ROYAL CIVIL SERVICE COMMISSION
CIVIL SERVICE COMMON EXAMINATION (CSCE) 2009
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALIZATION PAPER for ICT (3 years)

Date	**: 8th Nov 2009**
Total Marks	**: 100**
Examination Time	**: 2.5 hours**
Reading Time	**: 15 minutes**

INSTRUCTIONS:

1. **This paper consists of 8 pages. Check that you have the complete set.** There are two sections to this paper.

   Section A: includes 30 multiple-choice questions of one mark each and 4 short answer questions of 5 marks each. (50 marks)

   Section B: contains two case studies and candidates are required to attempt only one of them. (50 marks)

2. **All answers must be answered in the answer sheets provided.** Answers in question papers will **not** be considered.

3. Please read the questions carefully before answering them. Take note of negatives in each question for example "not".

4. If any question is unclear, please make an educated assumption and clearly write down the assumption next to your answer

5. Scientific calculators will not be required for this exam.

SECTION A
(50 Marks)

a) Multiple-Choice questions: Select your answer and fill it in the answer sheets provided along with the question number. Please ensure that the section is clearly identified in your answer sheet. For each question carefully read all the choices provided and select the most appropriate answer. **(30 Marks)**

1. What is the best way to test software?
    a. Unit testing
    b. UAT
    c. Integration testing
    d. All of the above
2. What is the best protocol to use to retrieve email via a web-mail system?
    a. SMTP
    b. IMAP
    c. POP
    d. XHTML
3. Find the binary representation of the octal number 567
    a. 011100100
    b. 110011001
    c. 001101010
    d. 101110111
4. Convert the decimal number 483 to octal
    a. 763
    b. 743
    c. 753
    d. 773
5. Why is conversion required from one number system to another in computer science?
    a. To encrypt data
    b. To simplify interpretation
    c. To decode data
    d. None of the above
6. XML is a superset of HTML
    a. TRUE
    b. FALSE
7. Which of the following devices requires the highest input data transfer rate?
    a. Floppy Disk
    b. CDROM
    c. Keyboard
    d. Mouse

8. In UI interface WIMP stands for
    a. Windows, Index, Maps, Pointers
    b. Windows, Integers, Menus, Pages
    c. Windows, Icons, Menus, Pointers
    d. Windows, Icons, Menus, Pages
9. What is the result of the following program?

```
#include <stdio.h>
main ( )
{
    int x;

for(x=10; x>0; x--){
    printf("%x", &x);
            }
    return;
}
```

    a. 109876543210
    b. 10987654321
    c. 1098765432
    d. 012345678910
10. Main Memory is always faster than Cache memory.
    a. True
    b. False
11. Select the best result for the following program

```
Main ( ) {
    int k = 11;
    while (k>0) {
    print(k);
    k = k mod 2;
    }
}
```

    a. 11
    b. 1111111111111111.....
    c. 1111111111
    d. Error (Infinite loop)
12. Jpeg compression is not suitable for storing photographic images
    a. True
    b. False
13. Which of following stages comes first in Software development
    a. Change Management
    b. Requirements analysis
    c. Programming
    d. UI design

14. Which of the following can be used to define a process within a DFD
    a. Flow Chart
    b. ER diagram
    c. UML
    d. Class diagram
15. A debugger in Multithreaded programming is essential because
    a. Multithreaded programming is error prone
    b. Multithreaded programs require multiple programmers
    c. Finding causality of bugs in Multithreaded programs is very difficult
    d. Multithreaded programs are complex
16. Allowing multiple programs to run apparently simultaneously by the CPU is known as
    a. Multi-running
    b. Multi-tasking
    c. Multi-programming
    d. Parallel-execution
17. Which of the following is best used to send an email between two computers?
    a. POP
    b. IMAP
    c. TCP/IP
    d. MTA
18. The following is an example of cloud computing
    a. Grid computing
    b. Artificial Intelligence
    c. Bit torrent
    d. Peer 2 peer
19. Grand Central Dispatch is technology to optimally utilize
    a. Memory space
    b. Hard disk
    c. Indexes
    d. Multi-cores
20. Which of the following is asymptotically bigger
    a. N log N
    b. N^2
    c. 2^Google
    d. N^10
21. Which of the following can be used to directly input printed text
    a. Keyboard
    b. Mouse
    c. Photocopy
    d. OCR
22. Modern computers are reliable but they are not
    a. accurate
    b. powerful
    c. infallible
    d. Cheap

23. Which command gives better feedback about network connectivity
    a. Ping
    b. Trace Route
    c. ipconfig
    d. network
24. Phishing attacks are used to
    a. Illegally advertise
    b. Illegally collect user names & passwords
    c. Hack systems
    d. Intrude into systems without authorization
25. When new data are to be inserted into a data structure, but there is no available space; this situation is usually called
    a. Under flow
    b. Over flow
    c. Saturation
    d. House full
26. Push and Pop is usually related to
    a. arrays
    b. queues
    c. databases
    d. stacks
27. Which of the following data structure cannot store non-homogenous data
    a. Arrays
    b. Records
    c. Both
    d. None of the above
28. An algorithm that calls itself directly or indirectly is called a
    a. Sub Algorithm
    b. Recursion
    c. Polish notation
    d. Traversal algorithm
29. Two main measures for the efficiency an algorithm are
    a. Processor and Memory
    b. Complexity and Capacity
    c. Time and Space
    d. Data and Space
30. If P = NP
    a. ATMs will require new encryption algorithms
    b. You win a million dollars
    c. End of computer science
    d. Non of the above

b) Short answer questions: There are 4 short questions below. Please answer all the questions in the answer sheets provided. Be as succinct as possible. Clearly provide the question number next to each answer **(20 marks)**

1. Explain XML in your own words. Why do you think it is useful for web-services?
2. What is DNS? It is not essential for the Internet to work but why do we need it?
3. Explain why a router is essential for the Internet to work.
4. What is a digital signature?

SECTION B
(50 Marks)

From the given two case studies, choose one and attempt all the questions. Wherever necessary draw diagrams to illustrate your point. Clearly indicate which case you are attempting.

Case 1: Applications – Answer the questions below about Databases , algorithms and protocols.

Q1. Design a database, using the EER model, for an online student registration system. The database should have provision to store each student's bio-data and subjects registered for each school year are recorded. Also make sure that the teachers for each subject are able to see which students are enrolled in his/her class for each year. Ensure that the database is normalized as far as possible and primary and foreign keys are used. (20 marks)

Q2.Write a SQL query to generate a report of students by subject and year from the database that you designed. (5 marks)

Q3. You are given 8 stones that are exactly similar except one is slightly heavier than the other. You only have a pan balance used in the vegetable market to identify which is the unique stone. Write an algorithm that you could use to identify the unique stone in the least possible steps. (15 marks)

Q4. What is the difference between HTTP and HTTPS? (10 marks)

Case 2: Network- Answer the question below about Networks and Systems

Q1. Explain to a layman how email works. Describe how both POP and SMTP works (15 marks)

Q2. Internet Protocol is use to identify nodes in a network. Explain in your own words what ARP is used for in a LAN and describe how it works (15 marks)

Q3. There are many components required to secure a network. Explain what they are and how they work (10 marks)

Q4.Explain in your own words why it is necessary to have a Demilitarized zone in a network (10 marks)