Directions:

- Students need to go through the CASE STUDY shown in this exam paper.
- Analyze and answer specific section based on your own thinking and work.
- Do not share as this will be treated as plagiarism by Blended Learning Center.

1. Consider the following equation and describe the working procedures of the steps mentioned below on that equation:

   \[ E = m \times g \times h + \left( \frac{1}{2} \right) \times m \times v \times v \]

   a. Lexical Analyzer
   b. Intermediate Code Generator
   c. Code Optimizer
   d. Final Code Generator

2. Consider the following Finite Automata:

   ![Figure 1](image-url)  

   Figure. 1
a. Give the formal definition of the Finite Automata of Figure 1.

b. Is the Finite Automata of Figure 1 a NFA? Give reasons behind your decision. If it is a NFA then write down the subset construction table for converting it to DFA and draw the DFA.

3. Consider the following CFG:
   \[ X \rightarrow XYX|0|1|Z \]
   \[ Y \rightarrow ZX|0|1 \]
   \[ Z \rightarrow \varepsilon|0|1 \]
   a. Now derive the string “1111000101110” using LMD and RMD from the grammar.
   b. Draw the parse tree.
   c. Is the grammar ambiguous?

4. Consider the following C language code:

   ```c
   #include<stdio.h>
   int main{
     int a[2]={2,4,6},b=1;
     sum=a[b]+b
     printf("Result is %f, sum")
     return b;
   }
   ```

   Identify the specific error from the following code and write down the names of the errors of the code.