

6. (a) Explain how data-flow information is generated from three-address code, and illustrate using any one kind of information such as reaching definitions, available expressions, or live variables. [8]
- (b) Many GOTO statements generated by simple compilers are unnecessary. Describe two approaches for optimisation, either local or global, that can reduce the number of unnecessary GOTOS. You may assume any representation for intermediate or object code which will help explain the optimisations. [8]
- (c) Consider the following three-address code snippet:

```
L1:  j = 5
      i = 0
L2:  i = i + 1
      t2 = 4 * j
      t3 = a [t2]
      t4 = 4 * i
      a [t4] = t3
      if i < m goto L2
      return
```

Name and explain the loop optimisations that can be performed on this code and show the resulting optimised code. [9]