S.E. Electrical IV CBSGS 21.12.16
ADIC QP Code : 544003

(3 Hours) [Total Marks :80

N.B. : (1) Question No.1 is compulsory.
(2) Answer any **three** from remaining **five**.
(3) Assume suitable data whereever necessary and justify the same.

1 Solve any **FOUR** :
  (a) What is op-amp? List four basic building blocks of op-amp. 5
  (b) What are advantages of adjustable voltage regulators over the fixed voltage regulators? 5
  (c) Explain interfacing of CMOS and TTL logic families. 5
  (d) What is meant by race around condition in flip-flops? 5
  (e) Convert 5
      (i) 110101.101010_2 to octal
      (ii) $4BAC_{16}$ to binary

2 (a) Explain the operation of monostable multivibrator using IC 555. Draw the circuit diagram and waveforms. 10
  (b) Explain with the help of circuit diagram the operation of an op-amp as non- inverting amplifier. Derive expression for the voltage gain of this amplifier. 10

3 (a) Derive the filter gain of first order low pass filter and draw its frequency response characteristics. 10
  (b) Minimize the expression using K map and implement using gates. 10
      $f= \Sigma\ m\ (0,1,3,4,5,6,7,13,15)$

4 (a) With the help of neat diagram explain the operation of any one type of DAC. 10
  (b) Explain implementation of full adder circuit using two half adders along with truth table. 10

5 (a) (i) Realize the X-OR function using NAND logic. 10
      (ii) Simplify the following Boolean expression

      $\overline{A}\,\overline{B} + AB + \overline{A}B$

  (b) (i) Use 4:1 Mux to Implement the logic expression 10
          $F (A,B,C) = \Sigma\ m\ (1,2,4,7)$
      (ii) Convert S-R flip-flop to J-K flip-flop.

6 (a) Design a 3-bit synchronous counter using J-K flip-flops. 10
  (b) With neat circuit diagram and waveforms explain operation of Schmitt trigger using op-amp. 10