

## **Assignment 1**

Deadline: 11th January '24

### **Instructions:**

- 1) This assignment consists of 2 problems. All problems are compulsory.
- 2) Mention all assumptions while answering the questions.
- 3) Be clear in your arguments. Vague arguments shall not be given full credit.
- 4) Only Handwritten Submissions are allowed. Scan and upload it on moodle.

### **Problems:**

1. Let  $(C, +, \cdot)$  be the field of all Complex numbers  $C$  closed over binary operations  $+$  and  $\cdot$ . Prove that every subfield of  $(C, +, \cdot)$  must contain every rational number. .
2. Prove that the set of all complex numbers of the form  $x + y\sqrt{2}$ , where  $x$  and  $y$  are rational, is a subfield of  $(C, +, \cdot)$ .