(**3 Hours**)   (**Total Marks : 80**)

Please check whether you have the right question paper.

N.B.:   1)   Questions **No. 1** is **compulsory**.
          2)   Solve **any three** question out of remaining **five** questions.
          3)   Assume suitable **data** if **necessary**.
          4)   **Figures** to the **right** indicate **full marks**.

1   Solve any **four** out of five :   **(20)**
   a)   Why biasing is necessary in BJT amplifier?
   b)   Solve $(35)_{10} - (47)_{10}$ using two's compliment method.
   c)   Define :
         i)   truth table
         ii)   standard SOP
         iii)   De-Morgan's theorem
         iv)   Duality theorem
         v)   universal gate
   d)   Define multiplexer and state its application.
   e)   Convert S-R flip-flop to T flip-flop.

2.   **a)**   Using Quine-Me-dusky method determine minimum SOP form for   **(10)**
$$f(A, B, C, D) = \sum m(0, 1, 3, 7, 8, 9, 11, 15)$$

   b)   What do you mean by differential amplifier? What is its primary function? State   **(10)**
         different configurations of it, which one is popularly used.

3.   **a)**   Draw & explain Ring counter using suitable waveforms.   **(10)**
   b)   Implement the following using only one 4:1 MUX and few gates :   **(10)**
$$f(A, B, C, D) = \sum m(0, 1, 3, 4, 5, 7, 9, 10, 12, 15)$$

4.   **a)**   Design MOD-9 Synchronous counter using J-K flip-flop.   **(10)**
   b)   Design four bit BCD adder using IC7483.   **(10)**

5.   **a)**   What is shift register? Mention different modes of operation of shift register?   **(10)**
   b)   State and explain various VHDL data objects in brief.   **(10)**

6.   Solve the following (**Any Four**) :   **(20)**
   a)   VHDL program format.
   b)   Difference between combinational circuit and sequential circuits.
   c)   Different biasing methods.
   d)   Race-around condition in flip-flop.
   e)   Current mirror circuit.
   f)   Arithmetic logic unit.

_____