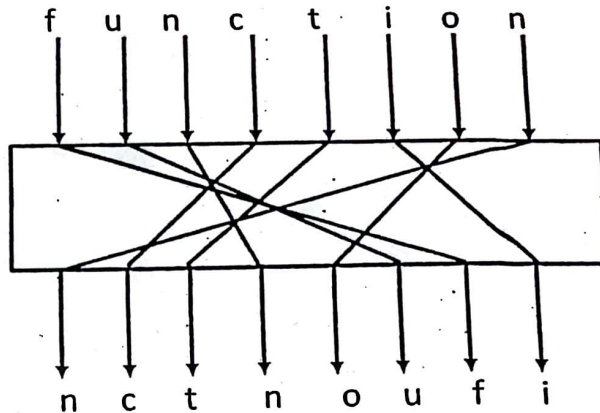


Paper Code: COE-201
 Time: 1:30 Hours

Title of the subject: Data Structures
 Max. Marks: 30

Note: Answer all questions.
 Assume suitable missing data, if any.

1. Consider following diagram to rearrange characters of 8-char array (e.g. string



"function" is converted to string "nctnoufi".

- (a) Design a suitable data structure (say 'X') and write function to perform this conversion.
 (b) Write a function to find inverse of data structure 'X' such that string "nctnoufi" is converted back to "function" using this new structure.

(4+4=8 marks)

2. There is a singly linked list containing data sorted in non-decreasing order. There are two elements in this linked list which store similar data values. Write an algorithm to delete first node (out of two-containing equal values) which contains duplicate data value.

(5 marks)

3. Write an algorithm for returning value stored in k^{th} node (from end) of the singly linked list.

(5 marks)

4. Use a stack to test for balanced parentheses, when scanning the following expressions. Only consider the parentheses $\{, \}, (,), \{, \}$. Ignore the variables and operators. Example inputs (valid balanced) are:

(a) $\{ a + \{ b / (c - d) + e / (f + g) \} - h \}$

(b) $[a \{ b + [c (d + e) - f] + g \}$

Write algorithm to test if given input string contains balanced parentheses.

(6 marks)

5. Let S be a stack of size $n \geq 1$. Starting with the empty stack, suppose we push the first n natural numbers in sequence, and then perform n pop operations. Assume that Push and pop operation take X seconds each, and Y seconds elapse between the end of one such stack operation and the start of the next operation.

- (a) For $m \geq 1$, define the stack-life of m as the time elapsed from the end of Push(m) to the start of the pop operation that removes m from S .
- (b) Compute the average stack-life of an element of this stack.

(6 marks)

Total No. of Pages: 01
3RD SEMESTER
MID SEMESTER EXAMINATION

Roll No.....
B.Tech.(CSE)
(Sept - 2019)

CO 203: Object Oriented Programming

Time: 1:30 Hours

Max. Marks: 30

Note: Answer all questions.
Assume suitable missing data, if any.

- Q 1. Differentiate between characteristics of procedure-oriented programming and object-oriented programming languages. (4)
- Q 2. List the operators that cannot be overloaded through member function and friend function. (3)
- Q 3. What is inline function? Explain situations where inline expansion may not work. (3)
- Q 4. Write a C++ program that adds two numbers belonging to different classes. Demonstrate the use of friend function in one class that is a member function of the second class. (5)
- Q 5. Write a C++ program to keep a track of number of objects created, number of objects destroyed, and number of active objects in a program. (5)
- Q 6. Explain virtual base class with suitable example. (5)
- Q 7. Write a C++ program to add two complex numbers using classes and operator overloading. (5)

CO 205 Discrete Structures

Time: 1:30 Hours

Max. Marks : 25

Note : Answer all questions.

Assume suitable missing data, if any.

Q.1 Let $P(x)$, $Q(x)$, $R(x)$ and $S(x)$ be the statements " x is a baby", " x is logical", " x is able to manage a crocodile" and " x is despised" respectively. Suppose that the domain consist of all people. Express each of these statements using quantifiers, logical connectives and $P(x)$, $Q(x)$, $R(x)$ and $S(x)$. (5)

- a) Babies are illogical.
- b) Nobody is despised who can manage a crocodile.
- c) Illogical persons are despised.
- d) Babies cannot manage crocodile.
- e) Does d) follow from a), b) and c) ? If not, is there a correct conclusion?

Q.2 [a] In a class of 100 students, 39 play Tennis, 58 play Cricket, 32 play Hockey, 10 play Cricket and Hockey, 11 play Hockey and Tennis, 13 play Tennis and Cricket. How many students play

- i. All 3 games
- ii. Just one game
- iii. Tennis and cricket and not Hockey?

[b] Find the conjunctive normal form of the function

$$f = [x \wedge (y' \vee z)] \vee z' \quad (3+2)$$

Q.3 Show that $2^n > n^3$, $n \geq 10$ using mathematical induction. (5)

Q.4 [a] In how many ways can a team of 11 cricketers be chosen from 6 bowlers, 4 wicket keepers and 11 batsmen to give a majority of batsmen if at least 4 bowlers are to be included and there is one wicket keeper.
[b] Give a recursive algorithm for finding reversal of a bit string.

(3+2)

Q.5 Find the explicit formula for the given recurrence relation with initial conditions $a_0 = 0, a_1 = 1$.

(5)

$$a_r - 7a_{r-1} + 10a_{r-2} = 2r^2 + 2$$

Total No. Of Pages 02
THIRD SEMESTER
MID SEMESTER EXAMINATION

Roll no.....
B.TECH (CO)
 September 2019

CO207 ENGINEERING ANALYSIS AND DESIGN
(MODELLING AND SIMULATION)

Time 1:30 hours

Max. Marks: 25

Note: All Questions are Compulsory. All Questions Carries Equal Marks.
Assume suitable missing data, if any:

Q1. J.M Bakers has to supply only 200 pizzas every day to their outlet situated in city bazaar. The production of pizzas varies due to the availability of raw materials and labour for which the probability distribution of production by observation made is as follows:

Production per day	196	197	198	199	200	201	202	203	204
Probability	0.06	0.09	0.10	0.16	0.20	0.21	0.08	0.07	0.03

Simulate the process for 15 days and find the average number of pizzas produced more than the requirement and the average number of shortage of pizzas supplied to the outlet. Random numbers for production per day for 15 days are 26, 45, 74, 77, 74, 51, 92, 43, 37, 29, 65, 39, 45, 95 and 93. (5)

Q2. Use Linear Congruential method to generate a sequence of 5 random numbers with given seed 27, increment 43, and constant multiplier 17, modulus 100. (5)

Q3. Write an analysis of when you feel simulation is required and when simulation is not required while evaluating real worlds system models giving an appropriate example of each. (5)

P.T.O.

- Q4. Differentiate with example
- i) Continuous and Discrete system
 - ii) Deterministic and Stochastic Simulation Models (2.5*2=5)

Q5. Explain Linear Congruential method. Write the different ways of achieving maximal period for different kinds of LCGs. (5)
