

- Instructions:
1. Question No. 1 is compulsory
  2. Attempt any **three** questions out of remaining **five** questions
  3. Figures to the right indicates marks
  4. Assumptions made should be clearly stated

Q.1 Attempt any five from following

- (a) Define input offset voltage and input offset current for an op-amp. State their ideal and practical values. [4]
- (b) Illustrate operation of op-amp as a voltage follower. [4]
- (c) Draw block diagram of op-amp and explain its operation. [4]
- (d) Prove universality of NAND gate for NOT gate and AND gate. [4]
- (e) Convert: (i)  $(1085)_{10}$  to octal (ii)  $(AB86.43)_{16}$  to decimal [4]
- (f) Convert JK flip flop to T flip flop. [4]

Q.2. (a) With circuit diagram, explain the operation of op-amp as Schmitt trigger and draw its input and output waveforms. [10]

(b) Illustrate the operation IC 555 as astable multivibrator using functional block diagram and derive the expression for frequency and duty cycle. [10]

Q.3. (a) Design and implement full adder using 8:1 and 4:1 multiplexer. [10]

(b) Illustrate operation of op-amp as V to I and I to V converter. [10]

Q.4. (a) Explain first order low pass filter using op-amp with its frequency response. [10]

(b) (i) Simplify the following Boolean expression and implement using basic gates [05]

$$ABC + \overline{AB} + \overline{ABC} + AC + \overline{AB}$$

ii) Write a short note on TTL and CMOS logic families. [05]

Q.5. (a) Minimize the expression using K-map & implement it using NAND gate [10]

$$f = \sum m(2,3,6,7,8,9,12,13) + d(0,1,10,11)$$

(b) Design and implement mod-8 ripple down counter using JK flip flops. [10]

Q.6 (a) Illustrate operation of op-amp as optical isolation amplifier. [10]

(b) (i) What are adjustable voltage regulators? [05]

ii) Explain ring counter. [05]