Time: 3 Hrs  
Marks: 80

NB:  
(1) Question No. 1 is Compulsory.  
(2) Attempt any three questions out of remaining five.  
(3) Each question carries 20 marks and sub-question carry equal marks.  
(4) Assume suitable data if required.

Q.1 Answer Any Four.  
a) Convert the decimal number (175.23)\(_{10}\) to their octal, hexadecimal, BCD and gray code equivalent.  
5m  
b) Prove the following Boolean theorem.  
\(A+\bar{A}B = (A+B)\)  
5m  
c) Implement CMOS inverter and NOR gate.  
5m  
d) Design and implement half subtractor circuit.  
5m  
e) Explain various triggering methods and symbols of flip flops.  
5m  

Q.2 a) Simplify the logic function using Quine-McClusky method.  
\[ Y (A, B, C, D) = \Sigma m \(0,1,2,3,5,7,8,9,11,14\) \]  
10m  
b) Design and implement D flip flop using T flip flop and JK flip flop using D flip flop.  
10m  

Q.3 a) Design and implement asynchronous MOD-9 counter using T flip flop.  
10m  
b) Draw and explain 5bit comparator using IC 7485.  
10m  

Q.4 a) Implement and explain 4-bit BCD adder using IC 7483.  
10m  
b) Design and implement the following expression using a single 8:1 multiplexer.  
\[ Y (A, B, C, D) = \Sigma m \(0,2,3,6,8,9,12,14\) \]  
10m  

Q.5 a) Draw and explain master slave JK flip flop with its advantage. Derive characteristics equation and excitation table of JK flip-flop.  
10m  
b) Implement and explain 4-bit twisted ring counter.  
10m  

Q.6 Write a short note on any three.  
a) Hamming code  
b) Characteristics of logic families  
c) Static and dynamic Hazards  
d) Application of flip flop in switch debouncing  
20m