

NATIONAL INFORMATICS CENTRE

**Question Paper for the post of
Scientific Officer/Engineer“SB”(Programmer/District Informatics Officer)-2008**

NOTE

- 1 There are **TWO PARTS** in this paper. **PART ONE** contains **THREE** questions and **PART TWO** contains **SIX** questions.
- 2 **PART ONE** is to be answered in the **SPECIAL ANSWER SHEET** only, attached to the **ANSWER BOOK**, as per the instructions contained therein.

TOTAL TIME : 2 HOURS

TOTAL MARKS : 100
(PART ONE – 30, PART TWO – 70)

PART 1

(Answer all the questions)

- 1 Each question below gives multiple choices of answers. Choose the most appropriate one and enter in the “SPECIAL ANSWER SHEET” attached to the ANSWER BOOK, following instructions therein.

(1 X 10)

- 1.1 A list of items, in which additions and deletions may be made at either end is known as a
 - A. Queue.
 - B. Push-down stack
 - C. Deque
 - D. None of the above

- 1.2 Reentrant code provides for
 - A. Execution of object program instruction segments by more than one process at the same time.
 - B. Improved console operations.
 - C. Multiprocessing
 - D. Contiguous areas of memory for storage of program, variables, data, reference, and dynamic process history.

- 1.3 Which is not a debugging technique
 - A. Core dumps
 - B. Traces
 - C. Print Statements
 - D. Regression Testing

- 1.4 The process of transforming a model into source code is
- A. Reverse Engineering
 - B. Forward Engineering
 - C. Re-engineering
 - D. Re-structuring
- 1.5 The process by which existing processes and methods are replaced by new processes and techniques is
- A. Reverse Engineering
 - B. Business Process Re-engineering
 - C. Software Process Management
 - D. Forward Engineering
- 1.6 init and cron are:
- A. linux processes
 - B. DOS processes
 - C. Windows processes
 - D. None of the above.
- 1.7 The differences between constructors and destructor in C++ are
- A. constructors can take arguments but destructor can't
 - B. constructors can be overloaded but destructor can't be overloaded
 - C. both A & B
 - D. none of these
- 1.8 Use Case is a:
- A. case in case/switch statement in a programming language.
 - B. a part of use case diagram, a modeling element.
 - C. special case in legal cases in computer industry.
 - D. None of the above.
- 1.9 PATH
- A. is a system variable naming the list of directories required to be searched for finding the commands to be executed.
 - B. is a path to be followed in finding Critical Path Method in Pert/CPM techniques
 - C. is a system variable naming the list of directories required to be searched for finding a class.
 - D. None of the above.
- 1.10 When a language has the capability to produce new datatype, it is called
- A. Extensible
 - B. Overloaded
 - C. Encapsulated
 - D. Reprehensible

2 Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the "SPECIAL ANSWER SHEET" attached to the ANSWER BOOK, following instructions therein.

(1 X 10)

- 2.1 JavaScript is an old version of Java Language.
- 2.2 Maintenance stage in SDLS precedes Implementation.
- 2.3 Symbian is an operating system.
- 2.4 Hotswappable hard disks requires systems to be closed and cooled before they can be removed.
- 2.5 PHP and Perl are examples of spreadsheet packages.
- 2.6 An abstract method in Java can be declared as final.
- 2.7 The fields in a C++ program are by default private.
- 2.8 Java allows multiple inheritance directly.
- 2.9 A return code of 0 from a function is interpreted that there are errors during its execution.
- 2.10 When a variable is passed by reference to a procedure, the changes made to the variable are passed back to the calling procedure.

3 Each statement below has a blank space to be filled. Enter your choice in the "SPECIAL ANSWER SHEET" attached to the ANSWER BOOK, following instructions therein.

(1 X 10)

- 3.1 Java's multi-threading system is built upon _____ class and _____ interface.
- 3.2 The time required by a sector to reach below the read/write head _____.
- 3.3 What will be the output of the following code snippet _____.
.....
try {
int x = 0;
int y = 50/x;
System.out.println("Division by Zero is an error");
}
catch(ArithmeticException e) {
System.out.println("catch block");
}
- 3.4 In a select statement _____ clause restricts the grouped rows that appear in the result.

- 3.5 The process of mapping/initialising a disk is called _____.
- 3.6 A popular open source DBMS _____.
- 3.7 An image scanner with _____ software can translate a scanned text into text that can be edited.
- 3.7 L1, L2, L3 are types of _____ memory.
- 3.8 A BIOS routine called _____, that runs whenever the system is started to determine the functioning of various parts of the computer system.
- 3.9 $(176)_8 \rightarrow (\text{_____})_{16}$
- 3.10 HTML tag for bulleted list is _____.

PART 2
(Answer any five questions)

- 4 Write short note on
- De-fragmentation, compression and encryption
 - Open Source, Commercial Software and Freeware
 - Paging and Segmentation
 - SDLC and its stages
- (3+3+4+4)
- 5
- What do you understand by Complexity of Sorting Algorithms? Explain in the context of various sorting techniques.
 - Write Quick Sort Algorithm using pseudocode and verify your code by tracing an example.
- (5+9)
- 6
- Explain final, finally, finalise, this and super in Java Context
 - Consider the following stack, where stack is allocated $N = 6$ memory cells
STACK : AAA, DDD, EEE, FFF, GGG, _____
Describe the stack as the following operations take place:
(i) PUSH(STACK, KKK),
(ii) POP(STACK, ITEM),
(iii) PUSH(STACK, LLL),
(iv) PUSH(STACK, SSS),
(v) POP(STACK, ITEM),
(vi) PUSH(STACK, TTT)
 - What does chmod, vi and grep do in linux system?
- (5+6+3)

7

- a. What is Object Oriented Programming? Why is Java called portable or platform independent language
- b. Write a program(in Java or C++) to produce fibonacci numbers
F0, F1 given below. Should one use recursion or iteration for the above program and why?

$$F_n = \begin{cases} 0 & n=0, \\ 1 & n=1, \\ F_{n-1} + F_{n-2} & n \geq 2 \end{cases}$$

- c. What is the significance of Client-side and server-side validations?

(4+6+4)

8

- a. Let a and b denote positive integers. Suppose a function Q is defined recursively as follows

$$Q(a,b) = \begin{cases} 0 & \text{if } a < b \\ Q(a-b,b) + 1 & \text{if } b \leq a \end{cases}$$

- (i) Find the value of Q(2,3) and Q(14,3)
- (ii) What does this function do? Find Q(5861,7).
- b. Describe Method Overloading and Method Overriding.
- c. Let LIST be a linked list in memory. Write a procedure which finds the number NUM of times a given ITEM occurs in LIST

(4+4+6)

9

- a. Based on type of organization of data what are different types of DBMS? Give examples of commercially available DBMS's today.
- b. An organization conducts training programmes (courses) for its own employees. These employees are recognized in the organization by an employee code and are placed in different specialized groups called Divisions headed by HODs (who are also employees). Design a fully normalized database, clearly indicating primary key and foreign key constraints, to store following information:
Employee Name, Employee Code, Designation, Division Name, HOD Name, Course Title (Training Programme Title), Course Start Date, Course Duration etc
Write SQL statement to generate
- (i) Division wise (List of all employees in a division) with the HOD Name
- (ii) List of courses attended by a particular employee
- (iii) List of employees who have attended a particular training programme
- c. Describe ACID in the context of DBMS.

(3+7+4)
