(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3071 Roll No. | | | | | | | | | | |

B.Tech.

THIRD SEMESTER EXAMINATION, 2005-2006

PULSE AND DIGITAL ELECTRONICS

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt **ALL** questions.*

(ii) Be precise in your answer.

1. Attempt ***any four*** of the following : **(5x4=20)**

(a) What is meant by TTL, ECL and CMOS logic families ?

(b) Calculate the noise margin of ECL gate.

(c) Using the actual output transistors of two open collector TTL gates, show (by means of truth table) that when connected together to an external register and Vcc, the wired connection produces an AND function.

(d) Describe the circuit of CMOS two input exclusive - NOR gate.

(e) Simplify the following Boolean expression using K-map.

$$f(w, x, y, z) = w\,x\,y + y\,z + x\bar{y}z + \bar{x}\,y$$

2. Attempt *any four* of the following : **(5x4=20)**

(a) Explain the methods used for fast addition

(b) Implement a full adder with two 4x1 multiplexers.

(c) Explain the operation of 4 - input priority encoder.

(d) Design a combinational circuit with three inputs and one output. The output is 1 when the binary value of inputs is less than 3. The output is zero otherwise.

(e) Explain the operational function of PLA.

(f) What is meant by amplitude comparator ? Construct 12-bit comparator with help of 4-bit comparators.

3. Attempt *any two* of the following : **(10x2=20)**

(a) Explain the differences among a truth table, a state table, a characteristic table and an excitation table of flip-flops. Show the characteristic equation for the complement output of a J K flip-flop is

$$\overline{Q}^{v+1} = \overline{J}^{v}\,\overline{Q}^{v} + \overline{K}^{v}\,\overline{Q}^{v}$$

Where Q^{v} = present state output

Q^{v+1} = next state output

(b) What is difference between serial and parallel transfer ? Explain how to convert serial data to parallel and parallel data to serial ?

The content of four-bit shift register is initially 1101. The register is shifted six times to the right with the serial input being 101101. What is content of register after each shift ?

(c) Design a synchronous counter with the following repeated binary sequence :

"0 , 1 , 2 , 4 , 6"

Use J K flip-flops.

4. Attempt *any two* of the following : **(10x2=20)**

(a) A symmetrical square wave of peak to peak amplitude V and frequency f is applied to a high-pass RC circuit. Show that percentage tilt p is given by

$$p = \left(\frac{1 - e^{-1/2fRC}}{1 + e^{-1/2fRC}} \right) \times 200\%$$

If tilt is small, show that this reduces to

$$p = \left(\frac{1}{2fRC} \right) \times 100\%$$

(b) Describe the successive approximation A/D conversion principle. With the neat diagram, explain this type of A/D converter.

Define conversion time and resolutions of an AD C.

(c) Write short notes on the following

(i) Sequential and Random Access memories

(ii) Semi-conductor memories

5. Attempt *any two* of the following : **(10x2=20)**

(a) What is higher order active filter ? Design an active second order high pass filter at a cut - off frequency of 2 KHz.

(b) What are the two basic modes in which the 555 timer operates ?

Design a 1 KHz square wave generator using 555 timer for duty cycle of 25%.

Write few applications of 555 timer.

(c) Explain the following

(i) Series, shunt and switching regulators

(ii) Fixed and adjustable voltage IC regulators.

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