



PAPER ID-410604

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Subject Code: KEC501

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B.TECH.
(SEM V) THEORY EXAMINATION 2021-22
INTEGRATED CIRCUITS

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.**2 x 10 = 20**

- a. What is meant by the term matched transistors.
- b. What is a Current Mirror circuit. Give its need.
- c. Define and give significance of Slew Rate.
- d. What do you mean by the quadrant operation of multiplier.
- e. What do you mean by a frequency response of a filter circuit.
- f. Differentiate wide band and narrow band pass filter.
- g. What role does PDN play in CMOS implementation.
- h. Differentiate between a peak detector and sample and hold circuit.
- i. Describe the need of voltage limiter circuits.
- j. List the application of PLL.

SECTION B

2. Attempt any *three* of the following:**10x3=30**

- (a) Find out the overall gain of an op-amp IC741 giving its cascaded equivalent circuit derived for its three stages. Also drive the relationship between f_T and Slew Rate for IC741.
- (b) Draw the generalized impedance converter and derive its impedance equation. Also simulate an Inductor.
- (c) Describe temperature compensated Log amplifier using two op-amp & explain its operation.
- (d) Sketch the logic gate symbolic representation of clocked SR flip-flop using NAND gate. Also sketch its CMOS circuit implementation and explain its operation.
- (e) Draw the block diagram of a PLL and explain its operation. Explain lock-in-range, capture range and pull-in time of a PLL.

SECTION C

3. Attempt any *one* part of the following:**10x1=10**

- a) Describe the operation and characteristics of a BJT complementary push-pull output stage.
- b) Give circuit description of IC741 with the help of its block diagram.



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4. Attempt any one part of the following:**10x1=10**

- a) Draw and explain Narrow Band Band Reject Filter. Also, find its transfer function.
- b) Compare and contrast active filters and passive filters. Design band pass filter with single op-amp for the given specifications: $f_L = 1\text{KHz}$; $f_H = 1.2\text{ KHz}$, $A_F = -5$.

5. Attempt any one part of the following:**10x1=10**

- a) Draw the circuit diagram for monostable multivibrator with operational amplifier. Explain its operation. Derive the expression for its time period.
- b) What do you mean by the quadrant operation of multiplier. Draw and explain a GILBERT analog multiplier.

6. Attempt any one part of the following:**10x1=10**

- a) Explain the structure and operation of CMOS inverter. Realize the circuit of 2 input NOR gate and 2 input NAND gate using CMOS and explain the operation.
- b) Discuss the features of CMOS circuit. Describe D-F/F circuit using NAND CMOS gates.

7. Attempt any one part of the following:**10x1=10**

- a) Explain the block diagram of IC 555. Design a 555 timer as astable multivibrator with an output signal with frequency 2KHz and 75% duty cycle.
- b) Describe the working of an VCO with the help of functional block diagram of VCO IC566.