

## AMIETE – ET (OLD SCHEME)

Code: AE09  
Time: 3 Hours

Subject: ANALOG & DIGITAL ELECTRONICS

Max. Marks: 100

**DECEMBER 2009**

**NOTE:** There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

**Q.1 Choose the correct or the best alternative in the following: (2x10)**

a. The circuit shown in Fig.1 is

- (A) Logarithmic Amplifier.
- (B) Anti-logarithmic Amplifier.
- (C) Clipper.
- (D) Clamper.

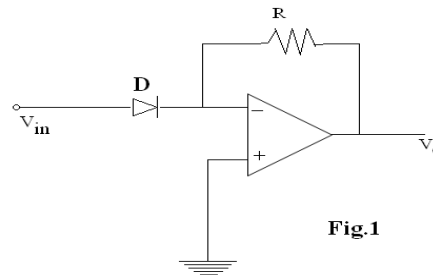


Fig.1

b. In the differentiating circuit given in Fig.2, the function of  $R_{comp}$  is to

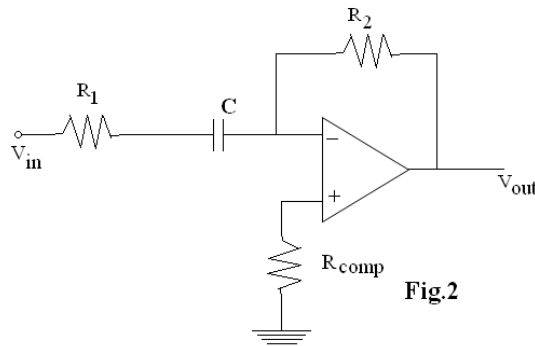
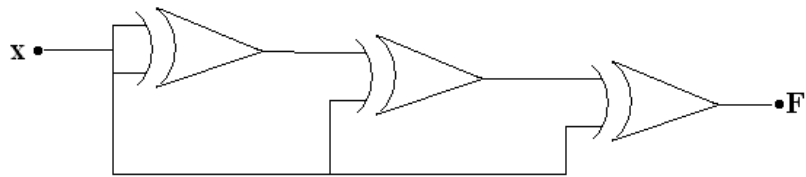


Fig.2

- (A) enable the circuit to approach ideal differentiator
  - (B) maintain high input impedance
  - (C) eliminate high frequency noise spikes
  - (D) prevent oscillations at high frequencies
- c. Digital ICs do not use
- (A) P-channel MOSFETs
  - (B) N-channel MOSFETs
  - (C) JFETs
  - (D) N-P-N transistors
- d. The number of flip flops required in a decade counter is

- (A) 2 (B) 3  
(C) 4 (D) 10
- e. The number of comparisons carried out in a 4-bit flash-type A/D converter is
- (A) 16 (B) 4  
(C) 15 (D) 3
- f. The primary switching delay in an over driven BJT is contributed by which one of the following characteristics of the transistor?
- (A) Storage time (B) Fall time  
(C) Rise time (D) Charging time
- g. For the circuit shown below in Fig.3, output F is



**Fig.3**

- (A)  $F = 1$   
(B)  $F = x$   
(C)  $F = 0$   
(D)  $F = \bar{x}$
- h. The basic memory cell of dynamic RAM consists of
- (A) a capacitance (B) a transistor  
(C) a flip flop (D) a transistor acting as a capacitor
- i. Which one of the following is equivalent to AND-OR realization?
- (A) NAND-NOR realization (B) NOR-NOR realization  
(C) NOR-NAND realization (D) NAND-NAND realization
- j. A PLA can be used
- (A) as a microprocessor. (B) as a dynamic memory.  
(C) to realize a sequential logic. (D) to realize a combinational logic.

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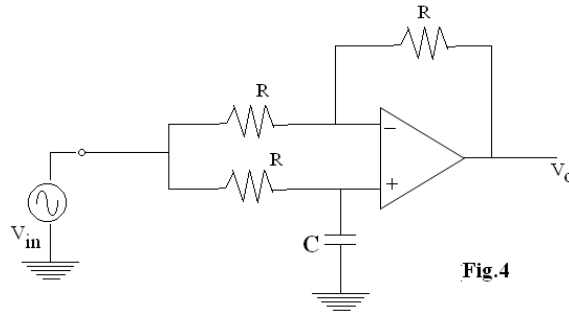
**Answer any FIVE Questions out of EIGHT Questions.**  
**Each question carries 16 marks.**

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- Q.2** a. Discuss briefly how op-amp can be used as instrumentation amplifier. (8)
- b. Explain following dc imperfections present in op-amps and how they are overcome?
- (i) Offset voltage

(ii) Input bias currents. (8)

**Q.3** a. Identify the filter and determine its transfer function. (8)



- b. Explain the working of second-order resonator. Discuss the two possible ways of exciting this resonator? (8)

**Q.4** a. Draw the block diagram of a counting A/D converter. Explain its operation. (8)

- b. An 8 bit successive approximation A/D converter has a resolution of 10mV. If analog input is 1.592 V, find the digital output of ADC. (8)

**Q.5** a. Explain the advantage of using Schottky transistors in a TTL gate with totem pole output. Draw the circuit of two input Schottky TTL and explain its features. (8)

- b. Describe following terms with respect to logic circuits

- (i) Noise Margin
- (ii) Propagation delay
- (iii) Fan out
- (iv) Power delay product (8)

**Q.6** a. Explain the operation of Dynamic RAM. Compare its advantages with respect to static RAM. (8)

- b. For each statement indicate whether it pertains to MUX, DEMUX, ENCODER or DECODER

- (i) can be used to steer an input signal to one of several possible outputs.
- (ii) produces a binary code at output.
- (iii) has select inputs.
- (iv) has more inputs than outputs.
- (v) can be used as a logic function generator.
- (vi) can be used for parallel to serial conversion.
- (vii) only one of its outputs can be achieved at one time.
- (viii) can be used for data routing. (8)

**Q.7** a. What is meant by the term edge-triggered flip flop? Draw the circuit / block diagram of positive edge triggered and negative edge triggered flip flop. (8)

- b. What is a ring counter? How it is different from Johnson counter. (8)

**Q.8** a. Explain following terms briefly w.r.t. semiconductor memories:

- (i) Memory cell
- (ii) Memory capacity
- (iii) Access time
- (iv) Dynamic memory
- (v) Read operation
- (vi) Write operation

(vii) Erasable memory

(viii) Static memory

**(8)**

b. What is interfacing? How interfacing is done between TTL and ECL family?  
**(8)**

**Q.9**

Write short notes on the following:

- (i) 4 bit binary adder and subtractor.
- (ii) CMOS logic circuit.
- (iii) Transmission gates.
- (iv) NMOS-AND and NOR gates.

**(4x4 =16)**