

單選題 (每題三分, 答錯不倒扣)

1. Which of the following items of information would not be contained in an operating system's process table?
 - (A) The location of the memory area assigned to the process
 - (B) The priority of each process
 - (C) Whether the process is ready or waiting
 - (D) The machine language instructions being executed by the process
 - (E) None of the above

2. Which of the following is not a means of performing multiple activities at the same time?
 - (A) Pipelining
 - (B) Multiprogramming
 - (C) Virtual memory
 - (D) Multiple processors
 - (E) None of the above

3. Which of the following is a protocol for controlling the right to transmit a message in a network?
 - (A) UDP
 - (B) TCP
 - (C) FTP
 - (D) CSMA/CD
 - (E) None of the above

4. Which layer of the TCP/IP hierarchy chops messages into units whose size is compatible with the Internet?
 - (A) Application
 - (B) Transport
 - (C) Network
 - (D) Link
 - (E) None of the above

5. Which of the following software engineering methodologies is the most rigid?

- (A) Waterfall model
(B) Incremental model
(C) Evolutionary prototyping
(D) Extreme programming
(E) None of the above
6. Which of the following is a notational system for representing object-oriented designs?
- (A) Structure charts
(B) Dataflow diagrams
(C) UML
(D) Modular designs
(E) None of the above
7. Given the two relations X and Y below

X:	<u>A</u>	<u>B</u>	Y:	<u>C</u>	<u>D</u>
	7	s		t	3
	2	z		r	2

what value would be retrieved by executing the following SQL statement?

```
select Y.C
  from X, Y
 where X.A < Y.D
```

- (A) s
(B) z
(C) t
(D) r
(E) None of the above
8. Which of the following features within a DBMS is not provided to maintain database integrity?

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- (A) Concurrent transaction processing
- (B) Log
- (C) Locking protocol
- (D) Commit points
- (E) None of the above

9. What action is performed by the Turing machine described below?

Current state	Current cell content	Value to write	Direction to move	New state
START	*	*	left	X
X	1	0	left	X
X	0	0	right	Y
Y	0	0	right	Y
Y	*	*	no move	HALT

- (A) It replaces any string of consecutive 1s to the left of an * with 0s.
- (B) It leaves the tape unchanged.
- (C) It places an * at the left end of any string of consecutive 1s appearing to the left of an *.
- (D) It complements the string of 0s and 1s appearing to the left of an *.
- (E) None of the above

10. Which of the following is the most precise classification of a problem X?

- (A) X is in $O(n^2)$.
- (B) X is in $\Theta(n^2)$.
- (C) X is in NP.
- (D) X is in P.
- (E) None of the above

11. The following numbers are in the 8 bit 2's complement format. Which number is the largest?

- (A) 10010011
- (B) 01101001
- (C) 11110000

(D) 01010101

(E) 00110110

12. What is the number in base-10 representation for the hexadecimal number A6F?

(A) 2651

(B) 2415

(C) 2715

(D) 2671

(E) 2561

13. Given $x = 143$ and $x \text{ XOR } y = 63$. What is y ?

(A) 56

(B) 80

(C) 102

(D) 176

(E) 227

14. What is the first 5 bits of the mantissa part of 3.125 in the IEEE-754 single precision floating point presentation?

(A) 10010

(B) 11001

(C) 00010

(D) 01100

(E) 01010

15. Estimate about how long it would take to transfer a 400-page novel encoded in Unicode at a transfer rate of 10 Mbps. Suppose each page contains 300 Chinese characters in average.

(A) 0.1 second

(B) 0.2 second

(C) 0.5 second

(D) 1 second

(E) 2 seconds

16. Before A, B, C, and D ran a race they made the following predictions:

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- A predicted that B would win.
- B predicted that D would be last.
- C predicted that A would be third.
- D predicted that A's prediction would be correct.

Only one of these predictions was true, and this was the prediction made by the winner.
In what order did A, B, C, and D finish the race?

- (A) ABCD
- (B) BADC
- (C) DCBA
- (D) CBAD
- (E) CDAB

17. If a program has time complexity $T(n) = T(n/2) + \Theta(n^2)$. What is the solution of $T(n)$?

- (A) $\Theta(n^2)$
- (B) $\Theta(n^2 \log n)$
- (C) $\Theta(n^2 \sqrt{n})$
- (D) $\Theta(n^3)$
- (E) $\Theta(n^3 \log n)$

18. In a recursive function call, which data structure is used to track the calling sequence?

- (A) Linked list
- (B) Queue
- (C) Stack
- (D) Binary Tree
- (E) Hash table

19. Which task is NOT part of the rendering process?

- (A) Clipping
- (B) Scan Conversion
- (C) Hidden-Surface Removal
- (D) Shading

(E) Triangulation

20. Deep learning belongs to which category of AI methods?

- (A) Statistical learning
- (B) Logic reasoning
- (C) Artificial neural network
- (D) Bayesian network
- (E) Genetic algorithms

多選題(每題四分, 答錯每個選項倒扣 0.8 分) 倒扣到該大題 0 分為止

21. Which of the following statements are/is correct in Computer Networks?

- (A) Bridge connects existing networks to form an internet.
- (B) Peer-to-peer is a means of performing interprocess communication over a network.
- (C) Tier-2 ISPs are assigned the task of providing individual users access to the Internet.
- (D) Port number identifies the application to which a message arriving from the Internet should be given.
- (E) Ethernet is a means of implementing the Star network topology.

22. Which of the following statements are/is correct in Programming Languages?

- (A) Most machine languages are based on the Imperative paradigm.
- (B) In the process of translating a program, executing the program is one of the key steps.
- (C) Polymorphism is the provision of a single interface to entities of different types.
- (D) The scope of a variable is the portion of the program in which the variable can be accessed.
- (E) Parse tree is not constructed by a typical compiler.

23. Given the following C-language declarations:

```
int * pt;  
int (*pa) [3];  
int ar1 [2] [3];  
int ar2 [3] [2];  
int **p2;
```

which of the following assignment statements are/is valid?

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- (A) `pt = ar1;`
- (B) `pa = ar2;`
- (C) `p2 = &pt;`//where `&` is the address-of operator
- (D) `p2 = ar2;`
- (E) `*p2 = ar2[0];`//where `*` is the indirection operator

24. Suppose you have this C-language function definition:

```
#include <stdio.h>
char *pr (char *str)
{
    char *pc;

    pc = str;
    while (*pc)
        putchar(*pc++);
    do {
        putchar(*--pc);
    } while (pc - str);
    return (pc);
}
```

Consider the following function call:

```
x = pr("Ho Ho Ho!");
```

which of the following statements are/is correct about this code segment?

- (A) "Ho Ho Ho!!oH oH o" is printed.
 - (B) `*--pc` means to take the value pointed to by `pc` and decrement that value by 1.
 - (C) `--*pc` means to decrement the pointer by 1 and use the value found there.
 - (D) `while (pc - str)` checks to see that `pc` does not point to the same location that `str` does (the beginning of the string).
 - (E) If `*--pc` were replaced with `*pc--`, "Ho Ho Ho!!oH oH oH" is printed.
25. Which of the following questions have/has been answered by researchers?
- (A) What is the time complexity of the problem of sorting a list?
 - (B) Is NP contained in P?
 - (C) Is P contained in NP?

- (D) Are all the problems in NP solvable?
- (E) Are all the problems in P solvable?
26. An 8 bit datum appends 1 bit odd parity checking bit for error detection. Which of the following data must have at least one bit error?
- (A) 100100110
- (B) 011010011
- (C) 111100001
- (D) 010101010
- (E) 001100101
27. Which of the following data structures are/is usually used to implement a queue?
- (A) Array
- (B) Tree
- (C) Circular list
- (D) Graph
- (E) Linked list
28. Which of the following sorting algorithms have/has worst case time complexity $O(n \log n)$?
- (A) Quick sort
- (B) Merge sort
- (C) Bubble sort
- (D) Heap sort
- (E) Insertion sort
29. Which of the following algorithms are/is used for global lighting in computer graphics?
- (A) Specular light reflection
- (B) Phong shading
- (C) Ray tracing
- (D) Gouraud shading
- (E) Radiosity
30. Which of the following components are/is in the production system for AI reasoning?

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- (A) A control system
- (B) A collection of states
- (C) An inference engine
- (D) A collection of productions
- (E) A search tree