

AMIETE – CS/IT (OLD SCHEME)

Time: 3 Hours

JUNE 2012

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

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.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- 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: (2×10)

- a. With an increase in temperature, the Fermi level in an intrinsic semiconductor
- (A) Moves closer to the conduction band edge.
(B) Moves closer to the valence band edge
(C) Moves into the conduction band
(D) Remains at the centre of forbidden gap.
- b. What is the purpose of impedance matching between the output of previous stage and input of next stage in a cascaded amplifier?
- (A) To achieve high efficiency (B) To achieve maximum power transfer
(C) To achieve reduced distortion (D) To achieve reduced noise.
- c. In an RC phase shift oscillator, the minimum number of R-C network to be connected in cascade will be
- (A) 1 (B) 2
(C) 3 (D) 4
- d. If one of the diode in a full wave bridge rectifier opens the output is
- (A) 0 V (B) $\frac{1}{4}$ of the amplitude of the input voltage
(C) A half wave rectified voltage (D) a 120 Hz voltage
- e. The expression for carrying C in the half adder with inputs A and B is given by
- (A) $A \oplus B$ (B) AB
(C) $\overline{A.B}$ (D) None of these
- f. To implement all functions of the basic logic functions it suffices to have
- (A) OR (B) NOT
(C) ANDNOT (D) None of these

- g. Which one of the following is not a characteristics of CMOS configuration?
- (A) CMOS devices dissipate much lower static power than bipolar devices.
 (B) CMOS devices have low input impedance
 (C) CMOS devices have higher noise margins
 (D) CMOS devices have much lower trans conductance than bipolar devices
- h. The logic circuit which belongs to non saturated logic is
- (A) ECL (B) TIL
 (C) CMOS (D) NMOS
- i. In D type FF preset (Pr) and (Cl) input are called
- (A) Synchronous (B) Asynchronous
 (C) Data (D) None of these
- j. The number of FF required in a decade counter is
- (A) 2 (B) 3
 (C) 4 (D) 10

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

- Q.2** a. What is Hall Effect? Derive the relation between Hall coefficient and carrier density. Assume the presence of only one type of charge carrier. (8)
- b. Explain the output characteristics of the JFET. (8)
- Q.3** a. Explain transistor R-C coupled amplifier with special reference to frequency response, advantages, disadvantages and application. (10)
- b. What are the advantages of using crystal oscillator? Mention its applications. (6)
- Q.4** a. Explain offset current and offset voltage of an op-amp. Discuss the techniques used for minimizing offset voltage and offset current in the inverting amplifier. (8)
- b. A full wave bridge rectifier with 120 Vrms sinusoidal input has load resistance of 1 k Ω . If Si diode are used, determine
- (i) dc voltage available at load
 (ii) required PIV rating of each diode
 (iii) maximum current through each diode during conduction
 (iv) required power rating of each diode. (8)
- Q.5** a. Simplify the following Boolean expression with which represents the output of logical decision circuit
- (i) $f(A, B, C, D) = (AB + C + D)(\bar{C} + D)(\bar{C} + D + E)$
 (ii) $Z = ABC + ABD + \bar{A}\bar{B}\bar{C} + CD + \bar{B}\bar{D}$ (8)

- b. Explain the operations of a 4 bit odd parity checker. (8)
- Q.6** a. Explain the physical significance of storage time and transition time in the diode switching. (8)
- b. Sketch and explain the operations of transmission gate as a switch by using CMOS transistor. (8)
- Q.7** a. Draw and explain the operations of totem pole output buffer with a TTL gate? (8)
- b. Write short note on:
(i) Tri-state logic (ii) Schottky TTL. (4×2)
- Q.8** a. Explain how to measure frequency by means of a counter. (6)
- b. Draw and explain the operations of a synchronous up-down counter (10)
- Q.9** Write short notes on any **TWO** of the following:
- (i) CCD
(ii) Seven segment display system
(iii) Bipolar memory cells
(iv) Programmable ROM. (8×2)