ROYAL CIVIL SERVICE COMMISSION

CIVIL SERVICE COMMON EXAMINATIONS (CSCE) 2008

EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALIZATION PAPER for B.TECH & B. ENGG.
(COMUTER SCIENCE & ENGINEERING)

DATE: 20th December 2008

TOTAL MARKS: 100

TIME: 2.5 HOURS (150 MINUTES)

READING TIME: 15 MINUTES

INSTRUCTIONS:

1. **All ANSWERS** must be written on the **ANSWER BOOK** provided.

2. All answers must be labeled with appropriate question numbers (Section, Question and sub-Question Numbers wherever applicable). **Unlabelled answers will not be assessed.**

3. This paper is divided into two Sections. **Section – A** carries 50 marks and consists of 30 multiple choice questions of one mark each (30 marks) and 5 short-answer questions of 4 marks each (20 marks). **Answer all questions in this section.**

4. **Section – B** carries 50 marks containing two case studies. Choose and answer any **ONE** case study.

5. All questions in one section must be completed/answered before answering the other section. If you start with Section-B first, you must finish all parts/questions in this section before moving to Section-A and vice-versa.

6. **This question paper consists of 9 (Nine) pages. Check that you have the complete set**.

All answers in this section must be written on the Answer Book provided.

Multiple Choices: Select the most appropriate answer. There is only one correct answer in the list. Answers that contain more than one selection will not be graded. Choose only one answer. **(30 Marks)**

Mark the correct answer letter (**a, b, c or d**) against the Question number in your answer book.

Example:

Q. *Which of the following is the correct sequence of steps in the process of developing a computer program?*

  a. flowcharting, pseudo-coding, algorithm development and coding
  b. coding, algorithm development, flowcharting and pseudo-coding
  c. pseudo-coding, algorithm development, coding, and flowcharting
  d. algorithm development, flowcharting, pseudo-coding and coding

Answer: Q – d

1. *What is the compliment of the following Boolean expression?*

AB + B'C + CD

  a. $A' \cdot B' + (B + C') \cdot (C + D)$
  b. $(A' + B) \cdot (B' + C') \cdot (C' + D')$
  c. $(A'+B') \cdot (B + C') \cdot (C' + D')$
  d. $(A' + B) \cdot (B' + C') \cdot (C' + B')$

2. *Which of the following is an example of System Software:*

  a. Mozilla Fire Fox
  b. Microsoft Office 2007
  c. Disk Defragmenter
  d. ROM-BIOS

3. *LISP Programming Language is associated with which of the following:*

  a. Building Artificial Intelligence Applications
  b. Restoring broken links on the web
  c. Writing windows drivers and controllers
  d. Building RDBM Systems

4. *Which of the following is the key concept/technique used in Objected-Oriented Programming:*

    a. Pre-Processing
    b. Encapsulation
    c. Enumeration
    d. Nested Iterations

5. *In Software Engineering, which of the following development process model requires maximum interaction with the users/clients:*

    a. The Prototyping Model
    b. The Open Systems Interconnections Model
    c. The Rapid Applications Development Model
    d. The Linear Sequential Model

6. *Which of the following category is __NOT__ considered while designing cache memories:*

    a. block size
    b. replacement algorithm
    c. mapping function
    d. CPU speed

7. *In a priori analysis of algorithms, which factors related to the following are considered while determining computing time?*

    a. frequency of execution of statements
    b. machine language dependent
    c. programming language dependent
    d. memory and execution time

8. *With reference to automata theory, what is defined as a finite sequence of symbols juxtaposed?*

    a. alphabet
    b. string
    c. language
    d. concatenation

9. *In networking, which OSI layer is concerned mainly with the end-to-end connections:*

    a. data link layer
    b. network layer
    c. transport layer
    d. physical layer

10. *What would the output of the following program be?*

```
#include <iostream.h>
func ( ) ;
void main ( )
{
    int r ;
    r = func ( ) ;
    cout << " \ n   r = " << r ;
    r = func ( ) ;
    cout << " , "   << r + 100;
}
func ( )
{
    return (100) ;
}
```

      a.   r = 100 , 200
      b.   r = 100
      c.   r, 100 = 200
      d.   r 100 = 200

11. *Which of the following technologies used in web designing deals only with structure and not presentation*

      a.   XML
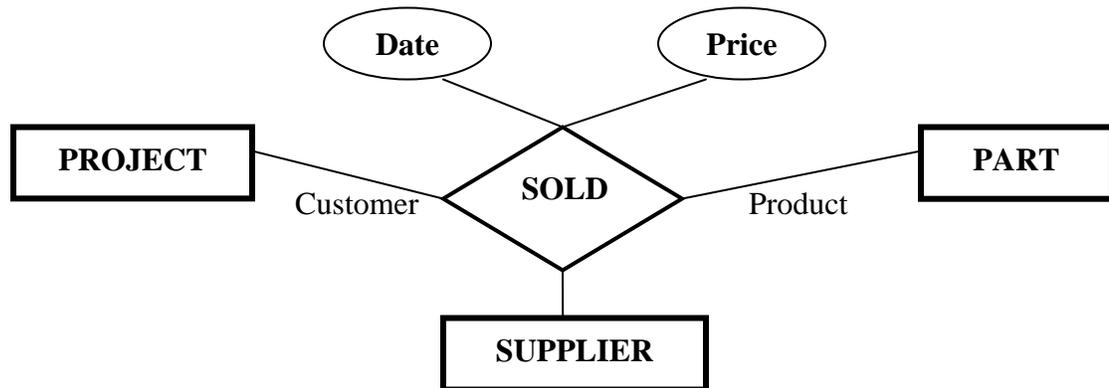   b.   HTML
      c.   DHTML
      d.   CSS

12. *The physical address (MAC Address) is hard-coded into which hardware component?*

      a.   modem
      b.   motherboard
      c.   NIC
      d.   VGA

13. *Which of the following protocol is used for handling outgoing e-mail from the network:*

      a.   SMTP
      b.   POP
      c.   SNMP
      d.   PPP

14. **Given the following E-R diagram, which of the relation schema is invalid:**

    a.   SOLD (Part_No, Date, Price)
    b.   SOLD(Part_No, Date, Price, supplier_ID, project_ID)
    c.   PART(part_No, supplier_ID)
    d.   PROJECT(Project_ID, Start_Date, End_Date)

15. **Which of the following media can carry signals furthest without the need for a repeater:**

    a.   single-mode optical fiber
    b.   multi-mode optical fiber
    c.   unshielded twisted pair CAT – 5
    d.   coaxial thick-net

16. **The function of the subnet mask in an IP address is:**

    a.   to hide the IP address while transmitting data
    b.   to route packets to the correct network or sub-network
    c.   to hide sub-networks from outside networks
    d.   to allow network administrators to create sub-networks

17. **Using universal gates such as the NAND and NOR gates to implement other logic gates are principally based on which laws of Boolean algebra:**

    a. De Morgan's Laws
    b. Idempotent Law
    c. Commutative Law
    d. Distributive Law

18. **Data in the optical memories (CDs and DVDs) are stored in which of the following forms:**

    a.   liquid crystals
    b.   pits and lands
    c.   polarized magnetic particles
    d.   photo-voltaic cells

19. When a modem connects to another modem/fax machine and agrees on the data transfer mode, this process is known as:
    a. initialization
    b. connection-oriented transfer
    c. windowing
    d. a hand shake

20. Which of the following is NOT a characteristic of modern operating systems
    a. microkernel architecture
    b. multithreading
    c. batch processing
    d. symmetric multiprocessing

21. Which of the following is NOT a sorting algorithm
    a. binary sort
    b. selection sort
    c. bubble sort
    d. insertion sort

22. Which of the following SQL commands constructs a virtual table
    a. CREATE VIEW
    b. CREATE TABLE
    c. ALTER TABLE
    d. CREATE TABLE AS

23. Which of the following is NOT a type of Radio Frequency (RF) propagation when transmitting data via air
    a. ground wave
    b. ionospheric
    c. line of sight (LOS)
    d. stratospheric propagation

24. A router is a networking device that operates at which layer of the OSI layer
    a. physical layer
    b. data-link layer
    c. network layer
    d. transport layer

25. Which of the following is NOT an application of Client/Server Architecture
    a. Remote Login (TELNET)
    b. Network File System
    c. FTP (File Transfer Protocol)
    d. Peer-Peer Networking

26. **Which of the following Internet tools uses a collection of servers to keep track of file locations in several different anonymous FTP sites**

    a.   Gopher
    b.   WAIS (Wide Area Information Service)
    c.   GOOGLE
    d.   ARCHIE

27. **In Intel processors, the technology used to double the speed of a given microprocessor is termed as:**

    a.   dual mode
    b.   duplexing
    c.   pre-fetch caching
    d.   hyper threading

28. **Interactive marketing unit (IMU) is associated with which format of advertising on the Internet**

    a.   Banner ads
    b.   pop-up ads
    c.   pop-behind ads
    d.   active ads

29. **The processor enters a reset state, clears all memory locations to zero, performs a parity check of memory and sets registers to the entry point of BIOS in ROM. This process is called:**

    a.   warm boot
    b.   bootstrapping
    c.   cold boot
    d.   booting up

30. **For a given set of n jobs and each job i is associated with a deadline d_i and profit p_i. The feasible solution J is given by $\Sigma_{i \in J} \, p_i$. For $n = 4$, $(p_1,p_2,p_3,p_4) = (100,10,15,27)$ and $(d_1,d_2,d_3,d_4) = (2,1,2,1)$, which of the following feasible solutions is optimal?**

	Feasible Solution	processing sequence
a.	(1, 2)	2, 1
b.	(1, 3)	1, 3 or 3, 1
c.	(1, 4)	4, 1
d.	(2, 3)	2, 3

SHORT ANSWERS (20 MARKS)

All answers in this section must be written on the Answer Booklet provided. Mark appropriate question numbers. Write answers with only blue/black ink/ballpoint pens. All diagrams and sketches must be done in HB pencils.

31. **What is the OSI-Model? State the name and basic functions of each of it's layers (4)**

32. **State Moore's Law. Discuss its significance with regard to the development of modern computers and it's limitations in the future   (4)**

33. **Differentiate between digital and analog systems. Briefly explain the 3 wave modulations (frequency, amplitude and phase) employed in digital data transmissions. (4)**

34. **Name the four key people involved in designing and developing Database Processing Systems and state their basic functions (4)**

35. **List 4 different types of media that can be handled by multi-media computer systems? For each type of media mention the I/O Devices that would be required by the system. (4)**

PART – B
(50 Marks)

All answers in this section must be written on the Answer Booklet provided. Mark appropriate question numbers. Write answers with only blue/black ink/ballpoint pens. All diagrams and sketches must be done in HB pencils.

Answer any 1 (one) Question. Each question carries 50 marks.

1.   **Design an E-R model for the following enterprise.**

Various organizations make business deals with various other organizations. (For simplicity let us assume that there are only two parties to each deal.) When negotiating (and signing) a deal, each organization is represented by a lawyer. The same organization can have deals with many other organizations and it might use different lawyers in each case. Lawyers and organizations have different attributes, like address and name. They also have their own unique attributes, such as specialization and fee incase of a lawyer and budget in case of an organization.

a.   Draw the E-R diagram and derive the database schema for the above. Specify the keys.

b.   Show how information loss can occur if a relationship of degree higher than two is split into binary relationship. Discuss assumption under which such a split does not lead to a loss of information.

OR

2.   **An interesting technique for obtaining a list of prime numbers that falls within the interval ranging from 2 to n, referred to as The Sieve of Eratosthenes is given below.**

Step1. Generate an ordered list of integers ranging from **2** to **n**.

Step2. For some particular integer, **i**, within the list carry out the following operations:

i.   Write out the integer, thus adding it to the list of primes.
ii. Remove all succeeding integers that are multiples of **i**.

Step3. Repeat **Step2** for each successive values of **i**, beginning with **i = 2** and ending with the last remaining integer.

a.   Develop an algorithm that uses this method to determine the primes that are contained in a list of numbers ranging from **1** to **n**, where **n** is an input quantity (a positive integer).

b.   Use appropriate pseudo-code and draw flowchart to illustrate your algorithm

c.   Trace your algorithm for **n = 10, n = 20 and n = 30**