

I B.Tech Supplementary Examinations, Aug/Sep 2008

C' PROGRAMMING AND DATA STRUCTURES

(Common to Civil Engineering, Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Aeronautical Engineering and Instrumentation & Control Engineering)

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Write the various steps involved in executing a C program and illustrate it with a help of flowchart.
(b) Candidates have to score 90 or above in the IQ test to be considered eligible for taking further tests. All candidates who do not clear the IQ test are sent reject letters and others are sent call letters for further tests. Represent the logic for automating this task. [8+8]
2. (a) Distinguish between getchar and scanf functions for reading strings.
(b) Write a program to count the number of words, lines and characters in a text. [8+8]
3. (a) How to use pointers as arguments in a function? Explain through an example.
(b) Write a 'C' function using pointers to exchange the values stored in two locations in the memory. [8+8]
4. (a) What is the use of struct keyword? Explain the use of dot operator? Give an example for each.
(b) Write a C program to accept records of the different states using array of structures. The structure should contain char state, population, literary rate, and income. Display the state whose literary rate is highest and whose income is highest. [6+10]
5. (a) Distinguish between text mode and binary mode operation of a file.
(b) Write a program to open a pre-existing file and add information at the end of file. Display the contents of the file before and after appending. [4+12]
6. Write a program to convert a given postfix expression to prefix expression using stacks. [16]
7. Write a C program to insert and delete the elements from a circular doubly linked list. [16]

8. Write a C program for implementing quick sort algorithm to arrange the elements in ascending order. Demonstrate the working of quick sort algorithm for the list of integers: 40,16,23,54,36,90,7,88,66,9. [8+8]

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1. (a) What is an expression? What kind of information is represented by an expression?
(b) What is an operator? Describe several different types of operators that are included with in the C language with an example each. [8+8]
2. The annual examination is conducted for 50 students for three subjects. Write a program to read the data and determine the following:
 - (a) Total marks obtained by each student.
 - (b) The highest marks in each subject and the Roll No. of the student who secured it.
 - (c) The student who obtained the highest total marks. [5+6+5]
3. (a) What is a pointer? How is a pointer initiated? Give an example.
(b) State whether each of the following statements is true or false. Give reasons.
 - i. An integer can be added to a pointer.
 - ii. A pointer can never be subtracted from another pointer.
 - iii. When an array is passed as an argument to a function, a pointer is passed.
 - iv. Pointers can not be used as formal parameters in headers to function definitions.(c) If m and n have been declared as integers and p1 and p2 as pointers to integers, then find out the errors, if any, in the following statements.
 - i. p1 = &m;
 - ii. p2 = n;
 - iii. m=p2-p1;
 - iv. *p1 = &n; [4+6+6]
4. A company markets Hardware items. Create a structure "hwItem" that stores the title of the item, it's price, an array of three floats so that it can record the sale in rupees of a particular item for the last three months, category of the item and it's

original equipment manufacturer. Write a short program that provides facility to read N no. of items information, append new item, and displays all records. [16]

5. (a) List and explain various binary modes of opening a file.
(b) Write a C program to read a C program file and count the total number of statements in the complete input C program. [6+10]
6. What is a Circular Queue? Explain the various operations on Circular Queues with suitable algorithms. [4+12]
7. What is Circular linked list? Explain various operations on Circular linked list with algorithms. [16]
8. (a) Write a C program to merge two sorted arrays of integers.
(b) Derive the time complexity of merge sort. [8+8]

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1. (a) Describe in detail the execution of while statement with example.
(b) Given a number, write a program using while loop to reverse the digits of the number. For e.g. 12345 should be written as 54321.
(c) Write a program to compute the sum of the digits of a given integer number.
[4+6+6]
2. (a) Distinguish between formal variable and actual variable.
(b) Distinguish between local and global variable.
(c) Distinguish between call by value and call by reference. [4+4+8]
3. (a) Write a 'C' Program to compute the sum of all elements stored in an array using pointers.
(b) Write a 'C' program using pointers to determine the length of a character string. [8+8]
4. (a) What are Bit fields. What are its advantages. What is its syntax.
(b) Write a C program to store the information of vehicles. Use bit fields to store the status information. Assume the vehicle object consists of type, fuel and model member fields. Assume appropriate number of bits for each field.[8+8]
5. Write a C program to read information about the student record containing student's name, student's age and student's total marks. Write the marks of each student in an output file. [16]
6. Declare two queues of varying length in a single array. Write functions to insert and delete elements from these queues. [16]
7. Circular linked lists are usually set up with so-called list header. What is the reason for introducing such a header? Write functions to insert and delete elements for this implementation. [4+12]

8. (a) By hand, trace the action of **heap sort** on the following lists. Draw the initial tree to which the list corresponds. Show how it is converted into heap and show how the resulting heap as each entry is removed from the top and the new entry inserted.
- 12 20 34 27 30 36 23
- (b) Discuss the advantages and disadvantage of all sorting techniques with example. [8+8]

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1. (a) What is the conditional operator. What is its general syntax.
(b) Write a C program to find the largest of three input numbers using conditional operator. [8+8]
2. (a) What do you mean by functions? Give the structure of the functions and explain about the arguments and their return values.
(b) Write a C program that uses a function to sort an array of integers. [8+8]
3. (a) Write a 'C' Program to compute the sum of all elements stored in an array using pointers.
(b) Write a 'C' program using pointers to determine the length of a character string. [8+8]
4. Write a C program which generates array of structures, each structure represents an "item" which contains item code, item name, stock in hand, unit price. Read n items information from the keyboard. Given item code and quantity to be purchased. Calculate and point total price along with other details. [4+6+6]
5. Write a program to read a C program file and count the following in the complete C program
(a) Total number of statements
(b) Total number of opening brackets. [8+8]
6. What is a stack? Explain two different representations of a stack. List the operations performed on a stack and write functions for implementing these operations. [16]
7. Write a function in 'C' to remove duplicate elements in a singly linked list. [16]
8. (a) Write an algorithm to sort n numbers in ascending order using merge sort.
(b) Derive the time complexity of merge sort. [8+8]
