



Q.P. Code: 24572

(3 Hours)

[Total Marks: 80]

- N.B.: (1) Question No. 1 is compulsory.  
 (2) Solve any three questions out of remaining five.  
 (3) Figures to right indicate full marks.  
 (4) Assume suitable data where necessary.

- Q1.** Solve any four 20
- Prove that NOR gate is a universal gate.
  - Convert following decimal number to Binary, Octal, Hexadecimal and Gray code  $(2538)_{10}$
  - Derive relation between  $\alpha$  and  $\beta$ .
  - Design full adder using half adder and additional gates.
  - Covert D flip flop to T flip flop.
- Q2.** a) Explain Voltage Divider Biasing Circuit with its stability factor. 10  
 b) Using Quine MC Cluskey Method determine Minimal SOP form for 10  
 $F(A,B,C,D) = \sum m(0,1,3,7,8,9,11,15)$
- Q3.** a) Implement following using only one 8:1 Multiplexer and few gates. 10  
 $F(A,B,C,D) = \sum m(0,1,3,4,5,7,9,10,12,15)$   
 b) With neat logic diagram explain operation of 4-bit Bidirectional Shift Register. 10
- Q4.** a) Design a Mod 12 asynchronous counter using J-K Flipflop. 10  
 b) Minimize the following four variable logic function using K-map 10
- $f(A,B,C,D) = \sum m(0,1,3,4,7,9,11,13,15)$
  - $f(A,B,C,D) = \pi M(0,2,5,6,10,12,13,14)$
- Q5.** a) Simplify following equation using Boolean algebra and Design using basic gates 10
- $(A + B)(A + C)$
  - $(A + C)(AD + \overline{AD}) + AC + C$
- b) Explain VHDL program format and write VHDL program for NAND gate. 10
- Q6** Solve any four- 20
- 3-bit binary to Gray code conversion.
  - Working of Master slave J-K flip flop.
  - Explain working Current Mirror Circuit.
  - Write VHDL program for Half Subtractor circuit.
  - Explain working of 3:8 Decoder.