to user B, the  
plaintext is encrypted with the public key of \_\_\_\_\_\_\_.  
a. user A  
b. user B  
c. the network  
d. a third party.

============================================================

12. The first electronic special-purpose computer was called \_\_\_\_\_\_\_.  
a. Pascal  
b. Pascaline  
c. ABC  
d. ENIAC

13. One of the first computers based on the von Neumann model was  
called \_\_\_\_\_\_\_.  
a. Pascal  
b. Pascaline  
c. ABC  
d. EDVAC

1. The base of the decimal number system is \_\_\_\_.  
a. 2  
b. 8  
c. 10  
d. 16

2. The base of the binary number system is \_\_\_\_.  
a. 2  
b. 8  
c. 10  
d. 16

3. The base of the octal number system is \_\_\_\_.  
a. 2  
b. 8  
c. 10  
d. 16

4. The base of the hexadecimal number system is \_\_\_\_.  
a. 2  
b. 8  
c. 10  
d. 16

5. When converting a decimal integer to base b, we repeatedly \_\_\_\_\_ b.  
a. divide by  
b. multiply by  
c. add to  
d. subtract from

6. When converting a decimal fraction to base b, we repeatedly \_\_\_\_b.  
a. divide by  
b. multiply by  
c. add to  
d. subtract from

7. Which of the following representations is erroneous?  
a. (10111)2  
b. (349)8  
c. (3AB)16  
d. 256

9. Which of the following representations is erroneous?  
a. (111)2  
b. (346)8  
c. (EEG)16  
d. 221

8. Which of the following representations is erroneous?  
a. (10211)2  
b. (342)8  
c. (EEE)16  
d. 145

10. Which of the following representations is erroneous?  
a. (110)2  
b. (141)8  
c. (EF)16  
d. 22A

11. Which of the following is equivalent to 12 in decimal?  
a. (1110)2  
b. (C)16  
c. (15)8  
d. None of the above

12. Which of the following is equivalent to 24 in decimal?  
a. (11000)2  
b. (1A)16  
c. (31)8  
d. None of the above

2. In a computer, the \_\_\_\_\_\_\_ subsystem stores data and programs.  
a. ALU  
b. input/output  
c. memory  
d. control unit

3. In a computer, the \_\_\_\_\_\_\_ subsystem performs calculations and  
logical operations.  
a. ALU  
b. input/output  
c. memory  
d. control unit

4. In a computer, the \_\_\_\_\_\_\_ subsystem accepts data and programs and  
sends processing results to output devices.  
a. ALU  
b. input/output  
c. memory  
d. control unit

5. In a computer, the \_\_\_\_\_\_\_ subsystem serves as a manager of the  
other subsystems.  
a. ALU  
b. input/output  
c. memory  
d. control unit

6. According to the von Neumann model, \_\_\_\_\_\_\_ are stored in mem-  
ory.  
a. only data  
b. only programs  
c. data and programs  
d. neither data nor programs

7. A step-by-step solution to a problem is called \_\_\_\_\_\_\_.  
a. hardware  
b. an operating system  
c. a computer language  
d. an algorithm

8. FORTRAN and COBOL are examples of \_\_\_\_\_\_\_.  
a. hardware  
b. operating systems  
c. computer languages  
d. algorithms

10. \_\_\_\_\_\_\_ is a set of instructions in a computer language that tells the  
computer what to do with data.  
a. An operating system  
b. An algorithm  
c. A data processor  
d. A program

6. An image can be represented in a computer using the \_\_\_\_\_\_\_  
method.  
a. bitmap graphic only  
b. vector graphic only  
c. Excess system only  
d. either bitmap or vector graphic

7. In the \_\_\_\_\_\_\_ graphic method of representing an image in a com-  
puter, each pixel is assigned a bit patterns.  
a. bitmap  
b. vector  
c. quantized  
d. binary

8. In the \_\_\_\_\_\_\_ graphic method of representing an image in a com-  
puter, the image is decomposed into a combination of geometrical  
figures.  
a. bitmap  
b. vector  
c. quantized  
d. binary

9. In the \_\_\_\_\_\_\_ graphic method of representing an image in a com-  
puter, re-scaling of the image creates a ragged or grainy image.  
a. bitmap  
b. vector  
c. quantized  
d. binary

17. The combination of sign and mantissa of a real number in IEEE stan-dard floating point format is stored as an integer in the \_\_\_\_\_\_\_\_\_\_\_\_ representation.  
a. unsigned  
b. sign-and-magnitude  
c. two's complement  
d. one's complement

13. Which number representation method is often used to store the expo-  
nential value of a fractional part?  
a. unsigned integers  
b. two's complement  
c. Excess  
d. ten's complement

3. The \_\_\_\_\_\_\_ method of integer representation is the most common  
method for storing integers in computer memory.  
a. sign-and-magnitude  
b. one's complement  
c. two's complement  
d. unsigned integers

1. \_\_\_\_\_\_\_ is an arithmetic operation.  
a. The exclusive OR  
b. The unary NOT  
c. Subtraction  
d. The binary AND

2. \_\_\_\_\_\_\_ is a logical bit operator.  
a. The exclusive OR  
b. The unary NOT  
c. The binary AND  
d. exclusive OR, unary NOT, or binary AND

4. In two's complement addition, if there is a final carry after the left  
most column addition, \_\_\_\_\_\_\_.  
a. add it to the right most column  
b. add it to the left most column  
c. discard it  
d. increase the bit length

5. For an 8-bit allocation, the smallest decimal number that can be rep-  
resented in two's complement form is \_\_\_\_\_\_\_.  
a. −8  
b. −127  
c. −128  
d. −256

6. For an 8-bit allocation, the largest decimal number that can be repre-  
sented in two's complement form is \_\_\_\_\_\_\_.  
a. 8  
b. 127  
c. 128  
d. 256

7. In two's complement representation with a 4-bit allocation, we get  
\_\_\_\_\_\_\_ when we add 1 to 7.  
a. 8  
b. 1  
c. −7  
d. −8

8. In two's complement representation with a 4-bit allocation, we get  
\_\_\_\_\_\_\_ when we add 5 to 5.  
a. −5  
b. −6  
c. −7  
d. 10

11. \_\_\_\_\_\_\_ operator (s) takes two inputs to produce one output.  
a. Only AND  
b. Only OR  
c. Only XOR  
d. AND, OR, or XOR

12. The unary \_\_\_\_\_\_\_ operator inverts its single input.  
a. AND  
b. OR  
c. NOT  
d. XOR

13. \_\_\_\_\_\_\_ operator (s), if the input is two 0s, the output is 0.  
a. In only AND  
b. In only OR  
c. In only XOR  
d. In AND, OR, or XOR

14. \_\_\_\_\_\_\_ operator (s), if the input is two 1s, the output is 0.  
a. In only AND  
b. In only OR  
c. In only XOR  
d. In AND, OR, or XOR

15. For the binary AND operation, only an input of \_\_\_\_\_\_\_ gives an  
output of 1.  
a. two 0s  
b. two 1s  
c. one 0 and one 1  
d. two 2s

16. For the binary OR operation, only an input of \_\_\_\_\_\_\_ gives an out-  
put of 0.  
a. two 0s  
b. two 1s  
c. one 0 and one 1  
d. two 2s

18. To flip all the bits of a bit pattern, make a mask of all 1s and then  
\_\_\_\_\_\_\_ the bit pattern and the mask.  
a. AND  
b. OR  
c. XOR  
d. NOT

19. To un-set (force to 0) all the bits of a bit pattern, make a mask of all  
0s and then \_\_\_\_\_\_\_ the bit pattern and the mask.  
a. AND  
b. OR  
c. XOR  
d. NOT

20. To set (force to 1) all the bits of a bit pattern, make a mask of all 1s  
and then \_\_\_\_\_\_\_ the bit pattern and the mask.  
a. AND  
b. OR  
c. XOR  
d. NOT

1. The \_\_\_\_\_\_\_ is a computer subsystem that performs operations on  
data.  
a. CPU  
b. memory  
c. I/O hardware  
d. bus subsystem

2. \_\_\_\_\_\_\_ is a stand-alone storage location that holds data temporar-  
ily.  
a. An ALU  
b. A register  
c. A control unit  
d. A tape drive

3. \_\_\_\_\_\_\_ is a unit that can add two inputs.  
a. An ALU  
b. A register  
c. A control unit  
d. A tape drive

8. The data in \_\_\_\_\_\_\_ is erased if the computer is powered down.  
a. RAM  
b. ROM  
c. a tape drive  
d. a CD-ROM

9. \_\_\_\_\_\_\_ is a memory type with capacitors that need to be refreshed  
periodically.  
a. SRAM  
b. DRAM  
c. ROM  
d. CROM

10. \_\_\_\_\_\_\_ is a memory type with traditional flip-flop gates to hold  
data.  
a. SRAM  
b. DRAM  
c. ROM  
d. CROM

12. \_\_\_\_\_\_\_ can be programmed and erased using electronic impulses  
but can remain in a computer during erasure.  
a. ROM  
b. PROM  
c. EPROM  
d. EEPROM

13. \_\_\_\_\_\_\_ is a type of memory in which the user, not the manufac-  
turer, stores programs that cannot be overwritten.  
a. ROM  
b. PROM  
c. EPROM  
d. EEPROM

15. A \_\_\_\_\_\_\_ is a storage device to which the user can write informa-  
tion only once.  
a. CD-ROM  
b. CD-R  
c. CD-RW  
d. CD-RR

16. A \_\_\_\_\_\_\_ is a storage device that can undergo multiple writes and  
erasures.  
a. CD-ROM  
b. CD-R  
c. CD-RW  
d. CD-RR

22. In the \_\_\_\_\_\_\_ method for synchronizing the operation of the CPU  
with an I/O device, the I/O device informs the CPU when it is ready  
for data transfer.  
a. programmed I/O  
b. interrupt-driven I/O  
c. DMA  
d. isolated I/O

23. In the \_\_\_\_\_\_\_ method for synchronizing the operation of the CPU  
with an I/O device, the CPU is idle until the I/O operation is finished.  
a. programmed I/O  
b. interrupt-driven I/O  
c. DMA  
d. isolated I/O

24. In the \_\_\_\_\_\_\_ method for synchronizing the operation of the CPU  
with an I/O device, a large block of data can be passed from an I/O  
device to memory directly.  
a. programmed I/O  
b. interrupt-driven I/O  
c. DMA  
d. isolated I/O

2. The \_\_\_\_\_\_\_ layer of the TCP/IP protocol suite provides services for  
end users.  
a. data-link  
b. transport  
c. application  
d. physical

3. The \_\_\_\_\_\_\_ layer of the TCP/IP protocol suite transmits a bit  
stream over a physical medium.  
a. physical  
b. data-link  
c. network  
d. transport

4. The \_\_\_\_\_\_\_ layer of the TCP/IP protocol suite is responsible for  
node-to-node delivery of a frame between two adjacent nodes.  
a. transport  
b. network  
c. data-link  
d. session

5. The \_\_\_\_\_\_\_ layer of the TCP/IP protocol suite is responsible for  
source-to-destination delivery of the entire message.  
a. transport  
b. network  
c. data-link  
d. session

9. \_\_\_\_\_\_\_ protocol (s) is one of the protocols in the transport layer.  
a. Only TCP  
b. Only UDP  
c. Only SCTP  
d. TCP, UDP, and SCTP

10. \_\_\_\_\_\_\_ is a protocol for file transfer.  
a. FTP  
b. SMTP  
c. TELNET  
d. HTTP

11. \_\_\_\_\_\_\_ is a protocol for e-mail services.  
a. FTP  
b. SMTP  
c. TELNET  
d. HTTP

12. \_\_\_\_\_\_\_ is a protocol for accessing and transferring documents on  
the WWW.  
a. FTP  
b. SMTP  
c. TELNET  
d. HTTP

1. \_\_\_\_\_\_\_ is a program that facilitates the execution of other pro-  
grams.  
a. An operating system  
b. Hardware  
c. A queue  
d. An application program

2. \_\_\_\_\_\_\_ supervises the activity of each component in a computer  
system.  
a. An operating system  
b. Hardware  
c. A queue  
d. An application program

3. Multi-programming requires a \_\_\_\_\_\_\_ operating-system.  
a. batch  
b. time-sharing  
c. parallel  
d. distributed

4. \_\_\_\_\_\_\_ is multi-programming with swapping.  
a. Partitioning  
b. Paging  
c. Demand paging  
d. Queuing

5. \_\_\_\_\_\_\_ is multi-programming without swapping.  
a. Partitioning  
b. Virtual memory  
c. Demand paging  
d. Queuing

6. In \_\_\_\_\_\_\_, only one program can reside in memory for execution.  
a. mono-programming  
b. multi-programming  
c. partitioning  
d. paging

7. \_\_\_\_\_\_\_ is a multi-programming method in which multiple pro-  
grams are entirely in memory with each program occupying a con-  
tiguous space.  
a. Partitioning  
b. Paging  
c. Demand paging  
d. Demand segmentation

8. In paging, a program is divided into equally sized sections called  
\_\_\_\_\_\_\_.  
a. pages  
b. frames  
c. segments  
d. partitions

9. In \_\_\_\_\_\_\_, the program can be divided into differently sized sec-  
tions.  
a. partitioning  
b. paging  
c. demand paging  
d. demand segmentation

10. In \_\_\_\_\_\_\_, the program can be divided into equally sized sections  
called pages, but the pages need not be in memory at the same time  
for execution.  
a. partitioning  
b. paging  
c. demand paging  
d. demand segmentation

13. A program becomes a \_\_\_\_\_\_\_ when it is selected by the operating  
system and brought to the hold state.  
a. job  
b. process  
c. deadlock  
d. partition

14. Every process is \_\_\_\_\_\_\_.  
a. only a job  
b. only a program  
c. only a partition  
d. a job and a program

15. The \_\_\_\_\_\_\_ scheduler creates a process from a job and changes a  
process back to a job.  
a. job  
b. process  
c. virtual  
d. queue

16. The \_\_\_\_\_\_\_ scheduler moves a process from one process state to  
another.  
a. job  
b. process  
c. virtual  
d. queue

17. To prevent \_\_\_\_\_\_\_, an operating system can put resource restric-  
tions on processes.  
a. starvation  
b. synchronization  
c. paging  
d. deadlock

18. \_\_\_\_\_\_\_ can occur if a process has too many resource restrictions.  
a. Starvation  
b. Synchronization  
c. Paging  
d. Deadlock

19. The \_\_\_\_\_\_\_ manager is responsible for archiving and backup.  
a. memory  
b. process  
c. device  
d. file

20. The \_\_\_\_\_\_\_ manager is responsible for access to I/O devices.  
a. memory  
b. process  
c. device  
d. file

3. The \_\_\_\_\_\_\_construct tests a condition.  
a. sequence  
b. decision  
c. repetition  
d. flow

4. The \_\_\_\_\_\_\_ construct uses a set of actions one after another.  
a. sequence  
b. decision  
c. repetition  
d. flow

5. The \_\_\_\_\_\_\_ construct handles repeated actions.  
a. sequence  
b. decision  
c. repetition  
d. flow

6. \_\_\_\_\_\_\_ is a pictorial representation of an algorithm.  
a. A UML diagram  
b. A program  
c. Pseudocode  
d. An algorithm

7. \_\_\_\_\_\_\_ is an English-language-like representation of code.  
a. A UML diagram  
b. A program  
c. Pseudocode  
d. An algorithm

8. \_\_\_\_\_\_\_ is a basic algorithm that adds a list of numbers.  
a. Summation  
b. Product  
c. Smallest  
d. Largest

9. \_\_\_\_\_\_\_ is a basic algorithm that multiplies a list of numbers.  
a. Summation  
b. Product  
c. Smallest  
d. Largest

10. \_\_\_\_\_\_\_ is a basic algorithm that arranges data according to its  
value.  
a. Inquiry  
b. Sorting  
c. Searching  
d. Recursion

15. \_\_\_\_\_\_\_ is a basic algorithm in which we want to find the location of  
a target in a list of items.  
a. Sorting  
b. Searching  
c. Product  
d. Summation

18. \_\_\_\_\_\_\_ is a process in which an algorithm calls itself.  
a. Insertion  
b. Searching  
c. Recursion  
d. Iteration

12. In \_\_\_\_\_\_\_ sort, the item that goes into the sorted list is always the  
first item in the unsorted list.  
a. selection  
b. bubble  
c. insertion  
d. every

13. In \_\_\_\_\_\_\_ sort, the smallest item from the unsorted list is swapped  
with the item at the beginning of the unsorted list.  
a. selection  
b. bubble  
c. insertion  
d. every

14. In \_\_\_\_\_\_ sort, the smallest item moves to the beginning of the  
unsorted list. There is no one-to-one swapping.  
a. selection  
b. bubble  
c. insertion  
d. every

16. We use a \_\_\_\_\_\_\_ search for an unordered list.  
a. sequential  
b. binary  
c. bubble  
d. insertion

17. We use a \_\_\_\_\_\_\_ search for an ordered list.  
a. sequential  
b. binary  
c. bubble  
d. insertion

1. The only language understood by computer hardware is a \_\_\_\_\_\_\_  
language.  
a. machine  
b. symbolic  
c. high-level  
d. natural

2. C, C++, and Java can be classified as \_\_\_\_\_\_\_ languages.  
a. machine  
b. symbolic  
c. high-level  
d. natural

3. FORTRAN is a(n) \_\_\_\_\_\_\_ language.  
a. procedural  
b. functional  
c. declarative  
d. object-oriented

4. Pascal is a(n) \_\_\_\_\_\_\_ language.  
a. procedural  
b. functional  
c. declarative  
d. object-oriented

5. Java is a(n) \_\_\_\_\_\_\_ language.  
a. procedural  
b. functional  
c. declarative  
d. object-oriented

6. LISP is a(n) \_\_\_\_\_\_\_ language.  
a. procedural  
b. functional  
c. declarative  
d. object-oriented

7. \_\_\_\_\_\_\_ is a common language in the business -environment.  
a. FORTRAN  
b. C++  
c. C  
d. COBOL

8. \_\_\_\_\_\_\_ is a popular object-oriented language.  
a. FORTRAN  
b. COBOL  
c. Java  
d. LISP

9. A \_\_\_\_\_\_\_ program can be either an application or an applet.  
a. FORTRAN  
b. C++  
c. C  
d. Java

10. LISP and Scheme are both \_\_\_\_\_\_\_ languages.  
a. procedural  
b. functional  
c. declarative  
d. object-oriented

11. Prolog is an example of a(n) \_\_\_\_\_\_\_ language.  
a. procedural  
b. functional  
c. declarative  
d. object-oriented

1. One phase in system development is \_\_\_\_\_\_\_.  
a. analysis  
b. application  
c. designing  
d. collecting

2. Defining the users, requirements, and methods is part of the \_\_\_\_\_\_\_  
phase.  
a. analysis  
b. design  
c. implementation  
d. testing

3. In the system development process, writing the program is part of the  
\_\_\_\_\_\_\_ phase.  
a. analysis  
b. design  
c. implementation  
d. testing

4. In the system development process, structure charts are tools used in  
the \_\_\_\_\_\_\_ phase.  
a. analysis  
b. design  
c. implementation  
d. testing

6. \_\_\_\_\_\_\_ is the breaking up of a large project into smaller parts.  
a. Coupling  
b. Incrementing  
c. Obsolescence  
d. Modularization

7. \_\_\_\_\_\_\_ is a measure of how tightly two modules are bound to each  
other.  
a. Modularity  
b. Coupling  
c. Interoperability  
d. Cohesion

8. \_\_\_\_\_\_\_\_\_between modules in a software system must be mini-  
mized.  
a. Coupling  
b. Cohesion  
c. Neither coupling nor cohesion  
d. Both coupling and cohesion

9. \_\_\_\_\_\_\_\_\_between modules in a software system must be maxi-  
mized.  
a. Coupling  
b. Cohesion  
c. Neither coupling nor cohesion  
d. Both coupling and cohesion

2. A stack is a \_\_\_\_\_\_\_\_\_ structure.  
a. FIFO  
b. LIFO  
c. DIFO  
d. SIFO

3. A(n) \_\_\_\_\_\_\_ list is also known as a queue.  
a. LIFO  
b. FIFO  
c. unordered  
d. ordered

4. If A is the first data element input into a stack, followed by B, C, and  
D, then \_\_\_\_\_\_\_ is the first element to be removed.  
a. A  
b. B  
c. C  
d. D

5. If A is the first data element input into a queue, followed by B, C,  
and D, then \_\_\_\_\_\_\_ is the first element to be removed.  
a. A  
b. B  
c. C  
d. D

6. The pop operation \_\_\_\_\_\_\_ of the stack.  
a. deletes an item from the top  
b. deletes an item from the bottom  
c. inserts an item at the top  
d. inserts an item at the bottom

7. The push operation \_\_\_\_\_\_\_ of the stack.  
a. deletes an item from the top  
b. deletes an item from the bottom  
c. inserts an item at the top  
d. inserts an item at the bottom

10. In \_\_\_\_\_\_\_ traversal of a binary tree, the right subtree is processed  
last.  
a. preorder  
b. inorder  
c. postorder  
d. any order

13. In \_\_\_\_\_\_\_ traversal of a binary tree, the left subtree is processed  
last.  
a. preorder  
b. inorder  
c. postorder  
d. out of order

11. In postorder traversal of a binary tree, the root is processed \_\_\_\_\_\_\_.  
a. first  
b. second  
c. last  
d. after the left subtree

12. In postorder traversal of a binary tree, the left subtree is processed  
\_\_\_\_\_\_\_.  
a. first  
b. second  
c. last  
d. after the right subtree

14. In an inorder traversal of a binary tree, the root is processed  
\_\_\_\_\_\_\_.  
a. first  
b. second  
c. last  
d. two times

1. \_\_\_\_\_\_\_ file can be accessed randomly.  
a. A sequential  
b. An indexed  
c. A hashed  
d. Any

2. \_\_\_\_\_\_\_ file can be accessed sequentially.  
a. A sequential  
b. An indexed  
c. A hashed  
d. No

3. When a sequential file is updated, the \_\_\_\_\_\_ file gets the actual  
update.  
a. new master  
b. old master  
c. transaction  
d. error report

4. When a sequential file is updated, the \_\_\_\_\_\_ file contains a list of  
all errors occurring during the update process.  
a. new master  
b. old master  
c. transaction  
d. error report

5. When a sequential file is updated, the \_\_\_\_\_\_ file contains the  
changes to be applied.  
a. new master  
b. old master  
c. transaction  
d. error report

6. After a sequential file is updated, the \_\_\_\_\_\_\_ file contains the most  
current data.  
a. new master  
b. old master  
c. transaction  
d. error report

7. If the transaction file key is 20 and the first master file key is 25, then  
we \_\_\_\_\_\_\_.  
a. add the new record to the new master file  
b. revise the contents of the old master file  
c. delete the data  
d. write the old master file record to the new master file

8. If the transaction file key is 20 with a delete code and the master file  
key is 20, then we \_\_\_\_\_\_\_.  
a. add the transaction to the new master file  
b. revise the contents of the old master file  
c. delete the data  
d. write the old master file record to the new master file

11. In the \_\_\_\_\_\_\_ hashing method, selected digits are extracted from  
the key and used as the address.  
a. direct  
b. division remainder  
c. modulo division  
d. digit extraction

12. In the \_\_\_\_\_\_\_ hashing method, the key is divided by the file size,  
and the address is the remainder plus 1.  
a. direct  
b. modulo division  
c. division remainder  
d. digit extraction

13. In the \_\_\_\_\_\_\_ hashing method, there are no synonyms or collisions.  
a. direct  
b. modulo division  
c. division remainder  
d. digit extraction

14. \_\_\_\_\_\_\_ are keys that hash to the same location in the data file.  
a. Collisions  
b. Buckets  
c. Synonyms  
d. Linked lists

15. When a hashing algorithm produces an address for an insertion key  
and that address is already occupied, it is called a \_\_\_\_\_\_\_.  
a. collision  
b. probe  
c. synonym  
d. linked list

16. The address produced by a hashing algorithm is the \_\_\_\_\_\_\_  
address.  
a. probe  
b. synonym  
c. collision  
d. home

17. The \_\_\_\_\_\_\_ area is the file area that contains all the home  
addresses.  
a. probe  
b. linked  
c. hash  
d. prime

In a three-level DBMS architecture, the layer that interacts directly with the hardware is the \_\_\_\_\_\_\_\_ level.  
A. internal  
B. conceptual  
C. external  
D. relational

In a three-level DBMS architecture, the \_\_\_\_\_\_\_\_ level determines where data is actually stored on the storage devices.  
A. internal  
B. conceptual  
C. external  
D. relational

The \_\_\_\_\_\_\_\_ level of a three-level DBMS architecture defines the logical view of the data.  
A. internal  
B. conceptual  
C. external  
D. relational

The data model and the schema of a DBMS are often defined at the \_\_\_\_\_\_\_\_ level.  
A. internal  
B. conceptual  
C. external  
D. relational

In a three-level DBMS architecture, the \_\_\_\_\_\_\_\_ level interacts directly with the users.  
A. internal  
B. conceptual  
C. external  
D. relational

Of the various database models, the \_\_\_\_\_\_\_\_ model is the most prevalent today.  
A. internal  
B. conceptual  
C. external  
D. relational

Each column in a relation is called \_\_\_\_\_\_\_\_ .  
A. an attribute  
B. a tuple  
C. insert  
D. update

Each row in a relation is called \_\_\_\_\_\_\_\_ .  
A. an attribute  
B. a tuple  
C. insert  
D. update

A unary operator is applied to \_\_\_\_\_\_\_\_ relation(s) and creates an output of \_\_\_\_\_\_\_\_ relation(s).  
A. one, two  
B. two, one  
C. one, one  
D. two, two

A binary operator is applied to \_\_\_\_\_\_\_\_ relation(s) and creates an output of \_\_\_\_\_\_\_\_ relation(s).  
A. one, two  
B. two, one  
C. one, one  
D. two, two

The unary \_\_\_\_\_\_\_\_ operation always results in a relation that has exactly one more row than the original relation.  
A. an attribute  
B. a tuple  
C. insert  
D. update

If you want to change the value of an attribute of a tuple, you use the \_\_\_\_\_\_\_\_ operation.  
A. update  
B. join  
C. project  
D. intersection

The operation that takes two relations and combines them based on common attributes is the \_\_\_\_\_\_\_\_ operation.  
A. update  
B. join  
C. project  
D. intersection

If you need to delete an attribute in a relation, you can use the \_\_\_\_\_\_\_\_ operation.  
A. update  
B. join  
C. project  
D. intersection

You want to create a relation called New that contains tuples that belong to both relation A and relation B. For this, you can use the \_\_\_\_\_\_\_\_ operation.  
A. update  
B. join  
C. project  
D. intersection

Which of the following is a unary operator?  
A. project  
B. difference  
C. SQL  
D. Lempel Ziv encoding

Which of the following is a binary operator?  
A. project  
B. difference  
C. SQL  
D. Lempel Ziv encoding

\_\_\_\_\_\_\_ is a declarative language used on relational databases.  
A. project  
B. difference  
C. SQL  
D. Lempel Ziv encoding

Data is compressed using a dictionary with indexes to strings. This is \_\_\_\_\_\_\_\_ .  
A. project  
B. difference  
C. SQL  
D. Lempel Ziv encoding

A string of one hundred 0s is replaced by two markers, a 0, and the number 100. This is \_\_\_\_\_\_\_\_ .  
A. run-length encoding  
B. JPEG  
C. lossless  
D. In MP3, JPEG, or MPEG

\_\_\_\_\_\_\_\_ is an example of lossy compression.  
A. run-length encoding  
B. JPEG  
C. lossless  
D. In MP3, JPEG, or MPEG

In a \_\_\_\_\_\_\_\_ data compression method, the received data is an exact copy of the original message.  
A. run-length encoding  
B. JPEG  
C. lossless  
D. In MP3, JPEG, or MP

\_\_\_\_\_\_\_\_ data compression method, the received data need not be an exact copy of the original message.  
A. run-length encoding  
B. JPEG  
C. lossless  
D. In MP3, JPEG, or MPEG

\_\_\_\_\_\_\_\_ encoding is a lossless data compression method.  
A. Huffman, run-length, or LZ  
B. Huffman  
C. run-length  
D. a dictionary, a buffer, and an algorithm

In \_\_\_\_\_\_\_\_ encoding, the more frequently occurring characters have shorter codes than the less frequently occurring characters.  
A. Huffman, run-length, or LZ  
B. Huffman  
C. run-length  
D. a dictionary, a buffer, and an algorithm

In \_\_\_\_\_\_\_\_ encoding, PPPPPPPPPPPPPPP can be replaced by P15.  
A. Huffman, run-length, or LZ  
B. Huffman  
C. run-length  
D. a dictionary, a buffer, and an algorithm

LZ encoding requires \_\_\_\_\_\_\_\_ .  
A. Huffman, run-length, or LZ  
B. Huffman  
C. run-length  
D. a dictionary, a buffer, and an algorithm

JPEG encoding involves \_\_\_\_\_\_\_\_ , a process that reveals the redundancies in a block.  
A. the discrete cosine transform  
B. blocking  
C. compression  
D. JPEG, MPEG

In JPEG encoding, the \_\_\_\_\_\_\_\_ process breaks the original picture into smaller blocks and assigns a value to each pixel in a block.  
A. the discrete cosine transform  
B. blocking  
C. compression  
D. JPEG, MPEG

The last step in JPEG, \_\_\_\_\_\_\_\_ , removes redundancies.  
A. the discrete cosine transform  
B. blocking  
C. compression  
D. JPEG, MPEG

\_\_\_\_\_\_\_\_ is a lossy compression method for pictures and graphics, whereas \_\_\_\_\_\_\_\_ is a lossy compression method for video.  
A. the discrete cosine transform  
B. blocking  
C. compression  
D. JPEG, MPEG

4. \_\_\_\_\_\_\_\_\_\_\_\_\_ means concealing the contents of a message by  
enciphering.  
a. Steganography  
b. Cryptography  
c. Compressing  
d. Authentication

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_means concealing the message by covering it with  
something else.  
a. Cryptography  
b. Steganography  
c. Compressing  
d. Authentication

6. In \_\_\_\_\_\_\_\_\_\_cryptography, the same key is used by the sender and  
the receiver.  
a. symmetric-key  
b. asymmetric-key  
c. public-key  
d. open-key

7. In \_\_\_\_\_\_\_\_\_ cryptography, the same key is used in both directions.  
a. symmetric-key  
b. asymmetric-key  
c. public-key  
d. open-key

8. \_\_\_\_\_\_\_\_\_ cryptography is often used for long messages.  
a. Symmetric-key  
b. Asymmetric-key  
c. Public-key  
d. Open-key

9. \_\_\_\_\_\_\_\_\_\_\_ cryptography is often used for short messages.  
a. Symmetric-key  
b. Asymmetric-key  
c. Secret-key  
d. Open-key

14. In \_\_\_\_\_\_\_\_\_\_ cryptography, everyone has access to everyone's  
public key.  
a. symmetric-key  
b. asymmetric-key  
c. secret-key  
d. private-key

16. The RSA algorithm for confidentiality uses \_\_\_\_\_\_\_ cryptography.  
a. asymmetric-key  
b. symmetric-key  
c. substitution  
d. transposition

10. \_\_\_\_\_\_\_\_\_\_means that the sender and the receiver expect confiden-  
tiality.  
a. Nonrepudiation  
b. Integrity  
c. Authentication  
d. encryption and decryption

11. \_\_\_\_\_\_\_\_\_\_\_ means that the data must arrive at the receiver exactly  
as they were sent.  
a. Nonrepudiation  
b. Message integrity  
c. Authentication  
d. Secrecy

1. The ethical principle that measures the consequences of an act is  
referred to as \_\_\_\_\_\_\_\_\_\_\_\_.  
a. moral rules  
b. utilization  
c. social contract  
d. none of the above

2. The ethical principle that dictates that a decision should be made  
according to the universally accepted principles of morality is  
referred to as \_\_\_\_\_\_\_\_\_.  
a. moral rules  
b. utilization  
c. social contract  
d. none of the above

3. The ethical principle that dictates that an act is ethical when a major-  
ity of people in society agrees with it is referred to as \_\_\_\_\_\_.  
a. moral rules  
b. utilization  
c. social contract  
d. none of the above

4. Which of the following is considered an intellectual property?  
a. a trademark  
b. a trade secret  
c. a patent  
d. all of the above

5. A company's product or service is identified as a \_\_\_\_\_\_\_\_\_\_.  
a. trade mark  
b. trade secret  
c. patent  
d. copyright

6. A right to a written or created work is referred to as .  
a. trade mark  
b. trade secret  
c. patent  
d. copyright

7. Information about a product is that is kept secret by the owner is  
referred to as a\_\_\_\_\_\_\_\_\_\_.  
a. trade mark  
b. trade secret  
c. patent  
d. copyright

8. A right to a monopoly to use a piece of intellectual property is  
referred to as \_\_\_\_\_\_\_\_.  
a. trade mark  
b. trade secret  
c. patent  
d. copyright

9. The attack that reduces the capability of a computer is called a  
\_\_\_\_\_\_\_\_ attack.  
a. penetration  
b. denial of service  
c. either a or b  
d. neither a nor b

10. Sending a virus to a computer is called an \_\_\_\_\_\_\_\_ attack.  
a. penetration  
b. denial of service  
c. either a or b  
d. neither a nor b