

Duration – 3 Hours

Total Marks - 80

**N.B.:** - (1) Question No.1 is compulsory.(2) **Attempt** any **Three** questions out of remaining **five** questions.

(3) Assume suitable data if necessary and justify the same.

- Q 1.      A) List and draw the type of shift registers **04**
- B) Draw the circuit of an Opamp as inverting amplifier. Also draw the input and output waveforms **04**
- C) Draw and explain in brief the block diagram of an operational amplifier. **04**
- D) State and prove De-Morgan's theorem. **04**
- E) Comment on the frequency response of an operational amplifier **04**
- Q 2 a)    Explain the operation of IC 555 operating as an Monostable multivibrator and derive the equations for output voltage frequency. **10**
- Q 2 b)    Explain first order Butterworth low pass filter and also derive expression for voltage gain. **10**
- Q 3 a)    With neat diagrams and waveforms explain Opamp operating as a differentiator. Also Sketch the output waveform for the circuit when the input is a square waveform. **10**
- Q 3 b)    Minimize the Boolean expression using K-Map and implement using gates. **10**
- $Y = \sum m(1, 2, 9, 10, 11, 14, 15)$
- Q 4 a)    With neat diagram and waveforms describe Schmitt trigger using an Opamp. **10**
- Q 4 b)    Implement the following expression using 3 data select input multiplexer **10**
- $F(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 10, 11, 14, 15)$
- Q 5 a)    Design a 3 bit binary to gray code converter and implement using logic gates **10**
- Q 5 b)    Design a mod-5 synchronous counter using JK flip flop. Also draw the timing diagram. **10**
- Q 6 a)    Explain successive approximation type ADC **10**
- Q 6 b)    List the types of logic family. Explain any logic family in detail. **10**