



Date : April 08th, 2006

Time : 0930 – 1230 hrs.

Answer 5 questions only. All questions carry equal marks.

Q1 Perform following calculations

- a) Convert 721.25_{10} to its binary equivalent.
- b) Find **b** so that $572_b = 2AC_{16}$.
- c) Perform the binary multiplication $11011.1_2 \times 1111_2$.
- d) Perform the binary division $1011100_2 \div 1000_2$.
- e) Subtract 3 from -4 using two's complement representation.

- Q2.
- a) Explain why digital computers use binary number system for their operations.
 - b) Simplify following logical expression using Boolean algebra. $Y = AB + BC + \overline{AC}$
 - c) Simplify the following expression using a Karnaugh map :

$$S = \sum (2, 3, 8, 13, 15) + d(0, 5, 11) \quad \text{where } d \text{ denotes don't-care terms.}$$

- Q3.
- a) Describe the time constant τ of simple R-C and R-L circuits.
 - b) A simple relay ($0.2H/15\Omega$) is connected in series with a load of 250Ω and a $12V/35\Omega$ battery. The relay operates at $25mA$.
 - i) Calculate the time constant for the circuit.
 - ii) What is the current of the circuit as soon as the battery is connected?
 - iii) What is the final current value?
 - iv) Find the time it takes until the relay is switched on.
 - c) Describe briefly the smoothing action of an inductor filter and a capacitor filter.

- Q4.
- a) Describe the functioning of a simple clamper circuit.
 - b) An input square wave with an amplitude $4V$ (pk-pk) at $2kHz$ is to be clamped using the above circuit. Calculate the maximum capacitance for the capacitor.

- Q5.
- a) What is a multivibrator?
 - b) Describe, with the help of circuits, how following types of multivibrators work:
 - i) Astable mv
 - ii) Monostable mv
 - iii) Bistable mv

- Q6.
- a) Write the truth table for the product of two 2-bit binary numbers.
 - b) Design and sketch an implementation for the above truth table using simple logic gates.

- Q7. Design a divide-by-three up-down counter using J-K flipflops.

- Q8.
- a) Compare the location addressing of Static and Dynamic R-W memories.
 - b) Describe the factors affecting dynamic R-W memory.
 - c) Compare TTL, ECL and CMOS logic families.