University of Baghdad

College of Science
Department of Computer Science

الأسم الكامل:

High Diploma Qualification Exam

Date: 13 Aug. 2015

Time: 3 hrs.

Notes:

- **Answer All Questions.**
- **Answer in English.**
- **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		
Total		
Out of	100	

Q1	Answer with either <u>True</u> or <u>False</u>. (30 Marks) Do not use T, ✓, F, or ×. Use only True and False to represent your answers.	Answer
1.	In an infinite while loop, the while expression (the decision maker) is initially false, but after the first iteration it is always true.	
2.	It is possible that the body of a while loop may not execute at all.	
3.	The union of sets A and B, denoted $A \cup B$, is the set containing all elements in either A or B.	
4.	Stack can be used to reverse data.	
5.	The suffix expression A B * D + E F / - is equivalent to -(D + A * B) / (E - F)	
6.	The arithmetic expression is valid if the difference between operations and operator equal one.	
7.	An object may be defined within a function F1 , in this case it is accessible by the function F1 only.	
8.	Automatas M1 and M2 are said to be equivalent if and only if their minimal state automatas are identical.	
9.	A syntax analyzer is a program obtains a string of tokens from the lexical analyzer and verifies whether or not the string can be generated by the CFG for the source language.	
10.	Array is an example of non-linear data structure.	
11.	Linear search is the simplest search algorithm with $O(n^2)$ where n is the number of elements.	
12.	Architecture of the database can be viewed as four levels.	
13.	Union operation does not require the participating tables to be union-compatible.	
14.	A functional dependency of the form $x \rightarrow y$ is trivial if $y \subset x$.	
15.	Authorization is the process that determines whether the user has the authority to carry out certain tasks.	

16.	**In symmetrical encryption, the key is published for people to encrypt their data with.**	
17.	**Transposition cipher replaces one character with another character.**	
18.	**Virtual address is the logical or program address that the process uses. Whenever the CPU generates an address, it is always in terms of virtual address space.**	
19.	**Any expert system should contain inference engine but not necessary need user interface.**	
20.	**PROLOG and LISP are commonly used programming languages in AI.**	
21.	**Artificial intelligence shows best on complex problems for which general principles don't help much.**	
22.	**UDP is a reliable protocol.**	
23.	**TCP uses variable transmission bit rate.**	
24.	**In OSI model, repeater works at physical layer.**	
25.	**In the blocked state, the processes waiting are found**	
26.	**The number of processes completed per unit time is known as throughput.**	
27.	**Swapping is a technique of temporarily removing inactive programs from the memory of computer system.**	
28.	**Digital signature is the ability of each party in a transaction to ascertain the identity of the other party.**	
29.	**Trojan horse floods a network server or Web server with requests for information or other data in order to crash the network.**	

Q2	**Choose the correct answer.** **(40 Marks)** **Use only A, B, C, and D to represent your correct choice.**	**Answer**
1.	The Cartesian product of $A = \{1,2\}$ and $B = \{a, b\}$ is **A.** $\{(\mathbf{1},\mathbf{2}),(\mathbf{2},\mathbf{1}),(\boldsymbol{a},\boldsymbol{b}),(\boldsymbol{b},\boldsymbol{a})\}$ **B.** $\{(\mathbf{1},\mathbf{1}),(\mathbf{2},\mathbf{2}),(\boldsymbol{a},\boldsymbol{a}),(\boldsymbol{b},\boldsymbol{b})\}$ **C.** $\{(\mathbf{1},\boldsymbol{a}),(\mathbf{2},\boldsymbol{a}),(\mathbf{1},\boldsymbol{b}),(\mathbf{2},\boldsymbol{b})\}$ **D.** $\{(\mathbf{1},\mathbf{2}),(\mathbf{1},\boldsymbol{a}),(\boldsymbol{a},\boldsymbol{b}),(\mathbf{2},\boldsymbol{b})\}$	
2.	The expression $(sqrt\ x)$ computes: **A.** $\boldsymbol{x^2}$ **B.** $\boldsymbol{x^{1/2}}$ **C.** $\frac{x}{2}$ **D.** $\frac{2}{x}$	
3.	In C++, Which of the following is a relation operator: **A.** $>=$ **B.** $==$ **C.** $!=$ **D. all of them**	
4.	In C++, Which of the following is a logical operator: **A.** ! **B.** && **C.** || **D. all of them**	
5.	Circular queue is used instead of queue to: **A. reduce time of search. B. search from any location. C. increase the time of search. D. reduce the wasted of storage.**	
6.	Linked linear list can be represented to: **A. permit insertion of data in any location. B. permit traversing the data sequentially. C. permit deletion of data from any location. D. All of them**	
7.	The main operation of stack is: **A. insert data in any location. B. delete data from the middle of stack.** **C. copy any element in the stack. D. change the first element entered to stack only.**	
8.	The underflow in queue occurs when: **A. front equal to rear B. rear equal zero C. Front equals zero D. none of the them**	
9.	Assume you have the following declarations void f1 (int x[20]); and int a[20]; then which of the following is a valid function call statement? **A. f1 (a[20]) B. f1 (int a[20]) C. f1 (int a) D. f1 (a)**	
10.	The constructor **A. returns an integer value B. returns a float value** **C. returns an array D. does not return any value**	

11.	In C++ , member y of object x is written as **A. x.y** **B. x (y)** **C. y.x** **D. y(x)**	
12.	In C++, Objects are variables of type: **A. array** **B. class** **C. any user defined data type** **D. all of them**	
13.	How many parameters we should assign to draw an ellipse? **A. 1** **B. 2** **C. 3** **D. 4**	
14.	A relational DB consists of a collection of: **A. tables** **B. fields** **C. records** **D. keys**	
15.	In case of entity integrity, the primary key may be: **A. Not Null** **B. Null** **C. Null & not Null** **D. none of them**	
16.	A legal expression in SQL is: **A. Select null from employee;** **B. Select name from employee;** **C. Select name from employee where salary = NULL;** **D. None of them**	
17.	A data manipulation command the combines the records from one or more tables is called: **A. SELECT** **B. PROJECT** **C. JOIN** **D. PRODUCT**	
18.	A 3D point $(x = 2, y = 3, z = 1)$ is reflected around point $(x_0 = 1, y_0 = 3, z_0 = 2)$ to get: **A.** $(\mathbf{1}, \mathbf{2}, \mathbf{1})$ **B.** $(\mathbf{0}, \mathbf{3}, \mathbf{1})$ **C.** $(\mathbf{1}, \mathbf{3}, \mathbf{1})$ **D.** $(\mathbf{0}, \mathbf{2}, \mathbf{1})$	
19.	A 2D point $(x = 2, y = 2)$ is passed through scaling $(S_x = 3, S_y = 2)$ around the point $(x_0 = 3, y_0 = 4)$, to get the new coordinates: **A.** $(\mathbf{0}, \mathbf{0})$ **B.** $(\mathbf{1}, \mathbf{1})$ **C.** $(\mathbf{2}, \mathbf{0})$ **D. non of them**	
20.	In a relation, **A. ordering of rows is immaterial** **B. no two rows are identical** **C. A and B are true** **D. None of them.**	
21.	DES generates sixteen round keys each of length: **A. 32-bit** **B. 48-bit** **C. 54-bit** **D. 42-bit**	
22.	In which phase, the virus places an identical copy of itself into other programs or into certain system areas on the disk? **A. Dormant phase** **B. Propagation phase** **C. Triggering phase** **D. Execution phase**	
23.	Travelling salesman problem with n cities has search space size equals: **A.** $\boldsymbol{n^2}$ **B.** $\boldsymbol{2^n}$ **C.** $\boldsymbol{2n}$ **D.** $\boldsymbol{n!}$	
24.	Which of the following is heuristic search in AI? **A. Best first search** **B. A*** **C. Hill climbing** **D. all of them**	
25.	Which image embodies an infinite number of details? **A. bitmap** **B. 8-bit** **C. 24-bit** **D. real world**	
26.	Switch is used to divide the network into multiple domains of:	

	A. collision B. broadcast C. bridge D. virtual	
27.	Bridge in networks is used to: **A. separate LANs B. control network speed** **C. improve network speed D. connect LANs**	
28.	MAC address is: **A. 8 bit B. 16 bit C. 32 bit D. 48 bit**	
29.	A program in execution is called: **A. program B. state C. process D. module**	
30.	To select processes from secondary storage, we need: **A. short term scheduler B. medium term scheduler** **C. long term scheduler D. process scheduler**	
31.	Not a fundamental process state is: **A. ready B. terminated C. cooperated D. waited**	
32.	Interval between submission time and job completion is: **A. waiting time B. turnaround time C. throughput D. response time**	
33.	OS enables cooperating processes to communicate with each other via: **A. IPC B. FCFS C. SJF D. none of them**	
34.	Network topology can be: **A. mesh B. hybrid C. bus D. all of them**	
35.	Degree of a vertex in a graph is number of: **A. incident edges to it B. number of neighbor vertex to it** **C. number of connected vertex to it D. all of them**	
36.	Hill-climbing search algorithm may stuck at: **A. near optimum B. global optimum C. local optimum D. none of them**	
37.	MAC address is at: **A. transport layer B. network layer C. data link layer D. physical layer**	
38.	Twisted pair cables have: **A. STP B. large bitrate C. no interference D. low loss in signal**	
39.	The protocol working at the Transport layer to provide connectionless service between hosts is: **A. IP B. ARP C. TCP D. UDP**	

40.	WiFi and Bluetooth: **A. use same frequency range** **B. wireless technologies** **C. multiple devices may communicate with each other** **D. all of them**	

Q3. Answer each of the following (30 Marks)

1. **State the difference between multiprogramming and multiprocessing**

2. **What is the output of the following program segment:**

```
int count = 5;
while (--count > 0)
        cout << count << " ";
cout << endl;
```

3. **What is the output of the following C++ program?**

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
}
int counter;
for (counter = 1; counter <= 100; counter++)
if (pow(floor(sqrt(counter + 0.0)), 2) == counter)
```

```
        cout << counter<<cout << endl;
return 0;
}
```

4. **Write a program code that can print out the following:**

Output	Code
1 **1 2** **1 2 3** **1 2 3 4** **1 2 3** **1 2** **1**	

5. **Write a program code that can compute and print the result of: $1 + 2! + 3 + 4! + 5 + \cdots + 2n!$**