Q.2 a. Enlist the various advantages of IC over discrete component circuits.
Answer: 1.2 of Text Book I

b. Draw basic differential amplifier and discuss transfer characteristics of an ideal operational amplifier.
Answer: 2.4.1 & 2.4.2 of Text Book I

c. Design an amplifier with a gain of +5 using one OP-AMP
Answer: Page Number 49 of Text Book I

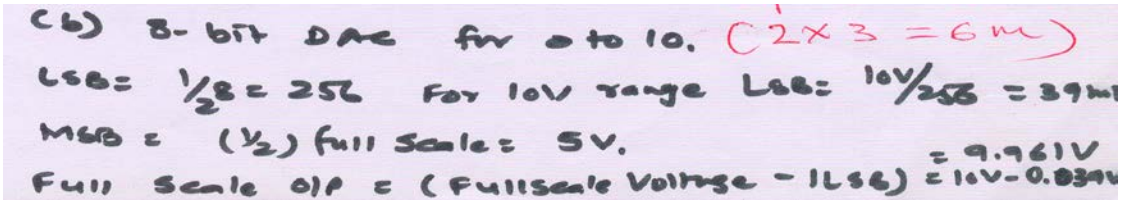
Q.3 a. State non-ideal DC characteristics of an op-amp. Explain any two of them in detail.
Answer: 3.2 of Text Book I

b. (i) Define Slew Rate of an op-amp
(ii) What causes the Slew Rate
(iii) How Slew Rate is measured
(iv) Can IC 741C be used for high frequency application?
Answer: 3.3.4 of Text Book I

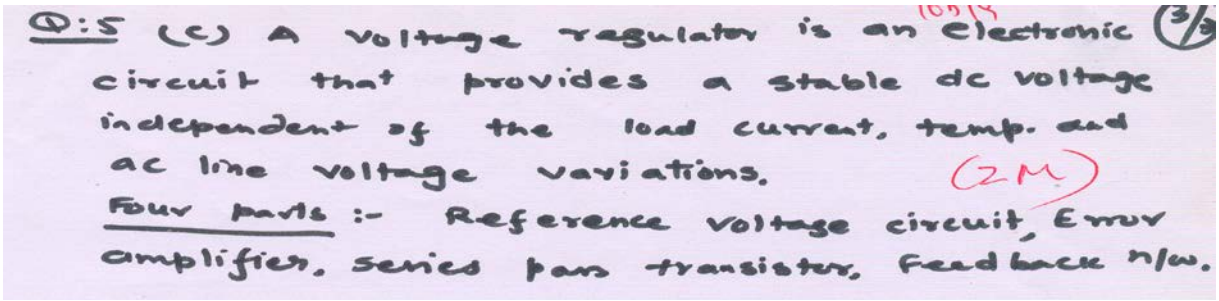
Q.4 a. Draw the characteristics of an ideal comparator and that of a commercially available comparator. Also list different types of comparators.
Answer: Page Number 207 of Text Book

Q.5 a. Describe the operation of an Astable multivibrator using 555 timer.
Answer: 5.4 of Text Book I

b. Calculate the values of LSB, MSB and full scale output for an 8-bit DAC for the 0 to 10V range.
Answer:


(b) 8-bit DAC for 0 to 10. (2×3 = 6M)
LSB = 1/28 = 25% For 10V range LSB: 10V/255 = 39m
MSB = (1/2) full scale = 5V.
Full scale o/p = (Full scale Voltage − LSB) = 9.961V = 10V − 0.039

c. What is a voltage regulator? State only name of the circuits that are used to make a regulated power supply.
Answer:


Q:5 (c) A voltage regulator is an electronic (3/3)
circuit that provides a stable dc voltage independent of the load current, temp. and ac line voltage variations. (2M)
Four parts :- Reference voltage circuit, Error amplifier, series pass transistor, Feedback n/w.

Q.6 a. Differentiate between positive logic and negative logic.

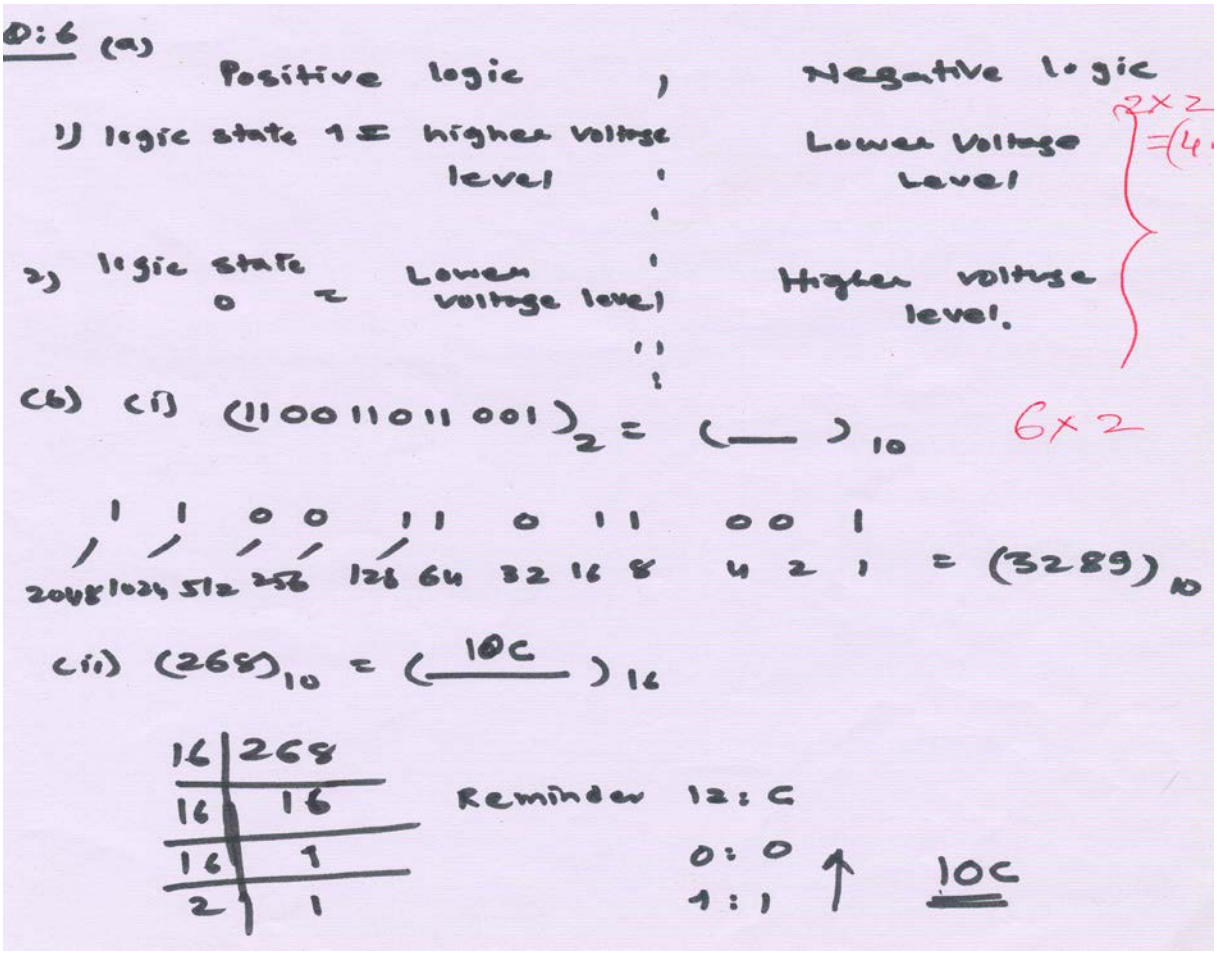
b. Perform the following conversions:

(i) $(110011011001)_2 = (\_\_\_\_)_{10}$ (ii) $(268)_{10} = (\_\_\_\_)_{16}$

(iii) $(39.12)_{10} = (\_\_\_\_)_2$ (iv) $(1054)_8 = (\_\_\_\_)_{10}$

(v) $(2040.125)_{10} = (\_\_\_\_)_{16}$ (vi) $(1001101.1011)_2 = (\_\_\_\_)_8$

Answer:



(iii) $(39.12)_{10} = (\quad)_2$ 10/9 4/2

		Remainder
2	39	
2	19	1 (LSB)
2	9	1
2	4	1
2	2	0
	1	0
		1 (MSB)

$0.12 \times 2 = 0.24$ 0
$0.24 \times 2 = 0.48$ 0
$0.48 \times 2 = 0.96$ 0
$0.96 \times 2 = 1.92$ 1
$0.92 \times 2 = 1.84$ 1

$(100101.00011\ldots)$

(iv) $(1054)_8 = (\quad)_{10}$

$10\ 5\ 4$
$8^3\ 8^2\ 8^1\ 8^0$ $= (556)_{10}$

(v) $(2040.125)_{10} = (7F8.2)_{16}$

		Remainder
16	2040	
16	127	8
16	7	15 (F)
		7

$.125 \times 16 = 2$

(vi) $(1001101.1011)_2 = (\quad)_8$

$001\ 001\ 101 . 101\ 100$
$\downarrow\ \downarrow\ \downarrow\ \downarrow\ \downarrow$
$1\ \ 1\ \ 5\ \ 5\ \ 4$ $= (115.54)_8$

Q.7 a. Why NAND and NOR gates are called universal gates?

Answer: 3.12 of Text Book II

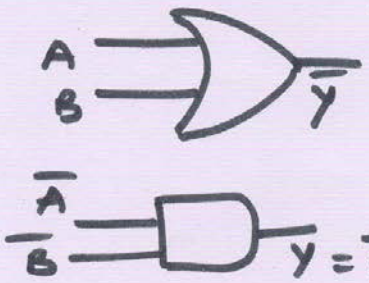
b. Prove that the given identity $Y = \overline{A + B}$ represents a NOR logic.

c. (i) Draw the logic circuit for the given identity $Y = ABC + \overline{ABC} + B$
(ii) Simplify the expression and draw a logic circuit for the same.

Answer:

(b) $Y = \overline{A+B}$ — NOR Gate. or $\bar{Y} = A+B$

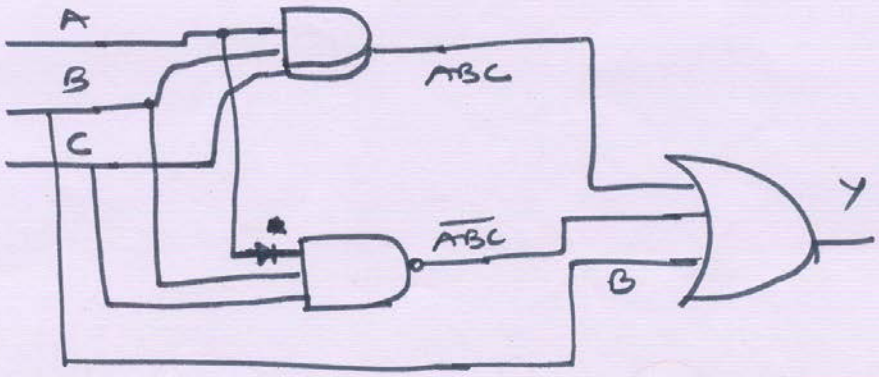
A	B	Y	$\bar{Y}$
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0



(2×2 = 4M)

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

(i) Logic circuit (2M)



(ii) simplification.

$Y = ABC + \overline{ABC} + B$

$= 1 + B$

$= 1$

Q.8 a. What is Priority encoder? Draw & explain the truth table of decimal to BCD priority encoder.

Answer: Page Number 593 of Text Book

b. Design a Full Adder Circuit consisting of three inputs A, B, C_{IN} and two outputs S, C_{OUT}.

Answer: Page Number 320 of Text Book

Q.9 a. Write short notes on:-
(i) NAND gate latch
(ii) Clocked D FF

Answer: 9.8 & 5.4 of Text Book

Text Books

1. Linear Integrated Circuits, Revised Second Edition, D Roy Choudhury, Shail B. Jain, New Age International Publishers.

2. Digital Systems – Principles and Applications, Ninth Edition, Ronald J Tocci, Neal S Widmer and Gregory L. Moss, Pearson Education, 2008.