

**B.C.S.E 1<sup>st</sup> Year 2<sup>nd</sup> Semester Examination 2017**  
**Introduction to Computer Programming**

Time: Three hours

Full Marks: 100

**All questions carry equal marks of 20 but Question# 1 & 4 are compulsory**

**All programs must be well commented**

**Many-part questions have equal division and must be answered in one place**

1. Write a main program that acquires a dynamic array of integers of some size, fills it with random integers in a given range, prints it, looks for a user-given integer in the array with linear search, sorts it with insertion sort and then again looks for a user-given integer with binary search; all using user-defined functions. Also, write all these functions integrated with the main program.
2. a) Write a program for finding  $x^n$  where  $n$  is an integer.  
 b) Write a program to find the largest, smallest, mean and standard deviation of a set of numbers without using an array.
3. a) Write a program to display  $\sin(x)/x$  for  $0 \leq x \leq 4 * \text{PI}$  with horizontal x-axis.  
 b) Write a program to find the g.c.d of two numbers.

4. a) Study this program:

```
#include <stdio.h>
int main(void) {
    unsigned int i; unsigned int *j; unsigned int **k;
    i=3;
    printf("i = %u \n", i); printf("&i = %p \n", (void*)&i);
    printf("**(&i) = %u \n", *(&i));
    j=&i;
    printf("j = %p \n", (void*)j); printf("&j = %p \n", (void*)&j);
    printf("**j = %u \n", *j); printf("**(&j) = %p \n", (void*)&j);
    printf("&>(*j) = %p \n", (void*)&>(*j));
    k=&j;
    printf("k = %p \n", (void*)k); printf("&k = %p \n", (void*)&k);
    printf("**k = %p \n", (void*)&k); printf("**(&k) = %p \n", (void*)&k);
    printf("&>(*k) = %p \n", (void*)&>(*k)); printf("***k = %u \n", **k);
    return 0;
}
```

Assuming addresses of  $i$ ,  $j$ ,  $k$  are  $x$ ,  $y$ ,  $z$  respectively, what are the outputs?

- b) Write a program to swap two integers using a function that allows parameter passing only by reference and does not use any 'temp' variable.

5. a) Write a program to implement the complex data type. This means create the appropriate data types and functions for all valid operations on complex numbers.  
b) Write a program to calculate and display the binary equivalent of a positive number.
  6. a) Write a program to input a date in the form ddmmyy and output as 'month date, year', for example, 221101 becomes November 22, 2001.  
b) Write a program for the sequence guessing game 1, 3, 6, 10, 15, 21, 28, 36, 45, 55,...
  7. a) Write a program to find the 4<sup>th</sup> root of a number but do justify the method.  
b) Write a program to find the value of  $\sin(x)$  with  $10^{-4}$  accuracy.
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