Printed Pages : 4 TEC-304

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

PAPER ID : 3071 Roll No.

B. Tech.

(SEM. III) EXAMINATION, 2008-09

PULSE & DIGITAL ELECTRONICS

Time : 3 Hours] *[Total Marks : 100*

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

*(ii) All questions carry **equal** marks.*

(iii) Be precise in your answer.

*(iv) **No** second answer book will be provided.*

1 Attempt any **four** parts of the following : 5×4=20

(a) What are the various parameters used to characterise logic families ? Explain.

(b) What is meant by open collector output of TTL gate ? What is its utility ? Explain its operation with the help of circuit diagram.

(c) What are the merits and demerits and ECL logic family with respect to TTL logic family ?

(d) Explain the operation of a 2-input CMOS NOR gate.

(e) Simplify the following function using K-map and implement the result using universal gates only :

$$F(A, B, C, D) = \sum m(1, 3, 4, 6, 8, 9, 11, 13, 15) + \sum d(0, 2, 14)$$

(f) Minimize the following Boolean function using tabulation method

$$f(w, x, y, z) = \sum m(0, 1, 4, 5, 6, 7, 9, 11, 15) + \sum d(10, 14)$$

2 Attempt any **four** parts of the following : 5×4=20

(a) Negate the unsigned binary number 00010101 and represent it in all four methods of negative binary number representation.

(b) Perform the subtraction on the following unsigned binary numbers using the 2's complement of the subtrahend.

(i) **1011 – 110000**

(ii) **11.11 – 0001.1110**

(c) Design a combinational circuit that compares two 3-bit numbers to check if they are equal. The circuit output is equal to 1 if the two numbers are equal and 0 otherwise.

(d) Draw a 4-bit adder-susbtractor circuit and explain its operation.

(e) Draw the logic diagram of a 2 to 4 line decoder using NOR gates only with enable input.

(f) Implement the following two Boolean functions with a PLA

$$F_1(x, y, z) = \sum m(1, 2, 4, 6)$$

$$F_2(x, y, z) = \sum m(0, 1, 6, 7)$$

3 Attempt any **two** parts of the following : **10×2=20**

(a) Explain the difference among a boolean equation, a state equation, a characteristic equation and a flip flop input equation.

(b) What is the difference between serial and parallel transfer ? Explain how to convert serial data to parallel and parallel data to serial. What types of register is needed ?

(c) Design a 4 bit synchronous binary counter using J-K flip-flops.

4 Attempt any **two** parts of the following : **10×2=20**

(a) Write short notes on the following :

(i) Random Access Memories

(ii) Memory Organization.

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

$$P = \frac{1 - e^{-\frac{1}{2}/RC}}{1 + e^{-\frac{1}{2}/RC}} \times 200\%$$

(c) What are the various types of A/D converter ? Explain any one of them with a neat block diagram in detail.

5 Attempt any **two** parts of the following : **10×2=20**

(a) What do you mean by active filter ? Design an active second order high pass filter at a cut-off frequency of 2 kHz.

(b) Describe with a neat sketch the function of each pin in 555 timer. Explain how will you connect it to perform as a monostable multivibrator ? Also draw the input and output waveforms of the circuit.

(c) Describe an adjustable voltage IC regulator. Also draw and explain the typical connection diagram for the regulator.
