

S.E. (Computer) (First Semester) EXAMINATION, 2009
PROGRAMMING AND PROBLEM SOLVING
(2008 COURSE)

Time : Three Hours

Maximum Marks : 100

- N.B. :—** (i) Answer *three* questions from Section I and *three* questions from Section II.
- (ii) Answers to the two Sections should be written in separate answer-books.
- (iii) Neat diagrams must be drawn wherever necessary.
- (iv) Figures to the right indicate full marks.
- (v) Assume suitable data, if necessary.

SECTION I

1. (a) What do you mean by Algorithmic solutions and Heuristic solutions ? Describe the *six* steps in problem solving. [8]
- (b) Construct a logical expression for the following policy on using a company credit card. The card may be used if the : [4]
- (i) Balance plus sales amount is less than the maximum allowable amount.
- (ii) Last payment was less than 45 days ago
- (iii) Credit card has not expired.
- (c) Is the = sign an assignment instruction or a relational operator in the following equations ? Justify your answer : [4]
- (i) $A = B + 2 + C$
- (ii) $A - B = 2 + C$.

Or

2. (a) Write short notes on the following with suitable examples : [8]

(i) Interactivity chart

(ii) Input-Processing-Output (IPO) chart.

- (b) Evaluate for $P = \text{true}$, $Q = \text{true}$, $R = \text{false}$, $S = \text{false}$: [4]

(i) $A = (P \text{ AND } Q) \text{ OR } R$

(ii) $A = Q \text{ OR } S \text{ AND } P$

(iii) $A = \text{NOT } P \text{ OR } \text{NOT } Q \text{ AND } S$

(iv) $A = P \text{ AND } \text{NOT } R \text{ OR } \text{NOT } S.$

- (c) What is the difference between an expression and an equation ? [4]

Set up an equation to calculate the following :

- (i) The number of miles given a number of feet (Use 5,280 feet per mile).
- (ii) The average of five numbers.
- (iii) The sale price of an item given an original price and a percentage discount.

3. (a) An admission charge for the cine max theater varies according to the age of the person. Complete the *six* problem-solving steps to calculate the ticket charge given the age of the person. The charges are as follows : [12]

(i) Over 55 : Rs. 50.00

(ii) 21-54 : Rs. 75.00

(iii) 13-20 : Rs. 50.00

(iv) 3-12 : Rs. 25.00

(v) Under 3 : free.

(Hint : No need to draw flowchart).

- (b) What are the major types of modules ? Explain the term coupling and cohesion related to module. [6]

Or

4. (a) Using first positive and then negative logic, write the algorithm and draw the flow-charts for the following set of conditions : [12]

Gross Salary	Tax Rate
Gross \leq 2000	1%
2000—4000	3%
4000—5000	5%
Gross $>$ 5000	8%

- (b) Distinguish between the parameter techniques a call by value and call by reference with suitable example. [6]

5. (a) Write Pseudoalgorithm to compute the sum of squares of n numbers. That is : [8]

$$S = \sum_{i=1}^n (a_i)^2.$$

- (b) Write Pseudoalgorithm to evaluate the function $\cos(X)$ as defined by the infinite series expansion : [8]

$$\cos(X) = 1 - \frac{X^2}{2!} + \frac{X^4}{4!} - \frac{X^6}{6!} + \dots$$

Or

6. (a) Design Pseudoalgorithm that converts binary numbers to octal. [8]
(b) Given an integer n devise Pseudoalgorithm that will find its smallest exact divisor other than one. [8]

SECTION II

7. (a) It is required to generate a histogram distribution for set of daily average temperature recorded in Delhi. The temperature are integer values in the range -30°C to $+10^{\circ}\text{C}$. Write Pseudoalgorithm to input n such temperatures and produce the appropriate distribution. [8]
(b) Write short notes on the following : [8]
(i) Table lookup technique
(ii) Pointer technique.

Or

8. (a) Write Pseudoalgorithm to remove all duplicate from an ordered array and contract the array accordingly. [8]
(b) Write Psuedoalgorithm for finding k^{th} smallest element. [8]

9. (a) Explain algorithm for line editing. [8]
(b) Explain algorithm for left-right justification of given text. [8]

Or

10. (a) Write Pseudoalgorithm for linear pattern search. [8]
(b) Explain the following algorithm : [8]
(i) Count number of spaces on each line for given text.
(ii) Search keyword from given text.
11. (a) Distinguish between the following terms : [9]
(i) Object and classes
(ii) Constructor and destructor
(iii) Procedure-oriented and object-oriented programming.
- (b) Can we use the same function name for a member function of a class and an outside function in the same program file ? If yes, how are they distinguished ? If no, give reasons. [3]
- (c) Define a class Distance having [6]
Data members :
 feet
 inches
Member functions
 read data()—To read values
 print()—To display values
 add()—To add two objects of Distance class
Write a main program in C++ accordingly.

Or

12. (a) Explain the following terms : [9]
- (i) Static member functions
 - (ii) Access specifier
 - (iii) Friend function.
- (b) What is the application of the scope resolution operator : : in C++ ? [3]
- (c) Write a C++ program for the following inheritance diagram : [6]

