Domain-specific languages (DSLs) are languages specialized for particular domains. HTML, SQL, etc. are examples of DSLs. In this assignment, you have to develop a DSL for tensor algebra and implement a subset of its operators. A tensor is a higher dimensional analog of a matrix. A vector is a 1D tensor, and a matrix is a 2D tensor and so on.

Q1) Design and implement a language to represent matrices and perform the assignment, addition, and multiplication operations. Use an AST to represent the operations and use it check for operand compatibility. Parse the AST and generate the equivalent C code.

Note 1: This question is restricted to matrices and not tensors
Note 2: You are free to design your own language. The language should NOT include explicit loops. See an example language below.
Note 3: The matrix dimensions should be integer constants

Sample input program
Tensor A[3][4];
Tensor B[4][5];
Tensor C[3][5];
Tensor D[3][5];
Tensor E[3][5];

D = C + A*B;
E=D;

//errors
A*C; // semantic error
C+B; // semantic error

Q2. Extend Q1 to support assignment and addition operation for tensors

Tensor A[3][4][5][6];
Tensor B[3][4][5][6];
Tensor C[3][4][5][6];

C=A+B

Marks distribution

Q1) Everything except code generation 9 Marks. Code generation 3 Marks

Q2) 3 Marks