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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST-1 EXAMINATION (FEB 2020)
B-Tech (2nd SEM)

Course Code: 18B17CI211

Max. Marks: 15

Course Name: DATA STRUCTURES AND ALGORITHMS

Max. Time: 1 HRS

Course Credit: 4

Note: All questions are compulsory. Skip syntax error if there any.

Q1. Find the output of following C programs and justify your answer. [2 x 2 = 4]

<pre>a) int main() { char a[5] = { 1, 2, 3, 4, 5 }; char *ptr = (char*)(&a + 1); printf("%d %d\n", *(a + 1), *(ptr - 1)); return 0;}</pre>	<pre>b) void main() { int a[] = {10, 20, 30, 40, 50, 60}; int (*p1)[2] = a, (*p2)[3] = a; if (sizeof(p1) == sizeof(p2)) printf("%d\n", *(*(p1+2))); if (sizeof(*p1) == sizeof(*p2)) printf("%d\n", *(*(p2+1))); }</pre>
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Q2.

a) Workout the computational complexity of following given codes (in the "Big-Oh" sense). Also show your all computational steps. [2 x 1½ = 3]

//Algo1

```
void prog2(int n)
{
int i, j, k;
for(i=0 ; i<n ; i++)
{
for(j=0 ; j<=i ; j+=2)
{
for(k=0 ; k<500 ; k++)
{
printf("hello");
}
}
}
}
```

//Algo2

```
for (i = 0; i < N; i++) {
for (j = 0; j < N; j++) {
sequence of statements
}
}
for (k = 0; k < N; k++) {
sequence of statements
}
```

b) Algorithms A and B spend exactly $T_A(n) = c_A n \log_2 n$ and $T_B(n) = c_B n^2$ microseconds, respectively, for a problem of size n. Find the best algorithm for processing $n = 2^{20}$ data items if the algorithm A spends 10 microseconds to process 1024 items and the algorithm B spends only 1 microsecond to process 1024 items. Justify your answer. [2]

Q3. Write an algorithm to merge elements presented in two linked lists.

[3]

Example: If the two linked lists are given as:

A: 1, 2, 3, 4

B: 7, 8, 9

Then merged linked list C should be:

C: 1,2,3,4,7,8,9

Q4. Consider the following operations in case of doubly linked list.

- Insertion at the front
- Deletion of the end node.

Answer the following:

- a) Write the algorithm for the above mentioned operations. [2]
- b) Find the time complexity of these operations for an implementation of unsorted doubly linked list which uses start pointer (pointing to the first node) and a tail pointer (pointing to the last node). [1]

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