

BITS PILANI – DUBAI
International Academic City, Dubai
First Semester 2010 – 2011
Computer Programming II TA C252 (II year)
Comprehensive Exam (Closed Book)

Duration : 3 Hours
26.12.2010

No of pages: 5

Weightage : 40%
Max Marks: 120 Marks

Note: Answer sections A, B, C in separate booklets provided to you.

PART A

1. a. What will be output of following C code?

```
void main()
{
    struct employee
    {
        unsigned id: 8;
        unsigned sex: 1;
        unsigned age: 7;
    };
    struct employee emp1={203,1,23};
    clrscr();
    printf("%d\t%d\t%d",emp1.id,emp1.sex,emp1.age);
    getch();
}          2M
```

b. Point out the error in the program.

```
#include<stdio.h>

int main()
{
    union a
    {
        int i;
        char ch[2];
    };
    union a z1 = {512};
    union a z2 = {0, 2};
    return 0;
}          3M
```

P.T.O

c. Point out the error in the program.

```
#include <stdio.h>
void main()
{
    FILE *fp1, *fp2;
    clrscr();
    fp1=fopen("day.txt", "r");
    fp2=fopen("night.txt", "r");
    fclose(fp1, fp2);
    getch();      2M
}
```

d. What will be output of following program?

```
#include <stdio.h>
void main()
{
    char c;
    FILE *fp;
    fp =fopen("myfile.txt", "r+");
    fprintf(fp, "you know");
    fclose(fp);
    fp=fopen("myfile.txt", "r");
    clrscr();
    while((c=fgetc(fp))!=EOF)
        printf("%c", c);
    fclose(fp);
    getch();
}      3M
//myfile.txt contains      I am reading file handling from textbook
```

2. Declare a structure having following members: Customer number, Customer name, number of units consumed and bill. The bill is to be calculated according to the following conditions.

Unit consumed	Tariff
For the first 50 units	Dhs 0.50 per unit
For the first 100 units	Dhs 1.00 per unit
For the first 150 units	Dhs 1.50 per unit
For the first 200 units	Dhs 1.75 per unit
For the first 500 units	Dhs 2.00 per unit

Write a program to calculate the bill and display the bill details for a given customer number. 10M

3. Write a program to read a file and to display the contents of the file on the screen as follows:

- To display the number of characters.
- To display the number of lines. 10M

4. Given the root node of a binary tree, write a recursive function to count the number of leaf nodes in it. (Note : write only the recursive function definition) 6 M
5. Write any two advantages of recursion. 4 M
6. Write a program using functions to store a string on a stack and using this stack to print all the vowels in the string with their position. 7 M
7. What is the disadvantage with the working principle in the array implementation of a linear queue? Give suitable illustrations. 3 M
8. What is binding? What are its types? Object oriented languages use which type of binding? 4 M
9. What is a latent error? Give an example of it. 2 M
10. Mention all input test cases for the working of the binary search algorithm. 4 M

PART B

1. Write functions for the following in the Singly Linked List.
 - a. To add a node at the end of the Singly Linked List.
 - b. To count the number of nodes in the Singly Linked List. (4x2=8M)

2. Write the output for the following 4M

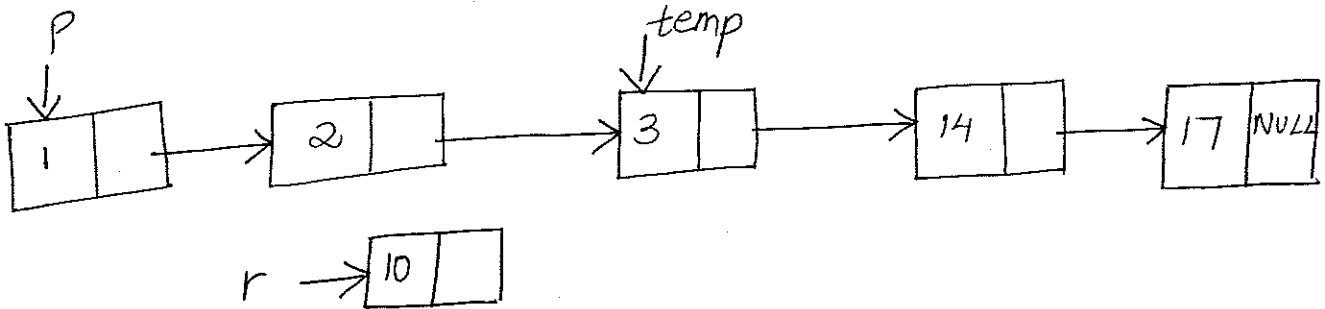
```

main()
{
    struct node
    {
        int data ;
        struct node *link ;
    };
    struct node *p, *q ;
    p = malloc(sizeof(struct node)) ;
    q = malloc(sizeof(struct node)) ;
    p->data = 60 ;
    p->link = q ;
    q->data = 600;
    q->link = Null ;
    printf("%d", p->data) ;
    p = p->link ;
    printf("%d", p->data) ;
}

```

P.T.O

3. Insert node 10 at the appropriate location in the Sorted Linked List given below, Display the final linked list diagrammatically after insertion. 3M



4. Sort the Array given below showing each state of the array after each pass (4x2=8M)

a) 30 12 18 8 14 41 3 39 using Bubble Sort

b) 77 33 44 11 88 22 66 55 using Insertion Sort

5. Write a C Program to search for a number X in a set of n numbers using Binary Search 7M

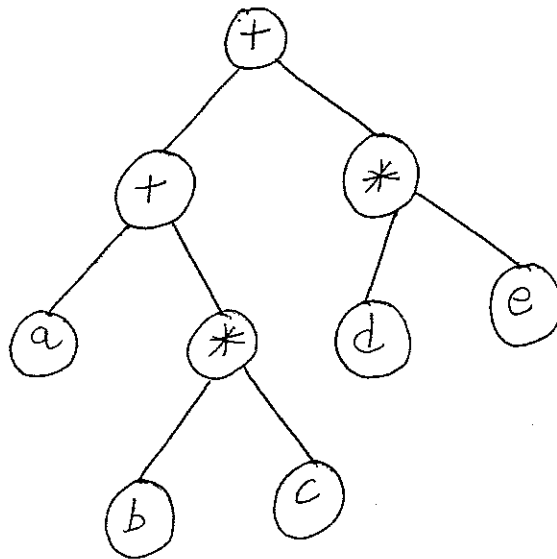
PART C

1. a. Explain each of the following terms with examples.

- i) Strictly binary tree
- ii) Complete binary tree
- iii) Non-binary tree

6M

b. Given the following tree, give the postorder, preorder and inorder traversal of the tree.



3M

c. i) Construct a Binary Search Tree with the given single character inputs . F S E C A L N B Z Y Z . Draw separate trees after the deletion of ii) N iii) E iv) S. In each of the cases ii) iii) and iv) consider the original tree you have drawn in i). 6M

2.a. Given the following program, give the output of the following printf statements, in the same order as given in the printf statements. Give the output clearly by stating val1= etc etc.

```
#include<stdio.h>
main()
{
    int val1,val2,val3,val4,val5,val6,*ptr1,*ptr2;
    val1=100;
    val2=250;
    ptr1=&val1;
    ptr2=&val2;
    val3= *ptr2 + *ptr1 /10;
    val4= 50 * *ptr2 / *ptr1 -20;
    printf("val1 = %d, val2 = %d", val1,val2);
    printf("val3 = %d, val4 = %d", val3,val4);
    *ptr2=*ptr2-7;
    *ptr1=*ptr2 + 12;
    val5=*ptr1 - *ptr2 +30;
    val6= *ptr1 + *ptr2/2;
    printf("val1 = %d, val2 = %d", val1,val2);
    printf("val5 = %d, val6 = %d", val5,val6);
}
8M
```

b. Using Dynamic memory allocation, create a block of memory to store 10 items. These items could either be all integer values or all floating point values depending on the option chosen by the user. Write a menu driven program to create this block and from this block of 10 values find the smallest element and display its position in the array. 7M

*****ALL THE BEST*****

BITS PILANI – DUBAI
International Academic City, Dubai
First Semester 2010 – 2011
Computer Programming II TA C252 (II year)
Test – II (Open Book)

Duration : 50 minutes
MAX Marks : 60 Marks

No of pages: 2

Weightage : 20%
Date: 21.11.10

Note: Answer sequentially. Answer all parts of a question together. This question paper has 4 questions Start the answers for questions 1,2,3,4 on a fresh page.

Only prescribed text books and handwritten class notes are allowed.

1. a. Write a function to find the number of occurrences of 'k' in a linked list.

(Complete program is not required, write only the function.) (5 marks)

b. Write a function that finds the nth to last element of a linked list, where 0 is the data stored in the last element (tail of the list)

(Complete program is not required, write only the function.) (10 marks)

2. a. Write a function which will search for all data elements which are greater than 10.5 in a singly linked list used to store float values and to replace each of these elements with data value 999. (9 marks)

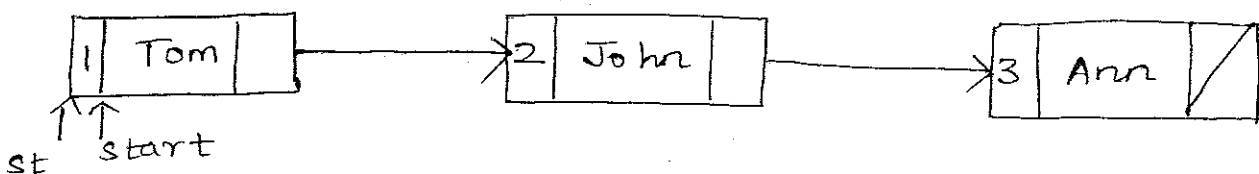
b. Consider the linked list shown below which is used to store the id_no and name of three students. Two pointers start and st point to the first element of the linked list. Give the data represented by each of the following statements.

a. start -> name

b. st -> next -> name

c. st -> next -> next -> id_no

(6 marks)

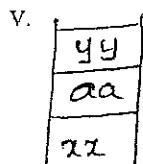
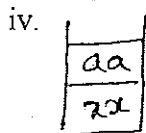
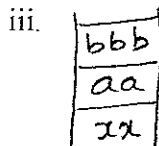
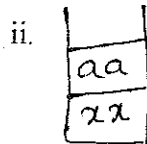
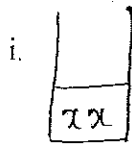


3. a. Write a program using dynamic memory management to store the string "PROGRAM", and print it in reverse order. (10 marks)

b. The function `free()` is used to release a memory block created by `malloc()`. How an array of memory blocks created by `calloc()` will be released. (5 marks)

4. a. Display the Queue after the following operations
ADD Z, ADD P, ADD C, DELETE, ADD S, ADD E, ADD H, ADD S,
ADD I, ADD W, DELETE, ADD T, ADD S, ADD E, ADD B, DELETE. (8 marks)

b. Write the operation for each step of a stack. (5 marks)



c. Write applications of Stacks and Queues (2 marks)

BITS PILANI – DUBAI
International Academic City, Dubai
First Semester 2010 – 2011
Computer Programming II TA C252 (II year)
Test – 1 (Closed Book)

Duration : 50 minutes
10.10.10

No of pages: 3

Weightage : 25%
MAX : 75 Marks

Note: Answer sequentially. Answer all parts of a question together. This question paper has 3 questions Start the answers for questions 1,2,3 on a fresh page.

1. a. Write a C program using structures to compute the monthly pay of 100 employees using each employee's name, basic-pay. The DA is computed as 52% of the basic pay. Gross-salary (Basic pay +DA). Print the employees name and gross salary. (10 marks)

b. i) Give the output of the following program (5 marks)

```
#include<stdio.h>
struct course
{
    int courseno;
    char coursename[25];
};
int main()
{
    struct course c[] = { {102, "Java"},
                          {103, "PHP"},
                          {104, "DotNet"} };
    printf("%d", c[1].courseno);
    printf("%s\n", *(c+2).coursename);
    return 0;
}
```

ii). Point out the error in the program? (5 marks)

```
#include<stdio.h>
int main()
{
    struct emp
    {
        char n[20];
        int age;
    };
    struct emp e1 = {"Dravid", 23};
    struct emp e2 = e1;
    if(e1 == e2)
        printf("The structure are equal");
    return 0;
}
```



```
}
```

iii). How will you access the field : name and yy of the below structure? (5 marks)

```
struct date
{
    int dd;
    int mm;
    int yy;
};
struct donor
{
    char name[20];
    date dob;
};
void main()
{
    donor person;
    .....
    .....
}
```

2.a. Given an array of **n** integers and an integer **x**, write a function to search for **x** in the array using the method of **linear search**. The function should use pointer parameters and also access the array elements using the pointer. Also show how this function may be used in a program (write the complete program). 10 M

b. Write the syntax of declaring a function pointer. 3 M

c. Find the output of the following program

```
main()
{
    struct s1
    {
        char *z;
        int i;
        struct s1 *p;
    };
    struct s1 a[] = { {"Nagpur", 1, a+1},
                    {"Raipur", 2, a+2},
                    {"Kanpur", 3, a}
    };
    struct *ptr = a;
    printf("%s", a[0].z);
    printf("%s", ptr -> z);
    printf("%s", a[2].p -> z);
}
```

3 x 4 = 12 M

3. a. Write a file oriented C program that will process the student exam score in 5 subjects. Then create a report containing the name, exam scores and total marks for each student. Consider 30 student records. (Assume the input file is already available). 13M

b. Consider the following program structure

```
#include<stdio.h>
main()
{ struct { int a;
          float b;
          char c;
          char name[20];
        }values;
  pt1=fopen("data.old", "r+ ");
  pt2=fopen("data.new", "w+");
  .....
  .....
  fclose(pt1);
  fclose(pt2);
}
```

Add instructions in the program to

- i) Read input for the structure from the file data.old .
- ii) Write the contents of the structure into the file data.new. 3 X 2 = 6M

c. Given the structure struct book{

```
int isbn;
char author[40];
char title[40];
}b[30];
```

Give instructions to i) block write the entire structure array into a file specified by a pointer filestruct.

- ii) Write the details of only one book into a file specified by a pointer filestruct 3 X 2= 6M

*****ALL THE BEST*****

BITS PILANI – DUBAI
International Academic City, Dubai
First Semester 2010 – 2011
Computer Programming II TA C252 (II year)
Quiz (Closed Book)

Duration : 20 minutes
MAX : 15 Marks

Date: 2.11.10

Weightage : 5%

No of pages: 1
Set A

Note : Use the blank sheet provided for rough work

1.a. Show the contents of the following array while it is sorted into ascending order using insertion sort after 4 iterations. In each iteration clearly indicate the sorted part of the array and the element to be inserted.

77, 33, 44, 11, 88, 22, 55

2 M

b. Merge sort the contents of the two sorted arrays A and B given below into a single sorted array.

A = {Feb, Jan, Mar} B = {Apr, Jul, Jun, May}

2 M

2.a. How many steps are needed to search for element 56 in the array given in question 2.b.

1M

b. Consider the following sequence of integers sorted in ascending order. Write the steps of detailed working to search the number 55 using binary search method, specifying the array of elements considered, lower, upper and mid values at each step.

2M

0, 5, 13, 19, 22, 41, 55, 68, 72, 81, 98

3. a. Mention the type of sorting implemented for the given array after considering the state of Pass 1 and Pass 2. 1M

Unsorted array:	2	3	1	5	4
Pass 1	2	1	3	4	5
Pass 2	1	2	3	4	5

b. Give the array after the first pass through the given array sorted as i) Selection Sort ii) Bubble Sort. Consider arranging the data in ascending order
1.5x2=3M

17 45 11 30 47 12 33

4. a. Given a hashing function $h(X) = X \bmod 27$, give the maximum number of elements that can be stored in this hash table. 1M

b. Calculate the position of the data i) 45 ii) 54 in the hash table given that the hashing function for data element X is

$h(X) = (X \bmod 7 + X \bmod 9) \bmod 10$ 1.5 X 2 = 3M