Course No.	:	TA UC252
Course Name	:	Computer Programming – II
Component	:	Comprehensive Examination (Closed Book)
Date of Examination	:	26/12/2007
Weightage	:	40 % (40 Marks)
Duration	:	3 Hours

Sections: A, B, C & D

No. of Pages: 4

Note: 1. Use separate Answer Book for each Section. **Use the Main Answer book for Section A, and separate additional answer sheets for Section B, C, and D.**

    2. Read the instruction given in the answer book carefully, and fill up the front page of each answer book.

    3. Answer all the Questions in each section.

SECTION – A

1. Point out the errors, if any, from the following: (2 Marks)

    (a)
```
# include " stdio.h"
main ( )
{
    FILE *fp ;
        Char c;
        fp=fopen("try.c","r");
        if(fp= =null)
            {
            puts("cannot open file");
            exit();
            }
        while((c=getc(fp))!=EOF)
        putch(c);
        fclose(fp);
}
```

2. Answer the following: (each ½ Mark)

    (a) The macro FILE is defined in which of the following files:

        stdlib.h
        stdio.c
        io.h
        stdio.h

    (b) On opening a file for reading which of the following activities are performed

        1. The disk is searched for existence of the file
        2. the file is brought into memory
        3. A pointer is set up which points to the first character in the file
        4. All the above

3. While using the statement   (each ½ Mark)

        fp=fopen(" myfile.c", " r");

    What happens if,

        ' myfile.c ' does not exists on the disk

'myfile.c' exists on the disk

4. State whether True or False.   (each ½ Mark)
   a) A STACK is a data structure that exhibits a FIFO(first in first out) property.
   b) One of the important applications of a stack is in the implementation recursion in the programming language
   c) When the size of the stack/queue is not known beforehand then the array implementation can be used & is more efficient
   d) If a file is opened for reading it is necessary that the file must exist

5. Fill in the blanks.   (1 Mark)
   The operations' that are permitted to manipulate a stack are_____ & _____, and the operations that are permitted to manipulate a queue are _____ & _____

6. Two files Data1 and Data2 contains sorted list of integers. Write a program to produce the third file DATA which holds a single sorted, merged list of these two lists.   (2 Marks)

SECTION – B

1. A hash table is used to store the strings " TOM" , " ANN" , "JOHN" .The hash function used is the sum of the ASCII value of the individual characters that make up the string mod the size of the table (which is assumed to be 12).
   a. Construct the hash table   (2 Marks)
   b. Show the effect of inserting another string with hash values of 3 into the table using collision resolution technique. Explain the method used.   (1 Mark)
   Note : ASCII value of A = 65
           ASCII value of B = 66
           ASCII value of C = 67

           ASCII value of Z = 90

2. Give the recursive solution for Binary search.   (2 Marks)
3. Compare the organization of data and functions in Object Oriented Programming and Procedure Oriented Programming with appropriate diagrams.   (2 Marks)
4. State True or False   (each ½ Mark)
   a. One problem with OOP is that once a class is created it can never be changed
   b. Polymorphism is extensively used in implementing inheritance
   c. Some programs/problems can only be solved by recursion
   d. Recursion can be used to solve all programs/problems.

5. Give an example of a searching or sorting technique with the given order.   (each ½ mark)
   a. O(log n)
   b. O(n)

SECTION – C

1. Find the output of the following C program:-   (½ Mark)
```
   main()
   {
      printf(5+"Fascimile");
   }
```

2. In the following C program segment complete line number 4 to find the length of the array **arr[]** dynamically.   (1Mark)

	Line nos.
main()	1
{	2

2

```
    int arr[] = { 3,4,65,78,1,2,4};          3
    int length = _____ ;         4
}                                            5
```

3. State whether the following are true or false.   (each ½ Mark)
   a) Cast to malloc() required always in C.
   b) Pointers cannot be used on bit fields to access them.
   c)The size of a union is equal to the sum of the size of all its members.
   d)Always the largest member of a union can be initialized

4. Define a structure data type using bit fields to store the following data about an employee. Each employee can: (2 Marks)
   a. be male or female
   b. be single, married, divorced or widowed.
   c. Have one of the 8 different hobbies.
   d. Can choose from any of the 15 different schemes proposed by the company to pursue his/her hobby

5. Find the output of the following program   (½ * 6 = 3 Marks)

```
#include<stdio.h>
int data[2] = {100,200};
int moredata[2]={300,400};
main()
{
  int *p1, *p2, *p3;
  p1 = p2  = data;
  p3 = moredata;
  printf(" *p1++ =  %d, *++p2 = %d, (*p3)++ = %d\n", *p1++, *++p2,
  (*p3)++);
  printf(" *p1 =  %d, *p2 = %d, *p3 = %d\n", *p1, *p2,*p3);
}
```

6. Given the following declaration in C   (1 Mark)

```
struct book{
        float acc;
        char author[40];
        float value;
        };
struct book gift = {  .author = "BALAGURUSWAMY",
                  0.25};
struct book *b = &gift;
```

   Which of the following is true?
   a. b->acc = 0.25;
   b. b->value = 0.25;

7. Given the following declaration in C   (½ Mark)

```
#define LEN 20
struct names{
        char first[LEN];
        char last[LEN];
        };
```

Give an alternative declaration for the structure data type **names**, which declares its members as pointers with same name
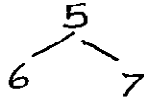
1. True or False, and Justify.   (each ½ Mark)
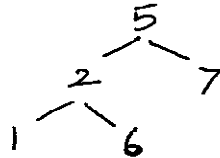   a) A preorder traversal of a binary search tree will output the values in sorted order.
   b) examine the tree to determine if it meets the requirement to be a binary search tree:
   i)

```
       5
      / \
     6   7
```

   ii)

```
         5
        / \
       2   7
      / \
     1   6
```

2. Give a binary tree with 5 nodes 0, 1, 2, 3 and 4 whose inorder and postorder sequences are the same. How many such trees with 5 nodes can be constructed satisfying the condition whose inorder and postorder sequences are same and give the tree.   (1 ½ Mark)

3. Under what condition the node 75 can be deleted, what will be the element replaces the position of the element 75? Justify your answer properly to get the full marks.   (2 Marks)

```
      50
        \
        75  ← To be deleted
       /  \
     62    87
          /  \
        77    93
          \
          79
```
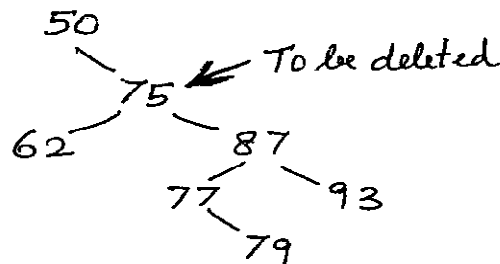
4. For the tree sketched above, identify or answer each of the following :   (2 ½ Marks)
   a) internal nodes
   b) ancestor of G
   c) ancestor of A
   d) left sub tree of B
   e) children of A

```
          A
         / \
        B   C
         \   \
          D   E
         /   / \
        F   G   H
           /     \
          I       J
```
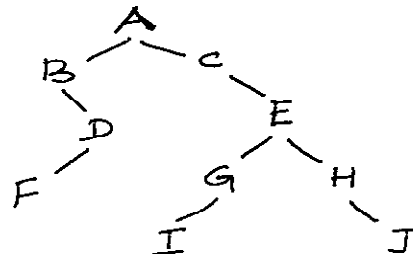
5. Write a count function that counts the number of times a given integer number occurs in a list. Assuming your own structure for the linked list.   (2 Marks)

6. Write a program to implement the stack operation like addition of integers and deletion of integers using linked list.   (1 ½ Mark)

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Course Name	:	TA UC252 – Computer Programming – II
Component Name	:	Test – II (Open Book)
Date of Component	:	18-11-2007, Sunday
Duration	:	50 mins
Weightage	:	20 % (20 Marks)

Note: Answer the questions sequentially.

Only Text Book: "Programming in ANSI C" – by Balagurusamy and Reference Book: "How to solve it by Computer" by Dromey are allowed for Open Book test Component.

Section – A

1. Write a program that compares 2 files and returns 0 if they are equal and 1 if they are not.

   (3 Marks)

2. Distinguish between getc and getchar.   2 Marks)

3. Files are always referred to by name in C program. (T / F)   1 Mark)

Section – B

1. Give the primary difference between the memory created by the given two dynamic memory allocation instructions.

   ```
   int *ptr;
   ptr = (int * ) malloc ( 5* sizeof(int));
   ptr = (int * ) calloc(5, sizeof(int));
   ```
   (½ Mark)

2. Give the instructions which could do the equivalent operation using dynamic memory allocation.
   ```
   int a[5] = { 1,2,3,4,5};
   ```
   ( 1 Mark )

3. Write a program to create three arrays using dynamic memory allocation and to compute the difference of the first two arrays and store the difference in the third array. ( 2 ½ Marks )

## Section - C

1. Identify the data structure used in the following operations and also mentioned the five steps involved in the data structure operations mentioned below, from (a) to (b).



1
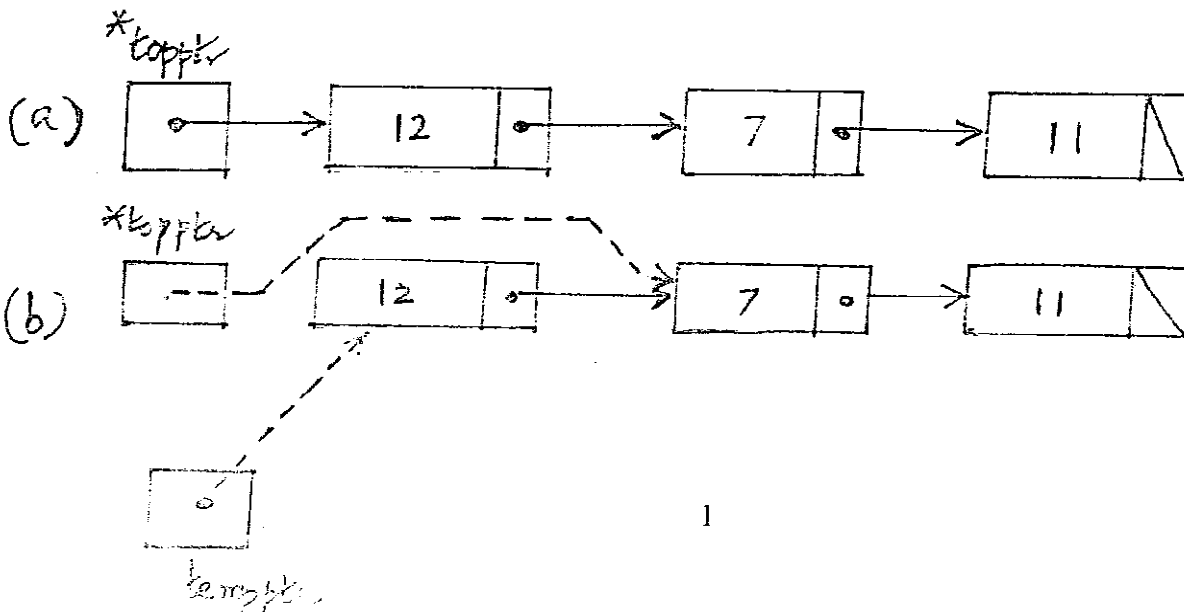
2. For the given expression, show the final result stored in the stack by showing the step by step process of the adding data items into the stack. Finally where the result will be stored in the stack, if the stack size is 10. The expression is as follows: 1+2*4+3.          ( 1 ½ Mark )

3. What are the differences between a linked list and stack based the insertion and deletion of data items.          ( ½ Mark )
4. The content shown below represents the data items stored in the array memory after the some addition and removal of the data items. On seeing the content, give the operations involved in each processes of storing and removal of the data items and also mention what type of linear data structure it represents?          ( 1 Mark )

| Operations | Contents | |
|---|---|---|
| \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* | \*\*\*\*\*\*\*\*\*\*\* | |
| _____ | z | |
| _____ | mz | |
| _____ | cmz | |
| _____ | cm | z is removed |
| _____ | kcm | |
| _____ | kc | m is removed |
| _____ | ekc | |
| _____ | gekc | |
| _____ | gek | c is removed |

## Section – D

1. State whether the following is true or false.
   Objects in linked list are stored in memory contiguously _____          ( 1 Mark )
2. Give a suitable definition for representing a node in a doubly linked list using C language with explanation.          ( 1 Mark )
3. A singly linked list is created using the following declarations and variables.          ( 2 Marks )
   a. A structure data type called **node** is used to represent each node of the linked list.
   ```
   struct node
   {
     int data;
     struct node *next;
   };
   ```
   b. **first** is a pointer to the first node of the linked list.
   c. The linked list has **n** number of nodes.
   d. All declarations are global.
   Define a function count() to count the number of nodes in the linked list which are positive, negative and zero. Display the result in the function itself.
4. A queue is implemented as a linked list, with its pointers initialized to NULL.

Show diagrammatically the status of the queue in terms of its pointers after each of the following operations.

Add an item 5 to queue.

Add an item 4 to queue.

Delete from queue. Mention the item deleted also.                    ( 1 Mark )

5.  Given the following C program segment, complete line numbers 14 and 15 with suitable C statements , to get the following infinite output                    ( 1 Mark )

10

20

10

20

10

20

...

...

| The incomplete program is | Line number |
|---|---|
| #include<stdio.h> | 1 |
| main() | 2 |
| { | 3 |
| struct node | 4 |
| { | 5 |
| int data; | 6 |
| struct node *next; | 7 |
| }; | 8 |
| struct node *p, *q; | 9 |
| p = (node*) malloc(sizeof(struct node)); | 10 |
| q = (node*) malloc(sizeof(struct node)); | 11 |
| p->data = 10; | 12 |
| q->data = 20; | 13 |
| p->next = ____; | 14 |
| q->next = ____; | 15 |
| while(p != NULL) | 16 |
| { | 17 |
| printf("%d\n",p->data); | 18 |
| p = p->next; | 19 |
| } | 20 |
| } | 21 |

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| | | |
|---|---|---|
| Course Name | : | TA UC252 – Computer Programming – II |
| Component Name | : | Test – I (Closed Book) |
| Date of Component | : | 30-09-2007, Sunday |
| Duration | : | 50 mins |
| Weightage | : | 25 Marks |

Note: Answer the questions sequentially, questions answered out of sequence will not be evaluated.
Read the instructions from the cover page of the main answer book.

## Section – A

1. Given a structure                                                                          (0.5 Mark)

```
struct complex {
        float imag;
        float real;
}a,b;
```

   Give an equivalent statement which does the given operation
   a = b;

2. Which of the following is a properly defined structure?   (0.5 Mark)
   a. struct { int a; }

   b. struct a_struct { int a ; }

   c. struct a_struct int a;

   d. struct a_struct { int a;};

3. Write a C program to store details of 50 customers in a structure. Write separate functions to perform each of the following operations a. Open an account   b. Deposit an amount in the account   c. Withdraw an amount from the account. The details to be stored in the structure include Customer Name, Account No, Type of account (Savings, Current) Date of Opening account, balance.

   (3 Marks)

4. Bit fields can be any one of the following data types _____ , _____
   and _____.   (3 * ¼ = 0.75 Mark)

5. Create a structure to store details of an employee using minimum number of memory locations (Use bit fields where ever appropriate). The details to be stored include employee name, id _ no, age, number of years of service, date of joining. Clearly indicate any approximations made. Using a figure show how this structure is stored in memory.   (1.25 Mark)

6. Write a program to calculate the subject-wise and student-wise total and store them in a part of structure.   (4 Marks)
7. How are the members in the structure accessed?   (1 Mark)
8. State whether the statement given below are true or false: (2 * ½ = 1 Mark)
   i) We can initialize individual members inside the structure template.
   ii) The order of values enclosed in braces must match the order of members in the structure definition.

Section – B

1. State whether the statement given below is True or False. If your answer is False, justify it.

   i) The number of bytes used to store a union must be at least enough to hold the largest member.

   ii) Referencing with the wrong type data stored in a union with a different type is a logic error.

   iii) Two unions can be compared (using = =) to determine if they are equal.

   iv) Pointer increases the computation time and complexity of the program.

   v) Data tables and arrays are not handled efficiently using pointer.

   vi) Pointer provides an efficient tool for manipulating dynamics data structures such as linked list, trees.

2. Explain the following in one or two lines with examples.   (3 * ¼ = 0.75 Mark)

   i) Pointer constant

   ii) Pointer Value

   iii) Pointer variables

3. Answer the following with a single C statement.   (2 * ½ = 1 Mark)

   i) Declare a pointer **nptr** that points to an object of type **float.**

   ii) Give the statement that assign the starting address of array **Number** to the pointer variable **Id_No.**

4. Give the line by line comments for the following program segment.   (0.75 Marks)

   ```
   int x, *p, y;
   x=10;
   p=&x;
   y=*p;
   *p=20;
   ```

5. Find the error in the program segment. If you find error, justify it.   (0.75 Mark)
   ```
   union values {
      char w;
      float x;
      double y;
   } v = {1.2789};
   ```

6. Find the output for the following coding given below: (0.75 Mark)
   ```
   #include<stdio.h>
   union numbers{
      int x;
   ```

```
        double y;
    };
int main( )
    {
    union numbers value;
    value . x = 100;
    printf("%s \n %s\n %s %d \n %s %f \n\n",
        "Put a value in the Integer Member",
        " and Print both membes",
        " int :     ", value.x,
        " double   : \n", value.y);
    value . y = 100.00;
    return 0;
    }
```

Section C

1. Given the following C program segment   (1 Mark)
   ```
   char *p1;
   int *p2;
   ```
   State whether the following assignments and comparisons are valid or invalid.
   a.   p2 = 0;
   b.   p2 = p1;
   c.   p1 = (char *) p2;
   d.   if (p2 == 0)

   ------

2. Write the output of the following program   (1 Mark)
   ```
   #include<stdio.h>
   main()
   {
     int *var;
     int a = 100;
     var = &a;
     printf("%d\n",(*var)++);
     printf("%d\n",*var);
   }
   ```

3. Write the output of the following program   (2 Mark)
   ```
   #include<stdio.h>
   main()
   {
     int i, j=25;
     int *pi, *pj = &j;
     *pj = j + 5;
     printf("%d\n",*pj);
     i = *pj + 5;
     printf("%d\n",i);
   ```

```
pi = pj;
*pi = i + j;
printf("%d\n", *pi);
printf("%d",j);
}
```

4. Identify errors if any in the following program. If there is no error write the output. If there is an error, identify it and write the debugged program. (0.5 Mark)

```
#include<stdio.h>
struct complex
{
  float real;
  float imag;
};

main()
{
  struct complex *ptr;
  ptr->real = 23.5;
  ptr->imag = 34.5;
  printf("%f\n",ptr->real);
  printf("%f\n",ptr->imag);
}
```

5. Define a structure data type called **record** with the following members:

won   : integer
lost   : integer
percentage   : floating point   (0.25 Mark)

Define a structure data type called **t** with the following members:

A 40 element character array called **name**

A structure named stats of type **record**.

Declare a structure variable called **team** of type t.   (0.25 Mark)

Declare a pointer variable called **pt** which is a pointer to a structure of type **t**.

Write expressions to access each member and sub-member within the structure through the structure pointer **pt**.   (0.5 Mark)

6. Write suitable structure definition statements to represent the following data structure.

                                                       (0.5 Mark)

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