

科目	計算機概論	適用系所	資訊工程學系	時間	100分鐘
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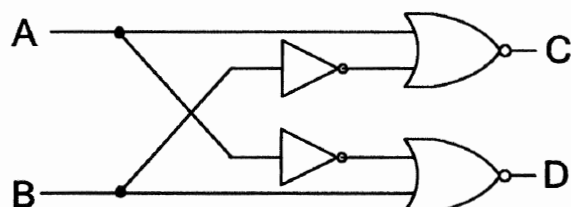
※請務必在答案卷作答區內作答。

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一、(65%)Choose the best answer.(1 point each, no deduction on wrong answers)

1. A computer has 64 MB (megabytes) of memory. Each word is 4 bytes. How many bits are needed to address each single word in memory? (A) 16 (B) 24 (C) 32 (D) 40
2. Which of the following techniques can pass a large block of data from an I/O device directly to the main memory? (A) programmed I/O (B) interrupt-driven I/O (C) DMA (D) isolated I/O
3. The control bus of a computer consists of 8 wires. What is the maximum number of CPU instructions of this computer? (A) 8 (B) 32 (C) 128 (D) 256
4. Which of the following techniques uses swapping technique to support multiprogramming? (A) partitioning (B) paging (C) demand paging (D) queuing
5. Which of the following events will cause a process to switch from ready to running state? (A) when a process is brought into main memory (B) when a process gets CPU time (C) when a process is performing I/O (D) when a process is finished
6. Which of the following could cause dead lock? (A) mutual exclusion (B) resource holding (C) no preemption (D) all of above
7. Which of the following supports virtual memory? (A) partitioning (B) paging (C) demand paging (D) synchronization
8. What is the functionality of the lexical analyzer in a compiler? (A) grammar analysis (B) generation of the symbol table (C) code generation (D) code optimization
9. When call-by-reference is used, the main program will pass which of the following to a subprogram? (A) address (B) value (C) constant (D) file
10. In a relational database, to delete a column of a table, which operation can be used? (A) project (B) join (C) select (D) intersection
11. Consider the OSI networking reference model. Which layer is responsible for the transmission between two adjacent nodes? (A) network (B) data link (C) transport (D) session
12. How many bytes are used in forming IP addresses in IPv4? (A) 4 (B) 6 (C) 8 (D) 2
13. Which layer in the OSI networking reference model implements the client/server communication model? (A) physical (B) data link (C) network (D) transport
14. Which of the following gets threatened by denial of service attack? (A) confidentiality (B) integrity (C) availability (D) none of the above
15. How many keys are created in the asymmetric-key cryptography? (A) 1 (B) 2 (C) 3 (D) 4

16. Which one of the following does not belong to “system software”? (A) assembler (B) compiler (C) spreadsheet (D) linker
17. What is the average time to execute one instruction when the CPU speed is 5MIPS?
(A) $0.2\mu\text{s}$ (B) 0.2ns (C) $5\mu\text{s}$ (D) 5ms
18. How do you express the number 654.24_8 (which is a number in octal system) in hexadecimal system? (A) $1AC.4_{16}$ (B) $1AC.5_{16}$ (C) $1AD.5_{16}$ (D) $1AB.4_{16}$
19. If $(023)_x + (0111)_2 = (01A)_{16}$, then what is x ? (A) 2 (B) 4 (C) 8 (D) 10
20. Which one of the following Boolean equations is wrong? (A) $X(X'+Y)Z=XYZ$
(B) $(X+Y)(Y+Z)(X'+Z)=(X+Y)(X'+Z)$ (C) $(X+Y'+Z)'=X'YZ'$ (D)
 $XY+X'Z+YZ=XZ+X'YZ$
21. Which of the followings is not included inside CPU chips? (A) Control Unit
(B) Register (C) ALU (D) Main Memory
22. A DRAM memory chip contains 10 address lines and 4 data lines. What is its capacity?
(A) $1K \times 4$ (B) $256K \times 4$ (C) $512K \times 4$ (D) $1M \times 4$
23. In terms of the speed for CPU to access data, which of the following storage device is the fastest? (A) hard disk (B) main memory (C) cache (D) register
24. In the following picture, node A and B are input, C and D are output. Then which statement is correct?



- (A) If both A and B are 1, then $C=1$, $D=0$
- (B) If both A and B are 0, then $C=1$, $D=0$
- (C) If $A=1$, $B=0$, then $C=1$, $D=0$
- (D) If $A=0$, $B=1$, then $C=1$, $D=0$
25. If you are only allowed to use NOR gate to synthesize an AND gate, what is the minimal number of NOR gate that you need to complete the task? (A) 2 (B) 3 (C) 4 (D) 5
26. The Boolean function $F=(A+B+C)(A'+B+C)(A+B+C')(A+B'+C')(A'+B+C)$, after simplified, is equivalent to the equation: (A) $F=AB+BC'$ (B) $F=A'C+B'$ (C)
 $F=A'C+B'C$ (D) $F=A+B+C'$
27. Which one of the followings cannot randomly access the data? (A) disk (B) tape (C)
CD (D) main memory

28. Which one of the following can record data on both sides of an optical disk? (A)CD-R (B)CD-ROM (C)DVD-ROM (D)All of the above
29. If only one bit is allowed to use to represent a pixel, a computer system can only display two colors: black and white. If 5 bits are allowed to use, then how many levels of gray scale can be displayed in such system? (A) 8 (B) 16 (C) 32 (D) 64
30. A special technology which enables computers to speak out a text document is called (A) video recognition. (B) speech synthesis. (C) video graphics. (D) speech recognition.
31. When you boot a computer, which one of the following programs would be execute first? (A)absolute loader (B)bootstrap loader (C)relocating loader (D)linking loader
32. Which one of the followings can convert Assembly to Machine Language? (A) Compiler (B) Interpreter (C) Assembler (D) Editor
33. What is the order of conversion process of an advanced high level programming language? (A) Edit, Compile, Execution, Link/Load (B) Compile, Edit, Execution, Link/Load (C) Edit, Compile, Link/Load, Execution (D) Edit, Link/Load, Compile, Execution
34. Assume we have four processes in CPU, each of them has its particular arrival time, and each of them needs different amount of CPU time to complete. The arrival time and the CPU time needed is listed in the following table. Now, if we use shortest-job-first algorithm to schedule the process, what is the “average turnaround time” for all of them to complete? (P.S: the turnaround time means the time duration of a process from its arrival to its completion)

Process	Arrival time	CPU time needed
1	0ms	5ms
2	2ms	9ms
3	2ms	4ms
41	3ms	7ms

- (A)11ms (B)12ms (C)13ms (D)14ms
35. Which of the following statement is incorrect? (A) Memory segmentation management is prone to cause external fragment (B) When using paging method to manage memory, the size of a page is usually an exponent of 2 (C) Virtual memory is not suitable for real time OS (D) All of the above are correct
36. Which of the following statement about memory management is incorrect? (A) Garbage collection is a dynamic management (B) Memory management by paging is prone to cause internal fragment (C) By increasing the size of a page, we can effectively decrease internal fragment (D) When the page fault happens too frequently, it increases the system response time.
37. Which of the following statement is correct? (A) Multi-tasking OS can run on a single CPU system (B) Batch processing can be used in traffic management and bank ATM machine (C) It is better to build an employee salary management system with real-time system architecture (D) When a computer system uses more than two CPUs to execute one program, it is called “time-sharing system”.

38. Which UNIX command can list all processes in the system? (A)pwd (B)ps (C)type (D)rlogin
39. Under Linux environment, the command “pwd” means (A) delete files (B) show the current path (C) show the content of a file (D) list all the processes
40. Of the OS listed below, which one is aimed to become a thin-client OS for cloud computing? (A) Mac OS X (B) Windows Vista (C)Unix (D)Google Chrome OS
41. When calling a sub-routine in Java, which of the following mechanism is used? (A) call by value (B) call by address (C) call by reference (D) none of them
42. Which one of the following is an Object-Oriented Programming Language? (A)BASIC(B)Quick Basic(C)Visual Basic(D)Visual Basic .NET
43. Which of the following UML diagram is used to describe the system from user's perspective? (A) Use case diagram (B) Class diagram (C) Object diagram (D) Sequence Diagram
44. Which of the following UML diagram is used to describe the object class and the static relation between classes in a system? (A) Use case diagram (B) Class diagram (C) Object diagram (D) Sequence Diagram
45. Which of the following image or video format has the lowest distortion? (A)BMP (B)GIF (C)MPEG-1 (D)MPEG-2
46. If the monitor is set to use 24 bits, full color, to display images, using RGB value to represent color Red, Green and Blue, respectively, then how many levels that each color can be displayed? (A) 8 (B) 16 (C) 256 (D) 1024
47. Which video transmission spec is used in Taiwan? (A)NTSC (B)PAL (C)SECAM (D) None of the above
48. In the 7 layers OSI network model, which layer does not have the function of “flow control”? (A) Physical layer (B) Data link layer (C) Network layer (D) Transport layer
49. How much data can be transmitted per minute when using a network of speed 56K bps ? (A)56 Kbits (B)56 KBytes (C)420KBytes (D)3360Kbytes
50. How many lines are needed if we want to form a network of 10 computers, so that every possible pair of them is connected? (A)20 (B)45 (C)81 (D)90
51. IEEE 802.16 WMAN(Wireless MAN Standard for Wireless Metropolitan Area Networks) is usually known as (A)Wi-Fi (B)Wi-Fly (C)Wi-Max (D) Wi-3G
52. HSDPA technology belongs to (A)Wi-Fi (B)Wi-Max (C)3.5G (D) GPRS
53. Which of the following statement about TCP/IP is incorrect? (A) Each PC can only have one IP address (B) is a transmission protocol used in internet (C) can be used in LAN too (D) HTTP uses TCP protocol to transmit data
54. What is the default socket port number in HTTP? (A)17(B)21(C)35(D)80(E)92

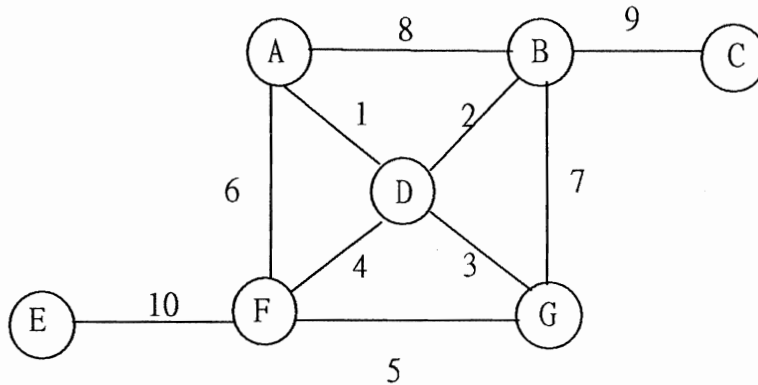
55. Which of the following does not belong to AJAX? (A)DOM (B)XML (C)Java Applet (D)JavaScript
56. Which of the following statement about “cookie” in dynamic web programming is incorrect? (A) Cookie is a tiny text file (B) Cookie can be written from server side into client side (C) Both PHP and ASP use cookies (D) Cookie is a delicious dessert for cheering up programmers when they are exhausted
57. Which of the following is not the main advantage of “data mining”? (A) Finding out the potential customers for marketing (B) Recovering the lost data in the long history of a company (C) Assisting to segment the market (D) Recognizing the potential problematic transactions
58. In an employee database, which field is best suited to use as “Primary Key”? (A) Salary (B) Birthday (C) Phone number (D) ID number
59. Which level of service does Google App Engine belong to? (A)IaaS(B)PaaS(C)SaaS(D) None of the above
60. Which of the following description about “Trojans” is wrong? (A) It can remotely control the client side computer (B) It is a internet game protocol (C) It is a malicious software (D) It won't self-copy to increase the number of its process
61. Phishing means using forged websites to steal vital personal information. What category of information ethics is violated by such behavior? (A) Privacy (B) Accuracy (C) Property (D) Accessibility
62. Two numbers, when represented by 2's compliment, are 01010101010101 and 1010101010101010. What is the sum of them? (A) -32768 (B) -1 (C) 32767 (D) 65535
63. $A=(A.4)_H$, $B=(10.24)_{10}$, $C=(1010.0101)_2$, then which statement is true? (A) $A > B > C$ (B) $B > A > C$ (C) $A > C > B$ (D) $C > A > B$ (E) $C > B > A$
64. Which of the following CPU instruction is equivalent to dividing a number by 2? (A) Logical OR (B) Logical AND (C) Shift one bit to the right (D) Shift one bit to the left
65. $11110000 \oplus 11001100 = ?$ (A) 10000111 (B) 11101010 (C) 00111100 (D) 11111100

二、(20%) Short answer questions. (2 point each)

- Convert the 8-bit binary number 11001110 (in two's complement representation) to its decimal equivalence.
- What is the result of the logic operation $(11 \text{ AND } 22) \text{ OR } ((\text{NOT } 99) \text{ AND } (77 \text{ XOR } 88))$? Assume all numbers are in hexadecimal.
- A computer uses memory-mapped I/O addressing. The address bus uses 10 lines (10 bits) . If the memory is made up of 1000 words, how many four-register I/O controllers can be addressed by the computer?

4. What is the content of the Program Counter in a computer CPU?

Refer to the following graph for questions 5, 6, and 7. The numbers are edge weights.



5. Write a traversal sequence of nodes by using breadth first search on the graph starting from the node D?

6. Write a traversal sequence of nodes by using depth first search on the graph starting from the node D?

7. Draw a minimum spanning tree rooted at node A.

8. What is the purpose to have exception handling feature in a programming language?

9. What is reentrant code (or pure code)?

10. Give an example of implementation of Abstract Data Type (ADT) in any programming language.

三、(5%) A binary tree has 8 nodes with IDs from A to H. The inorder and postorder traversal of the tree follow:

Postorder: GEBHCADF Inorder: GBEFDHAC

Please draw the tree.

四、(5%) Write a recursive C function "*power (int a, int b)*" which accepts two parameters *a* and *b* and returns the value of a^b to a calling program. Assume *a* and *b* are positive integers.

五、(5%) Propose a method to flip (change 1 to 0 and change 0 to 1) the three rightmost and the two leftmost bits of a 8 bit binary pattern by using logic operations and masks.