# Indian Institute of Technology Kharagpur

**AUTUMN Semester, 2015**
**COMPUTER SCIENCE AND ENGINEERING**

**CS19001: Programming and Data Structure Laboratory**

**Assignment – 5**

**Full Marks: 10**

**Time allowed: 3 hours**

**INSTRUCTIONS:** Please see the questions and write C programs step by step. Ensure proper indentations to improve the readability of your code. All these features are necessary and absence will lead to deduction of marks.
Please do not forget to upload files to *Moodle* before you leave.

## Arrays in C

1. **Selection Sort** is a simple and common iterative sorting algorithm. After the end of the $c^{th}$ iteration of the selection sort, the subarray from index zero to ($c$ - 1) is sorted while the remaining elements of the array are unsorted. The algorithm proceeds by finding the smallest element in the unsorted subarray, exchanging it with the leftmost element of the unsorted subarray(putting it in sorted order), and moving the subarray boundaries one element to the right.

   The following is a sample run on a given array of five elements **64 25 12 22 11**:

   **11 25 12 22 64**

   **11 12 25 22 64**

   **11 12 22 25 64**

   **11 12 22 25 64**

   Write a complete C program to sort an given array with five integers in ascending order, using the **selection sort** algorithm. The five values should be entered by the user. **You are not allowed to use an extra array.** (4 marks)

2. Write C program that collects a word with maximum 20 characters from a user, utilizing the `getchar()` function, and then prints the word in reverse using a function `void print_reverse (char word[], int len)`. While entering the characters for the word, the user indicates the end of the word by entering the newline character (i.e. by pressing the return/enter key). The trailing newline character is not made a part of the word. (3 marks)

**3.** Write a complete C program to multiply two polynomials with integer coefficients of the form $f(x) = \sum_{i=0}^{4} a_i x^i$ with $g(x) = \sum_{i=0}^{4} b_i x^i$, to obtain a product polynomial $p(x) = f(x)g(x) = \sum_{i=0}^{8} c_i x^i$. The coefficients of $f(x)$ and $g(x)$ are to be collected from the user, and stored in arrays. Similarly, the coefficients of the product polynomial should also be calculated and stored in an array. The calculation of the coefficients of the product polynomial is to be performed using a function `void poly_mult (int f[], int g[], int p[])`. Print the coefficients of the product polynomial from inside the main function, after returning from the function `poly_mult()`. (3 marks)