Answer any TWO from each module (Each question carries 10 marks)

MODULE I

1. a. Translate the following statements into three address statements and construct the flowgraph.(10)

   for(i=0;i<n;i++)
   for(j=0;j<n;j++)
   c[i][j]=0.0
   for(i=0;i<n;i++)
   for(j=0;j<n;j++)
   for(k=0;k<n;k++)
   c[i][j]=c[i][j]+a[i][k]*b[k][j]

b. Identify Loops in the above code. (10)

c. Write notes on Symbol Table Management. (10)

MODULE II

2. a. Give the dataflow equations for liveness analysis. Perform the liveness analysis on the following flow graph.(10)
b. Perform loop invariant code motion with the following code segment. (10)

\[
\begin{align*}
  & B=2 \\
  & i=1 \\
  & \text{L3: if } i>100 \text{ goto L4} \\
  & a=b+1 \\
  & c=2 \\
  & \text{if } I \bmod 2 == 0 \text{ goto L1} \\
  & d=c; f=a+1; \text{L2: } i=i+1; \\
  & \text{if } a<2 \text{ goto L4} \\
  & \text{goto L3} \\
  & \text{L1: } d=a+d \\
  & e=1+d \\
  & \text{goto L2} \\
  & \text{L4: end}
\end{align*}
\]

c. What is Static Single Assignment form? Transform the following code into SSA form. (10)

\[
\text{MODULE III}
\]

3. a. Explain register allocation algorithm with coalesing. Do register allocation with coalesing on the following code. Make necessary assumptions.

\[
\begin{align*}
  & c=a \\
  & p=b \\
  & \text{if } p=0 \text{ goto L1} \\
  & b=\text{mem}[p] \\
  & s=b \\
  & b=\text{mem}[p+4] \\
  & t=b \\
  & u=s+t \\
  & \text{goto L2} \\
  & \text{L1: } u=1
\end{align*}
\]
L2: b = u
a = c

b. Write notes on Procedure Optimisation. (10)
c. Write notes on Instruction Code Scheduling. (10)