

(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 **Four** from the following. 20
 (a) Compare ideal and practical values of op-amp parameters.
 (b) Draw and explain frequency response of op-amp.
 (c) Derive expression for voltage gain of op-amp in non-inverting mode with feedback.
 (d) i) Perform binary subtraction using 2's complement for decimal numbers.
 $(45)_{10} - (27)_{10}$
 ii) Convert the following:
 (A) $(B8AF.E6)_{16}$ to decimal
 (B) $(1101111001.101)_2$ to octal
 (e) Simplify the Boolean expression and implement using gates

$$Y = ABC + (\overline{AC} + B) + \overline{AC} + AB + (\overline{A} + \overline{BC})$$
- Q.2** (a) Draw and explain operation of Schmitt Trigger with circuit diagram and waveforms. 10
 (b) With neat functional block diagram and waveforms, explain operation of IC 555 timer as astable multivibrator. Derive expression for output frequency and duty cycle. 10
- Q.3** (a) Design and implement 4 bit gray to binary code converter. 10
 (b) Simplify the following function using K-map and implement using NAND gates 10
 $f(A,B,C,D) = \sum m(1,3,5,9,11,12,13,15) + d(4,6,8,10,14)$
- Q.4** (a) Draw and explain operation of sample and hold circuit using op-amp with waveforms. 10
 (b) Design mod-8 synchronous up counter using JK flip flops. 10
- Q.5** (a) Convert: i) JK Flip flop to T Flip flop 10
 ii) SR to JK flip flop
 (b) Implement the following function using one 8:1 multiplexer and two 4:1 multiplexer. $f(A,B,C,D) = \sum m(0,2,5,6,8,9,12,13,15)$ 10
- Q.6** (a) Explain operation of basic voltage regulator circuit. Compare the linear and switching type regulators. 10
 (b) Define the characteristics of digital IC's. Explain interfacing of TTL and CMOS logic families.