

INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR
Department of Computer Science & Engineering
Programming and Data Structures (CS11001)
Class Test-II (Autumn, 1st Year)

Place: V-1, V-2, V-3, V-4, F-141, S-301, S-302
Time: 07:00-08:00pm

Date: Tue, Nov 09, 2011
Students: 660
Marks: 25

Answer ALL the questions.
Do all rough work on separate rough sheets (if needed) which you should not submit.
Answer on the question paper itself in the spaces provided.

Roll no: _____ Section: _____ Name: _____

1. (a) The number of comparisons required to find out the largest element of an array containing n elements is: n-1 OR O(n) 1

(b) In 'C' the index of the first element of an array is: 0 1

Consider the following type definition and variable declaration:

```
typedef struct { int num, den; } ratTyp, *ratPtr;  
ratTyp ratVal, *ratP, ratArr[];
```

(c) The member `num` of `ratVal` is accessed as: ratVal.num 1

(d) The member `den` of the `ratTyp` structure pointed to by `ratP` is accessed as:
 ratP->den 1

(e) Code for dynamically allocating memory for an array of 10 `ratTyp` elements and storing the array address in `ratArr` is:
`ratArr=` (ratPtr) malloc(10*sizeof(ratTyp)) 1

2. (a) Minimum number of bits needed to represent the variable `c`, declared as "`char c`" is 8 1

(b) The number of characters needed to store the string "`Hello World!`" is 13 1

(c) The last character of the above string must be the '\0' or NUL character 1

(d) If the ASCII character code for '`A`' is 65 then the character code of '`P`' should be: 80 1

(e) Let `hwStr` be declared and initialised as `char hwStr[]="Hello World!"`, then `*(hwStr+6)` evaluates to: 'W' 1

3. For the following entities, present the suitable structure declarations (`struct` in running lines):

(a) The sinusoidal waveform $A \sin(\omega t + \delta)$:

```
  typedef struct { float a, t, omega, delta; } swaveTyp;   2
```

(b) Data for a student represented by his `rollNumber` and `name` (both strings):

```
typedef struct studTag { char rollNumber[], name[]; } studTyp, *studPtr; 3
```

(c) A course, represented by a `courseNumber` (`int`) and data of a certain number (known at runtime) of students registered for the course:

```
typedef struct courseTag { int courseNumber, count;
                          studTyp students[]; } courseTyp, *coursePtr; 3
```

4. Develop the datatype `circleTyp` (by `typedef`) to represent a circle specified by the co-ordinates of its centre and its radius:

```
typedef struct { float x, y, r; } circleTyp; 2
```

Complete the function `intersecC()` to check if two given circles intersect.

```
int intersecC(circleTyp c1, circleTyp c2) {
// return values: 1 for intersecting; 0 otherwise
float distSqr; // square of distance between centres

distSqr = _____ (c1.x - c2.x) * (c1.x - c2.x) +
               _____ (c1.y - c2.y) * (c1.y - c2.y) ;

if ( _____ distSqr > (c1.r + c2.r) * (c1.r + c2.r) )

    return _____ 0 _____;
else
    return _____ 1 _____;
} 5
```