

(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 NAND and NOR gate are universal gate.
  - Convert following decimal number to Binary, Octal, Hexadecimal and Gray code  
i)  $(256)_{10}$  ii)  $(45)_{10}$
  - Draw and explain circuit diagram of a differentiator using Op-amp.
  - Covert S-R flip flop to D flip flop.
  - Derive the relation between  $\alpha$  and  $\beta$
- Q2. a) Explain Voltage Divider Biasing Circuit with its stability factor. 10  
 b) Implement following using only one 8:1 Multiplexer and few gates.  

$$F(A,B,C,D) = \sum m(0,1,2,3,5,7,9,11,12,15)$$
 10
- Q3. a) Draw circuit diagram and explain the operation of Astable Multivibrator using IC555. 10  
 b) Design 4-bit binary to Excess-3 code conversion. 10
- Q4. a) Minimize the following four variable logic function using K-map and design by using only NAND gates 10  

$$f(A,B,C,D) = \sum m(0,1,2,3,4,7,8,9,11,12,15)$$
  
 b) What are the different methods used to improve CMRR in Differential Amplifier. Explain one in brief. 10
- Q5. a) Design a Mod 12 asynchronous counter using J-K-Flip Flop. 10  
 b) With the help of neat diagram explain functioning of Universal Shift register. 10
- Q6 Write short notes on **any four** 20
- Design XOR gate using only NOR gates.
  - Explain working of a Current Mirror Circuit.
  - Write VHDL program for half adder.
  - Explain Encode and Decoder.
  - Explain working of Zener diode with VI characteristics.

\*\*\*\*\*