

Computer Science & Engineering Department
Motilal Nehru National Institute of Technology Allahabad
 Data Structure (CA 2201)

End Semester Examination April 2015

MCA & Master of Science (Mathematics & Scientific Computing)

Time: 3 Hrs.

Semester: 2nd

M.Marks:60

NOTE—Attempt all questions / Answers must be supported by diagrams wherever necessary / Answers should be **VERY BRIEF & PRECISE** / Any overwriting or cutting in the algorithm / program shall lead to the answer not being evaluated.

Q1. What do you understand by the following? Give example / diagram wherever necessary.

- | | |
|---------------------|-----|
| a) Ternary Operator | [1] |
| b) Union | [1] |
| c) Bucket Hashing | [2] |
| d) Multigraph | [1] |
| e) 2-3 Heap | [1] |

Q2. What shall be the output of the following?

[1 * 4 = 4]

a)

```
int main ()
{ char ch = 'a';
char *p1, **p2, *p3;
p1 = &ch;
p3 = p1; // Pointer Assignment
Taking Place
p2 = &p1; // Pointer Assignment
Taking Place
printf (" *p1 = %c | **p2 = %c | *p3
= %c \n", *p1,**p2,*p3);
}
```

b)

```
{int a[]={1,2,3};
int *p;
p=&a[1];
printf("%d",*p);
p++;
printf("%d",*p);
}
```

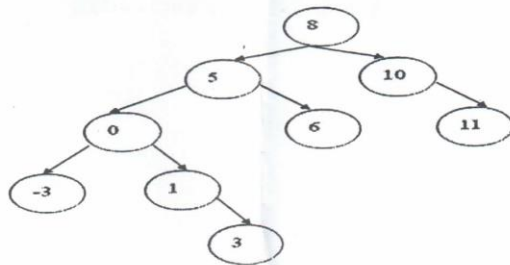
c)

```
{int arr[]={1,2,3,4,5,6,7};
int c;
int *a, *b;
a=&arr[1];
b=&arr[5];
c=b-a;}
```

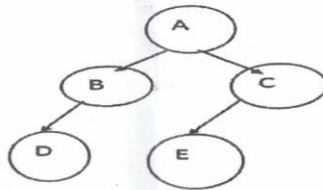
d)

```
{ int k1, k2;
int *p1, *p2;
k1=5;
p1 = &k1;
k2 = ((*p1)/2)+10;
p2 = p1;
printf("k1=%d, k2=%d, p1=%d,
p2=%d \n", k1, k2, *p1, *p2);
}
```

- Q3. Given the Integer set = {21, 4, 6, 71, 56, 8, 26, 9, 10}, use chained hash table with 10 slots and the hash function be $H(k) = \text{key} \bmod 10$ to construct the hash table. Illustrate each step clearly with diagram. [10]
- Q4. Construct a B+ tree of order 3 while or deleting elements strictly in the given order. Initially insert the elements 4, 6, 8, 10, 11 and 15. Now delete the elements 13 and 11. Illustrate each step clearly with diagram. [10]
- Q5. Illustrate the implementation of stack using singly linked list. Is there any advantage or disadvantage of this implementation? [5]
- Q6. Is the given tree a height balanced binary tree? If not, write the Algorithm so that the given binary tree is height balanced? Every step of the algorithm must be neatly illustrated with diagram. [10]



- Q7. Construct a threaded binary tree for the given tree? Illustrate its node structure. Also show the Memory Representation of a Complete TBT for this. [5]



- Q8. Illustrate Floyd-Warshall algorithm for the given graph. [10]

