Code.No: 09A1EC01 | R09 | SET-1

I B.TECH – EXAMINATIONS, JUNE - 2011
COMPUTER PROGRAMMING AND DATA STRUCTURES
(COMMON TO CE, EEE, ME, ECE, CSE, CHEM, EIE, BME, AE, AME, BT, ECOMPE, ETM, IT, ICE, MCT, MMT, MIE, MIM)

Time: 3hours **Max.Marks:75**

Answer any FIVE questions
All questions carry equal marks

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1.a) What is an algorithm? Write an algorithm to read five integers and find out if the values are in ascending order.
b) Draw a flow chart to read ten integer values and print the sum of squares of the values. [8+7]

2.a) Write minimal C expressions for the following:
i) $2x^4 + 3x^3 - 4x^2 + 7x - 10$
ii) Digit at the 10's place of the given positive integer x (for example, digit at the 10's place in 3458 is 5)
iii) True if the given positive integer x is odd, false otherwise
iv) Add x to y, and then decrement x
v) True if 5 <= a <= 10, false otherwise
vi) Fourth bit from the right if the number x is treated in binary representation.
b) Write a complete C Program to print all the prime numbers between 1 and n. Where 'n' is the value supplied by the user. [6+9]

3.a) Explain the following storage classes with examples: auto, register, extern.
b) Explain how two dimensional arrays can be used to represent matrices. Write C code to perform matrix addition and matrix multiplication. [6+9]

4.a) Consider the function *maxpos* that has two parameters: *int maxpos(int arr[], int n)* *n* is greater than or equal to 1, but less than or equal to the size of the array *arr*. Code the function *maxpos* to return the position of the first maximum value among the first *n* elements of the array *arr*.
b) What are command line arguments? Illustrate their use with a simple C program. [9+6]

5. Explain the following with examples:
a) Nested structures b) Array of structures c) Unions. [5+5+5]

6.a) List and explain the Streams functions for text files along with their prototypes.
b) Write a complete C program to copy data from one file to another file. The name of the source file and the name of the destination file are supplied by the user. [6+9]

7.a) Explain bubble sort with the algorithm or a C program.
b) Illustrate the results of bubble sort for each pass, for the following initial array of elements: 68 67 99 33 122 200 [9+6]

8.a) Explain what is stack and the operations performed on stack.
b) Explain how a stack be implemented using arrays. [7+8]

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Time: 3hours **Max.Marks:75**

Answer any FIVE questions
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1.a) What is an algorithm? Write an algorithm to find out if a given number is a prime.
b) Draw a flow chart to read ten positive integers and print how many are multiples of 7. [8+7]

2.a) Write minimal C expressions for the following:
i) $3x^4 + x^3 - 4x^2 + 7x$
ii) Maximum of the values of three variables a, b and c
iii) Digit at the 100's place of the given positive integer x (for example, digit at the 100's place in 3458 is 4)
iv) True if the given positive integer x is even, false otherwise
v) Increment x, and then add to z
vi) True if the given positive integer x is a multiple of 3 and 7, false otherwise.
b) What are the bitwise operators in C? Explain the same with examples. [6+9]

3.a) What is recursion? Write a complete C program that reads a positive integer, calculate the factorial of the number using recursion, and print the result.
b) Explain the facilities provided by the C preprocessor with examples. [8+7]

4.a) Write a complete C program that reads a string and prints if it is a palindrome or not.
b) Explain about memory allocation functions in C. [8+7]

5. Explain the following with examples:
a) Pointers to structures b) Self referential structures c) Unions. [5+5+5]

6.a) Explain the different modes that can be provided as a parameter to the *fopen( )* function.
b) Write a complete C program for the following: There are two input files named "first.dat" and "second.dat". The files are to be merged. That is, copy the content of "first.dat" and then the content of "second.dat" to a new file named "result.dat". [6+9]

7.a) Write a C program or algorithm to sort an array of integers in ascending order using insertion sort.
b) Illustrate the results of insertion sort for each pass, for the following initial array of elements: 68 57 99 33 122 200 [9+6]

8. What is a singly linked list? Explain with C code how the insertion, deletion and searching operations are performed on a singly linked list**.** [15]

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Time: 3hours **Max.Marks:75**

Answer any FIVE questions
All questions carry equal marks

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1.a) Write an algorithm to find out all the factors of a given positive integer.
b) What is a flow chart? Draw a flow chart to read ten integers and print the sum of squares of all ten values. [8+7]

2.a) Write minimal C expressions for the following:
i) $x^3 - 4x^2 + 7x - 12$
ii) Absolute value of (a-b)
iii) Remainder when unsigned integer variable x is divided by 8, using bitwise operators.
iv) True if the given positive integer x is even and is also a multiple of 7, false otherwise.
v) Minimum of the values of three variables a, b and c.
vi) True if the given character variable c represents a numeral (that is '0'...'9'), false otherwise.
b) Write a complete C program that reads a value in the range 1 to 12 and print the name of that month and the next month: Print error for any other input value. (For example, print “May followed by June” if the input is 5. Note that December is followed by January**).** [6+9]

3.a) What is recursion? Write a complete C program that reads a positive integer N, compute the first N Fibonacci numbers using recursion and print the results. Illustrate how the results are computed when the value of N is 4?
b) Explain how matrices can be represented using two dimensional arrays. Explain with code how Transpose of a matrix can be done. [8+7]

4.a) Write a complete C program that displays the position or index in the string S where the string T begins. The program displays -1 if S does not contain T. For example, if S is “information processing” and T is “process”, the value displayed is 12. The strings S and T are supplied by the user.
b) Explain the following:
i) Array of pointers
ii) Malloc function. [9+6]

5. Explain the following with examples:
a) Self referential structures
b) Typedef
c) Enumerated types. [5+5+5]

6.a) Explain what is a text file and what is a binary file.
b) Write a complete C program for finding the number of words in the given text file. Assume that the words are separated by blanks or tabs. [6+9]

7.a) Write an algorithm or C program for sorting integers in ascending order using selection sort.

b) Illustrate the results for each pass of selection sort, for the following the initial array of elements: 23 78 45 8 32 56 [9+6]

8. Explain what is a queue and operations performed on queue**.** Provide C code for the same. [15]

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Time: 3hours **Max.Marks:75**

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1.a) Write an algorithm to read ten positive integers and find out how many are perfect squares (such as 49, 81). You may assume that the input values read are in the range 1 to 10000.

b) List the various steps in software development**.** [8+7]

2.a) Write minimal C expressions for the following:

i) $x^3 - 3x^2 + 3x - 1$

ii) Digit at the 10's place of the given positive integer x (for example, digit at the 10's place in 3458 is 5)

iii) True if the given positive integer x is a multiple of both 17 and 11, false otherwise.

iv) Remainder when unsigned integer variable x is divided by 8, using bitwise operators.

v) True if $25 > a \geq 10$, false otherwise

vi) Second bit from the right if the number x is treated in binary representation.

b) Write a complete C Program to read ten integers and find:

(i) The number of even integers and their sum, and

(ii) The number of odd integers and their sum. [6+9]

3.a) Write a complete C program to perform these functions:

(i) to return the factorial of the given number using recursion, and

(ii) to return the factorial of the given number using iteration.

b) Write a complete C program to do the following: Read data to fill a two dimensional array *int table [4] [4]*. Then print the sum of each column and sum of each row. [8+7]

4.a) Write the C function *int minpos (float x[], int n)* that returns the position of the first minimum value among the first *n* elements of the given array *x*.

b) Explain the use of functions *strcpy ( )* and *strcmp ( )* [9+6]

5.a) Explain how complex numbers can be represented using structures. Write two C functions: one to return the sum of two complex numbers passed as parameters, and another to return the product of two complex numbers passed as parameters.

b) Explain the following with examples:

i) Enumerated types ii) Unions. [9+6]

6. Write a complete C program to reverse the first *n* characters in a file. The file name and the value *n* are specified on the command line. Incorporate validation of arguments: that is, the program should check that the number of arguments passed and also the value of *n* are meaningful. [15]

7.a) Write an algorithm or program for binary search to find a given integer in an array of integers.

b) Illustrate the results of bubble sort for each pass, for the following initial array of elements: 44 36 57 19 25 89 28 [8+7]

8.a) Explain the properties of the abstract data structure stack.

b) Explain the algorithm to convert infix expression to postfix expression**.** [7+8]

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