**Long answer question**  
**Attempt two questions (2×10=20)**

1. Implement the following function F=∑(0,1,3,4,7) using
2. Decoder
3. Multiplexer
4. PLA
5. What do you mean by ripple counter? Design asynchronous Decade counter (or MOD-10 counter or BCD counter) with necessary timing diagram and logic diagram.
6. What do you mean by Mealy model? Explain the design procedure of sequential circuits that detects 3 or more consecutives 1s.  
   **Short answer questions**  
   **Attempt any eight questions (5x8=40)**
7. Convert the following hexadecimal number to decimal and octal numbers.  
   a) 4FF  
   b) 6FED
8. Explain the error detection code with example.
9. Explain the duality theorem with example.
10. Design half adder logic circuit using only universal gates.
11. Design a 3 to 8 line decoder using 2 to 4 line decoder and explain it
12. Design MOD-8 Johnson counter with necessary table and logic diagram.
13. Explain the PLA with the block diagram.
14. What is race around condition? Explain how to overcome it with necessary logic diagram.
15. Explain the shift register with example.
16. Write short note on **(any two)**:  
    a) Binary counter  
    b) State reduction  
    c) Negative edge triggering