



(3 Hours)

[Total Marks:80]

- N.B.** (1) Question no.1 is compulsory.
(2) Attempt any three from the remaining.
(3) Numbers to the right indicate full marks to that question

Q.1 Answer any **FIVE** from the following. 20

- (a) State the ideal op-amp characteristics with their significance.
(b) Draw and explain block diagram of op-amp.
(c) Compare op-amp close loop configurations in inverting and non-inverting mode.
(d) i) Simplify the Boolean expression and implement using gates

$$Y = ABC + \overline{A}B + \overline{A}BC + \overline{(A + \overline{BC})}$$

- ii) Perform binary subtraction using 2's complement for decimal numbers.
(65)₁₀ - (20)₁₀
(e) Define for Digital ICs: i) Fan-in and Fan-out ii) Noise immunity
(f) Convert the following: i) (A7E3.F9)₁₆ to binary ii) 10011010₂ to decimal

Q.2 (a) With neat circuit diagram and waveforms, explain operation of op-amp as a Summing amplifier. 10

(b) With neat functional block diagram, explain operation of IC 555 timer as monostable multivibrator. Draw the waveforms for output voltage and capacitor voltage. 10

Q.3 (a) Simplify the following using K-map implement using NAND gates 10
 $f(A,B,C,D) = \sum m(0,1,2,5,9,13,14,15) + d(4,6,7,10)$

(b) Convert 10
i) JK Flip flop to T Flip flop
ii) Compare TTL and CMOS logic family

Q.4 (a) Draw and explain op-amp as differentiator. Also draw its input and output waveforms. 10

(b) Design and implement full subtractor circuit using logic gates 10

Q.5 (a) Design and implement 4 bit binary to gray code converter. 10

(b) Implement the following function using 8:1 multiplexer 10
 $f(A,B,C,D) = \sum m(0,1,3,5,6,7,8,10,12,14)$

Q.6 (a) Explain types of Voltage regulators. 10

(b) Design 3 bit synchronous up counter using JK flip flop 10