

Computer Programming - II TA C 252 (II year)  
Comprehensive Examination(Closed Book)

Duration : 3 hours

Weightage : 40%

24.12.09

MAX : 120 Marks

- Note: 1. Answer the questions sequentially, questions answered out of sequence will not be evaluated.  
2. Do not write full program unless asked for in the question.  
3. Read the instructions from the cover page of the main answer book.

PART – A

1. Modify the program to make it efficient. (5M)

```
x = 0;
for(i=1;i<10;i++)
{
    x = x + 1;
    y = (b*b*b) – (4*a*c);
}
```

where a, b, c are constants.

2. Suppose STACK is allocated 6 memory locations and initially stack is empty (Top=0). Give the output of the program segment. (3M)

p = 6, q = 5;

```
push(STACK, p+1);
push(STACK, p);
push(STACK, q);
push(STACK, q+5);
push(STACK, p+q);
while (Top > 0)
{
    pop(STACK, ITEM);
    printf("%d",ITEM);
}
```

3. QUEUE is a queue with 6 memory locations and with FRONT = 2, REAR = 5.

QUEUE : \_\_\_\_\_, UK, India, UAE, China, \_\_\_\_\_

where \_\_\_\_\_ denotes empty locations. The index locations start from 1. Diagrammatically display the queue including FRONT and REAR as the following operations take place:

- a. USA is added

- c. From the tree obtained in b, Draw the tree after the deletion of the data element 4. (1M)
- d. From the tree obtained in b, Draw the tree after the deletion of data element 1. (1M)

### PART - B

9. Write a program to read two complex numbers and find their sum and difference using the following specifications :
- use a structure data type to represent the complex numbers.
  - write a menu – driven program using functions to find the sum and difference. Functions have to be defined with suitable (actual/formal) arguments. (8M)
10. When should we use a union type component inside a structure variable? (2M)
11. Write a single program statement in C to write an array of 10 integers into a binary file.  
[Note : Assume the array name is **marks** and the file pointer is **bp**] (4M)
12. Write a C program to create a binary file with only the even integers from 1 to 100. (8M)
13. List any two benefits of a well-designed program. (2M)
14. What are latent errors? Give an example of it. (3M)
15. For the following data sets: (8M)
- a) Data1: 3 8 14 18 20 35 39 41
  - b) Data2: 41 39 35 20 18 14 8 3
  - c) Data3: 18 3 41 35 8 14 20 39
- show with detailed steps the implementation of sorting by insertion. Also obtain for each of the three data sets, the number of
- 1) comparisons
  - 2) exchanges
  - 3) shifts, inserts (Hint : This is required by the definition of insertion sort algorithm.)
16. For the following data set: 18 3 41 35 8 39 20 14, show the tree created for sorting by partitioning (Quicksort). Identify the pivot [partitioning element] chosen for each list in each level of the tree. (4M)

```

b)main( )
{
  struct country
  {
  char ch[7];
  char *str;
  };
  struct country s1={"DUBAI", "INDIA" };
  printf (" \n %c %c ",s1.ch[0],*s1.str);
  printf("\n %s %s ", s1.ch,s1.str);
  }

```

19. Mention the 3 cases to Delete a node from the queue (3M)  
(program and function not required)

20. Mention 3 applications of Stacks. (3M)

21. What is Object Oriented Programming. Mention 3 points on (5M)  
i)Object  
ii)Class  
iii)Polymorphism

22. If a linked list contains three nodes with values "ALL", "THE", and "BEST",  
And hp is a pointer to the list head, Assume the data component of node type  
pro\_node\_t is pronoun, the link component is nextp, and np and mp are pointer  
variables, what will be the effect of the following statement

a) np = hp->nextp;  
strcpy(np ->pronoun, "COMPUTER-PROGRAMMING"); (5M)

b) np = hp;  
hp = (pro\_node\_t \*)malloc(sizeof(pro\_node\_t));  
strcpy( hp->pronoun, "bestwishes" );  
hp->nextp = np; (5M)

23. What is Doubly Linked List. Give the pictorial representation of doubly linked list  
with 4 nodes. (2M)

Best of Luck  
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**BITS PILANI – DUBAI**  
International Academic City, Dubai  
First Semester 2009 – 2010  
Computer Programming - II TA C 252 ( II year )  
Test – II (Open Book)

No. of Questions : 12 No. of Pages : 3
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Duration : 50 minutes

Weightage : 20%

06.12.09

MAX : 60 Marks

- Note: 1. Answer the questions sequentially.  
2. Only Prescribed Text Book and Handwritten Class Notes are allowed.  
3. Do not write full program unless asked for in the question.

**PART – A**

1. What will be the output of the following program: (3M)

```
main()
{
    int i = -5, j = -2;
    junk(i,&j);
    printf("\ni = %d j = %d", i , j);
}
junk(int i, int *j)
{
    i = i * i;
    *j = *j * *j;
}
```

2. In the following program add a statement in the function **fun()** such that address of **a** gets stored in **j**. (4M)

```
main()
{
    int *j;
    void fun(int **);

    fun(&j);
}
void fun(int **k)
{
    int a = 10;
    /* add statement here */
}
```

3. a. Build the hash table for the given array using mod 11; indicating collisions. (4M)  
30, 31, 39, 42, 44, 45, 49, 57, 60
- b. Find the average number of steps needed to locate a single element for the above given data. (4M)

### PART – B

4. The following functions related to singly linked lists have been studied. (6M)

- i. append( )
- ii. addatbeg( )
- iii. addafter( )

The addafter() function adds an element, q in the location specified as an integer (loc). Write a function, addafterelement(), that inserts an element, q, in the singly linked list after an element, r. *There is no need to write the main method that calls this function.*

### PART – C

5. Write two differences between malloc() and calloc(). (4M)

6. For a binary search tree, the results of its three traversals are known. Name the traversals that identify the root node of the tree. (3M)

7. The results of traversals on a binary search tree are: (3 + 2 + 3M)

Inorder : 1 2 3 4 5 6 7 8 9  
Postorder : 1 3 5 4 2 8 7 9 6

- a) What is the inorder successor of node 7?
- b) What is the root node of the tree ?
- c) Identify the nodes in the left subtree and nodes in the right subtree of the root node.

### PART – D

8. Each node of a stack contains the following information, in addition to the required pointer field,

- a) Pin code of the city
- b) Name of the city

Give the structure of the node for the linked stack in question. (2M)

TOP is a pointer that points to the topmost node of the STACK, Write the following functions.

- 1) PUSH ( ) - to push a node into the stack, which is allocated dynamically (2M)
- 2) POP ( ) - to remove a node from the stack, and release the memory (2M)

(Complete program not needed)

9. Give the necessary declaration of a linked list implemented queue containing float type numbers, also write a user defined function to delete a float type number from the queue. (Complete program not needed) (6M)

10. Consider a Circular Queue with 7 memory locations, show the status of the queue after each of the following operations

- 1) P, Q inserted
- 2) R inserted
- 3) An element deleted
- 4) S, T, U inserted
- 5) 2 elements deleted
- 6) W inserted

(0.5x6=3M)

### PART - E

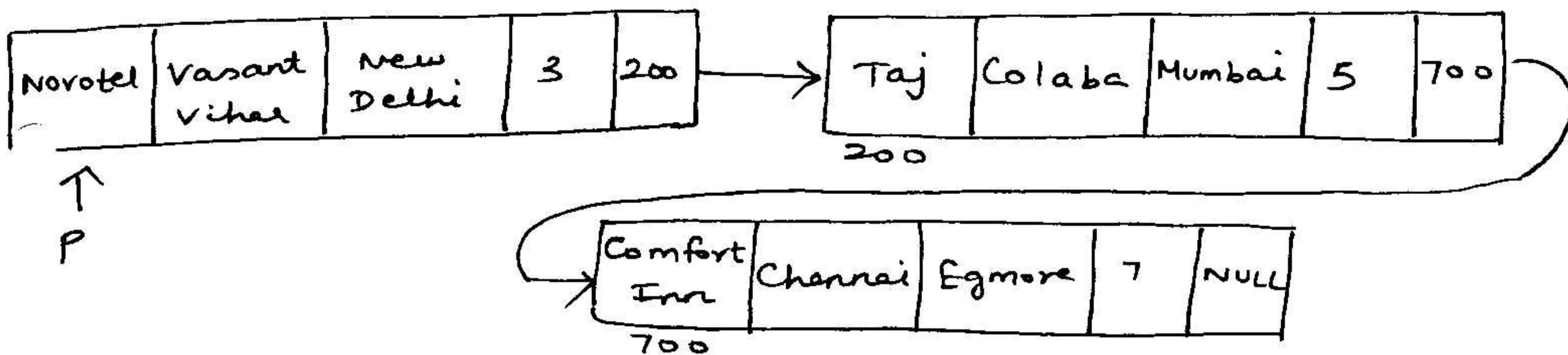
11. The given structure definition defines a structure which holds details of hotels in a city.

```
struct hotel {
    char name[30];
    char location [50];
    char city [20];
    int rating;
    struct hotel * next};
```

Given the following linked list , with the pointer p indicating a pointer to the first node , indicate the values of each of the following. Note that the number at the end of each node is the address of the first location of the next node. Refer to figure.

- a. p -> city
- b. p -> next
- c. p -> next -> city
- d. p -> next -> next

(4M)



12. Given a linked list which contains both positive and negative integers, write a function to compute and display the sum, average of only the positive elements in the given linked list which contains n nodes. (Complete program not needed) (5M)

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**BITS PILANI – DUBAI**  
**International Academic City, Dubai**  
**First Semester 2009 – 2010**  
**Computer Programming - II TA C 252 ( II year )**  
**Test – 1 (Closed Book)**

**Duration : 50 minutes**  
**11.10.09**

**Weightage : 25%**  
**MAX : 75 Marks**

**Note: Answer the questions sequentially.**

**PART – A**

1. Given the following declarations and definitions,

```
typedef struct {  
    char f_name[20];  
    char l_name[20];  
    int score;  
    char grade;  
}student_t;
```

```
-----  
student_t stu1, stu2;
```

Identify the data type of each of the following references

(4 X 3 = 12 M)

1. stu1
2. stu2.score
3. stu2.f\_name[3]
4. stu1.grade

2. Using the declarations and definitions given in the previous question

- a. How the two structure variables **stu1** and **stu2** can be compared for equality. (2M)
- b. Write the declaration statement of function **compare**, which takes **stu1** and **stu2** as arguments and returns 0, if the two are same and -1 otherwise. Assume **student\_t** is defined globally. (4 M)

**PART - B**

3. Given the series of instructions

```
push ( stack,"GB");  
push( stack, "DE");  
push ( stack , "FR");  
push (stack,"ES");  
display(stack);  
pop(stack);  
display(stack);
```

```
pop(stack);
push( stack,"IE");
display (stack);
```

Where push, pop and display are functions which work on an array called stack. The function push pushes the specified string onto the stack, the function pop pop's an element from the stack and the function display displays the contents of the stack starting with the data in the top of the stack. Show the status of the stack with each display instruction. 3M

4. Text editors always allow some character ( for example , backspace) to serve as an erase character, which has the effect of canceling the previous uncanceled character. For example if '#' is the erase character, then the string abc#d##e is really the string ae. The first # cancels c, the second d, and the third b. Write a program using stacks to implement this operation. 6M

### PART – C

5. Answer the following questions in one or two statements. (Complete program is not required)

a. Associate the stream pointer **ptr** with an existing stream-oriented data file called students.dat. Open the data file so that new information can be appended to the end of the file. 2M

b. Associate the stream pointer **ptr** with a new stream-oriented data file called sample.dat. Open the data file so that information can either be read from or written to the file. Show how the data file can be closed at the end of the program. 3M

c. Associate the stream pointer **ptr** with an existing stream-oriented data file called sample.dat. Open the data file so that information can either be read from or written to the file. Show how the data file can be closed at the end of the program. Generate an error message in the event that the data file cannot be opened. (if, for example, the data file is not present). 5M

6. The skeletal outline of a C program is shown below: (4 \* 2 = 8 M)

```
#include<stdio.h>
main()
{
    FILE *pt1,*pt2;
    char name[20];

    pt1 = fopen("sample.old","r");
    pt2 = fopen("sample.new","w");
    .....
    fclose(pt1);
    fclose(pt2);
}
```



- a. Read the string represented by name from the data file sample.old.
- b. Display it on the screen.

### PART – D

7. What will be the output of the following program 4M

```
main()
{
union x
{
int a ;
double b;
float c;
};
printf("%d\n" ,sizeof(union x));
union x b;
b.a=10;
printf("%d %f %f \n", b.a ,b.b,b.c);
b.c=1.23;
printf("%d %f %f \n", b.a, b.b,b.c);
}
```

8. When do we use Bit Fields? 1M

9. Draw the Queue for each step in the following sequence:  
Add(1), add(2), remove , add(3), add(4), remove, remove, add(5). Assume an initial size of 3 for the array implementation 4M

10. How do you say that a particular file is a Text file or a Binary file . 3M

11. Mention the function used to copy more than 1 structure into a file, explain each argument of the same 3M

12. What does the following segment do 3M

```
.....
for( i=1; i<= 5; i+ + )
{
fscanf(stdin, "%s", name)
fprintf( fp, "%s", name );
}
```

### PART – E

Consider the data structure below.

```
typedef struct {
    char place[100];
```

```
        long_lat_t longitude, latitude;
} location_t;

typedef struct {
    int degrees;
    char direction;
} long_lat_t;

location_t city[20];
```

13. Assume that an integer variable requires 4 bytes of storage and a character variable requires 1 byte of storage. How many bytes of storage are required for storing the location information of 20 cities. 4M

14. Assume that two cities are compared. Both have a direction of 'N' for direction. Write a program to check the location of two cities and print whether one city is to the south of the second city. 8M

The print out should look like: **Abu Dhabi is to the south of London**

**Hint:** The latitude of the Equator is 0 degrees and that of the North Pole is 90 degrees.

**Note:** Do not write an entire program. Only implement the required comparison of location and print result.



b. `p2 = n;`

c. `*p1 = &n;`

d. `p2 = &*&m;`

4. For an array of size 4, which sorting algorithm is used if the following are the first two steps of the algorithm? (1M)

a) `a[0] = min {a[1], a[2], a[3]}`

b) `a[min_index] = a[0], min_index = 1, 2, or 3`  
`a[1] = min { a[min_index], (a[i], i != min_index or 0) }`

5. Which sorting algorithm compares data over larger distances? (1M)

6. If the array of data to be sorted changes as below, which sorting algorithm is used?  
{30, 12, 18, 8} ---> {12, 30, 18, 8} ---> {12, 18, 30, 8} (1M)

7. Write an appropriate declaration for the following situations. (3 \* 1 = 3M)

(i) Declare a pointer to a pointer **pf** to a floating-point quantity.

(ii) Declare a pointer to a pointer to a pointer **pj** to an integer quantity.

(iii) Would the following program give any warning on compilation.

```
#include<stdio.h>
main()
{
    float *p1, i = 25.50;
    char *p2;
    p1 = &i;
    p2 = &i;
}
```

8. What is dereferencing operator, why is it used?

(1M)

9. Mention any 4 benefits of Pointers.

(2 M)