Information for candidates
This exam paper contains 5 questions totaling 20 marks.

**Question 1** Multiple Choice (5 marks)

Identify the choice that best completes the statement or answers the question.

1) An exclusive-OR function is expressed as
   a) \( \overline{AB} + AB \)  
   b) \( (\overline{A} + B) + (A + B) \)  
   c) \( (\overline{A} + B)(A + \overline{B}) \)  
   d) \( \overline{AB} + \overline{A}B \)

2) The following switching functions are to be implemented using a Decoder:

   \[ f_1 = \sum m(1, 2, 4, 8, 10, 14) \]
   \[ f_2 = \sum m(2, 5, 9, 11) \]
   \[ f_3 = \sum m(2, 4, 5, 6, 7) \]

   The minimum configuration of the decoder should be
   a) 2–to–4 line
   b) 4–to–16 line
   c) 5–to–32 line
   d) 3–to–8 line

3) The Gray code of the binary number 0111 is
   a) 1000
   b) 1000
   c) 0101
   d) 0100

4) In half adder, the XOR gate is used to execute the -----------:
   a) Sum
   b) Carry
   c) Remainder
   d) None of these

5) How many select lines are there for a 64 to 1 multiplexer?
   a) 4
   b) 5
   c) 6
   d) 8
**Question 2**
Use a **K-map** to simplify the Boolean expression

\[ E = \overline{A}B\overline{C}D + \overline{A}CD + \overline{A}\overline{C} + C \]

**Solution**

**Question 3**
Draw a diagram of a 6-bit parallel adder using one HA and five FAs.

**Solution**
Question 4

(3 marks)

Implement the following Boolean expressions

\[
\begin{align*}
f(a, b, c) &= \sum m(0, 2, 3, 7) \\
g(a, b, c) &= \sum m(1, 4, 6, 7)
\end{align*}
\]

a) Using Active High Decoder.
b) Using Active Low Decoder.

Solution
**Question 5**
Design a **Gray Code to BCD converter** by the following procedures:

a) Write down the **truth table** of the converter. (2 marks)

b) Apply Karnaugh Map to look for the **minimized logic expressions**. (4 marks)

**Solution**

**GOOD LUCK**