الأسم الكامل:

University of Baghdad
College of Science
Department of Computer Science
M.Sc. Qualification Exam
Date: 8 September 2013
Time: 3 hrs.

Notes:

- **Answer <u>All</u> Questions.**
- **Answer in <u>English</u>.**
- **It is not allowed to consult any information during the exam, depend on your own knowledge and on the clarifications given by assistants.**

Q. Number	Mark (Numbering)	Mark (Written)
Q1		
Q2		
Q3		
Q4		
Q5		
Q6		
Q7		
Total		
Out of	100	

Q1: Answer with either **True** or **False** **(20 Marks)**		**Answer**
1.	Binary search searches an ordered list by successively dividing the list in halves until the item searched for is found or determined to be not present.	
2.	The ascending order of a data hierarchy is bit-byte-field-record-file database.	
3.	Ambiguous grammar is one that produces one leftmost or one rightmost derivation for the same sentence.	
4.	The keywords: (for, while, if) should appear as terminals in C/C++ language grammar.	
5.	A function contained within a class is called member function.	
6.	Block or Buffer caches are used to increase the capacity of main memory.	
7.	$\neg(p \wedge q) \equiv \neg p \wedge \neg q$	
8.	If f and g are one to one then fog is also one to one.	
9.	The largest positive decimal value which can be represented by six binary digits (bits) is 64.	
10.	The signal is the physical path over which a message travels.	
11.	The memory address of the first element in the array is called first address.	
12.	Depth first search method takes less memory than breadth first search.	
13.	Memory unit accessed by content is called associative memory.	
14.	When a computer is first turned on or restarted, a special type of absolute loader is executed, called a boot loader.	
15.	Arrays are dynamic data structures.	
16.	A program in execution is called a process.	
17.	Constructors and other class member functions, except the Destructor, can be overloaded.	
18.	The number of rows of a truth table depends on the number of inputs, not the number of outputs	
19.	In a time domain plot, the horizontal axis is a measure of frequency.	
20.	A schedule which selects processes from secondary device is called long term schedule.	

Q2: Mark with **circle** the correct answer **(30 Mark)**

1. Which of the following database object does not physically exist?
- A. Base table
- B. Index
- C. View
- D. None of the above

2. When arguments are _____, the function works with the original arguments in the calling program
- A. Passed by reference
- B. Passed by value
- C. A or B
- D. None of the above

3. Multiplexer and arbitration logic units locate in
- A. Time shared common bus
- B. Dual bus
- C. Multiport memory
- D. Crossbar switch

4. Translator for low level programming language were termed as
- A. Assembler
- B. Compiler
- C. Linker
- D. Loader

5. The scheduling in which CPU is allocated to the process with least CPU-burst time is called
- A. Priority Scheduling
- B. Shortest job first Scheduling
- C. Round Robin Scheduling
- D. Multilevel Queue Scheduling

6. The main reason to encrypt a file is to
- A. Reduce its size
- B. Secure it for transmission
- C. Prepare it for backup
- D. Include it in the start-up sequence

7. Action implementing instruction's meaning are an actually carried out by
- A. Instruction fetch
- B. Instruction decode
- C. Instruction execution
- D. Instruction program

8. The _____key must contain unique and not null values; while the …… key can contain duplicate and null values**.**

A. Candidate/Primary
B. Primary/Foreign
C. Super/Primary
D. Alternate/Candidate

9. Main memory always contain the same data as in cache in

A. Write back
B. Write allocate
C. Write around
D. Write through

10. The equation set ($x_{new} = x_{old}+a$, $y_{new}= y_{old}+b$) represent the process

A. Translation
B. Scaling
C. Reflection
D. Rotation

11. _____ is a technique of improving the priority of process waiting in Queue for CPU allocation

A. Starvation
B. Ageing
C. Revocation
D. Relocation

12. An advantage of the database management approach is

A. Data is dependent on programs
B. Data redundancy increases
C. Data is integrated and can be accessed by multiple programs
D. None of the above

13. The constructor functions do not have

A. Parameters
B. Return data
C. Function body
D. A and B

14. Which scheduling policy is most suitable for a time-shared operating system

A. Shortest-job First.
B. Elevator.
C. Round-Robin
D. First-Come-First-Serve.

15. Richard has been putting in lots of time trying to learn about security. He comes to you with a question: What is the science of taking plaintext and converting it to ciphertext? What will your answer be?

A. Collision
B. Cryptanalysis
C. Cryptology
D. Cryptography

16. In predictive parsing of compiler, there is no

A. Backtracking
B. Matching
C. Left factoring
D. Start symbol

17. It is a protocol converter that is installed within a router.

A. CSMA/CD
B. Gateway
C. Token bus
D. Routing

18. Hardwired controller in building depends on

A. Micro program counter
B. Programmable logic array
C. Control steps
D. Instruction register

20. What are three principals of identification and authentication

A. Something you are, something you have, something you control
B. Something you know, something you are, something you control
C. Something you know, something you are, something you have
D. Something you have, something you control, something you know

21. If a base class is privately inherited by a derived class, then ---------- member of the base class is accessible to the objects of the derived class.

A. No
B. Private
C. Public
D. B And C

22. In asymmetric key cryptography, _____ keys are required per communicating party

A. 2
B. 3
C. 1
D. 4

23. The number -5 (base 10) represented in 4-bit two's complement binary arithmetic as

A. 1011
B. 1101
C. 0101
D. 1111

24. Which of the following approaches do not require knowledge of the system state

A. Deadlock detection.
B. Deadlock prevention.
C. Deadlock avoidance.
D. None of the above.

25. When data is transmitted from device A to device B, the header from A's layer 6 is read by B's _____ layer.

A. Transport
B. Physical
C. Data link
D. None from the above

26. A* algorithm is based on

A. Breadth-First-Search
B. Depth-First –Search
C. Best-First-Search
D. Hill climbing.

27. A heuristic is a way of trying

A. To discover something or an idea embedded in a program
B. To search and measure how far a node in a search tree seems to be from a goal
C. To compare two nodes in a search tree to see if one is better than the other
D. All the above

28. The primary job of the operating system of a computer is to

A. command resources
B. Manage resources
C. Provide utilities
D. Be user friendly

29. The equations set ($x_{new} = -x_{old}$, $y_{new} = -y_{old}$) represents the process

A. Reflection around x-axis
B. Refection around y-axis
C. Rotation clockwise 270
D. Rotation clockwise 180

30. The number of half and full-adders required to add 16-bit numbers is

A. 8 half adders and 8 full adders
B. 1 half adder and 15 full adders
C. 16 half adder and 0 full adder
D. 4 half adders and 12 full adders

Q3: Answer the following: (8 Marks)

1. Construct a parse tree of (A+B)*C for the grammar
$E \rightarrow E + E | \ E * E | (E) | id$
Answer:

2. What is the purpose of system calls?

Answer:

3. What is the term for flooding a service with meaningless data in an attempt to make that service unavailable to other users?

Answer:

4. Convert the sentence **"Everyone student who is taking AI is cool"** to first order logic
Answer:

Q4: For each of the **subjects** listed in **A**, select the **most suitable course number** in **B** that you may learn the subject in. **(10 Marks)**

A	Answer	B
Malware		**1. Graphics**
Brezenham Algorithm		**2. Digital Logic**
K-map		**3. Artificial Intelligence**
Neural Networks		**4. Object Oriented Programming**
Intermediate Code Generator		**5. Operating System**
MIMD		**6. Data Structure**
DDL		**7. Database**
Inorder traversal		**8. Compiler**
Semaphore		**9. Computer Architecture**
Constructor		**10. Computer Security**

Q5: Within computer science discipline, write down **(in the blank entries)** full names of the following short forms**. (10 Marks)**

1.	**SSTF**	
2.	**HIDS**	
3.	**NAT**	
4.	**VPN**	
5.	**Prolog**	
6.	**PHP**	
7.	**ARP**	
8.	**CMOS**	
9.	**IRQ**	
10.	**ODBC**	

Q6: What is the **output** of the following code segments? **(12 Marks)**

```
int a, b, c;
a = 1;
b = 2;
c = 6;
while (c > 0) {
    if ( c % 2 == 1 ) {
       a = a * b;
    }
    b = b * b;
    c = c / 2;
    System.out.println( a + "," + b + "," + c);
}
```

Output

```
x:=3;
y:=10;
do
  x:=x+round(1.1*y);
  y:=y-3;
loop until y<-1
write(x,y);
```

Output

```
x:=10;
y:=1;
while y<8
  x:=x+y;
  y:=y+2;
end while
write (x,y);
```

Output

Q7: Numerical Answer. (10 Marks)

1. An operating system contains 3 user processes each requiring 2 units of resource R .What is the minimum number of units of R such that no deadlocks will ever arise?

Answer:

2. How many paths of length 4 are there from a to d in the following graph **G?**

Answer:

3. What is the binary representation of 15.5 base 10?

Answer:

4. A point (x=50, y=20) is shifted by (30, 40) and then scaled by (2, 3). Write the new position of x and y.

Answer:

5. What is the number of swapping's needed to sort the numbers 8, 22, 7, 9, 31, 19, 5, 13 in ascending order, using bubble sort.

Answer: