MIDTERM EXAMINATION
Fall 2009
CS302- Digital Logic Design

Question No: 1 (Marks: 1) - Please choose one

Which of the number is not a representative of hexadecimal system

- ► 1234
- ► ABCD
- ► **1001**
- ► DEFH

Question No: 2 (Marks: 1) - Please choose one

The Unsigned Binary representation can only represent positive binary numbers

- ► **True**
- ► False

Question No: 3 (Marks: 1) - Please choose one

The values that exceed the specified range can not be correctly represented and are considered as _____

- ► **Overflow**
- ► Carry
- ► Parity
- ► Sign value

Question No: 4 (Marks: 1) - Please choose one

The 4-bit 2's complement representation of "-7" is _____

- ► 0111
- ► 1111
- ► **1001**
- ► 0110

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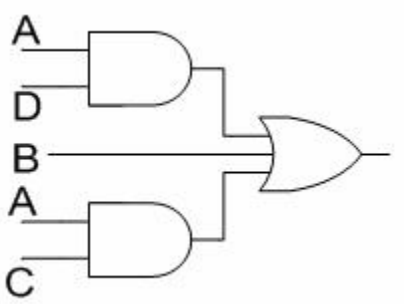
Question No: 5 (Marks: 1) - Please choose one

$\overline{A}B + \overline{A}B\overline{C} + AC$ is an example of _____

- ► Product of sum form
- ► **Sum of product form**
- ► Demorgans law
- ► Associative law

Question No: 6 (Marks: 1) - Please choose one

The diagram given below represents _____



- ► Demorgans law
- ► Associative law
- ► Product of sum form
- ► **Sum of product form**

Question No: 7 (Marks: 1) - Please choose one

The output of an AND gate is one when _____

- ► **All of the inputs are one**
- ► Any of the input is one
- ► Any of the input is zero
- ► All the inputs are zero

Question No: 8 (Marks: 1) - Please choose one

The 4-variable Karnaugh Map (K-Map) has _____ cells for min or max terms

- ► 4
- ► 8
- ► 12
- ► **16**

Question No: 9 (Marks: 1) - Please choose one

A BCD to 7-Segment decoder has

- ► 3 inputs and 7 outputs
- ► **4 inputs and 7 outputs**
- ► 7 inputs and 3 outputs
- ► 7 inputs and 4 outputs

Question No: 10 (Marks: 1) - Please choose one

Two 2-input, 4-bit multiplexers 74X157 can be connected to implement a ____ multiplexer.

- ► 4-input, 8-bit
- ► 4-input, 16-bit
- ► 2-input, 8-bit

► 2-input, 4-bit

Question No: 11 (Marks: 1) - Please choose one

The PROM
consists of a fixed non-programmable _____ Gate array configured as a decoder.

► **AND**
► OR
► NOT
► XOR

Question No: 12 (Marks: 1) - Please choose one

In ABEL the variable 'A' is treated separately from variable 'a'

► **True**
► False

Question No: 13 (Marks: 1) - Please choose one

The ABEL notation equivalent to Boolean expression A+B is:

► A & B
► A ! B
► **A # B**
► A $ B

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Question No: 14 (Marks: 1) - Please choose one

If an active-HIGH S-R latch has a 0 on the S input and a 1 on the R input and then the R input goes to 0, the latch will be _____.

► **SET**
► RESET
► Clear
► Invalid

Question No: 15 (Marks: 1) - Please choose one

Demultiplexer has

► Single input and single outputs.
► Multiple inputs and multiple outputs.
► **Single input and multiple outputs.**
► Multiple inputs and single output.

Question No: 16 (Marks: 1) - Please choose one

Which one is true:

► **Power consumption of TTL is higher than of CMOS**
► Power consumption of CMOS is higher than of TTL
► Both TTL and CMOS have same power consumption
► Power consumption of both CMOS and TTL depends on no. of gates in the circuit.

Question No: 17 (Marks: 1)

Briefly state the basic principle of **Repeated Division-by-2** method.

Repeated Division-by-2

Repeated Division-by-2 method allows decimal numbers of any magnitude to be converted into binary. In this method the Decimal number to be converted into its Binary equivalent is repeatedly divided by 2. The divisor is selected as 2 because the decimal number is being converted into Binary a Base-2 Number system. Repeated division method can be used to convert decimal number into any Number system by repeated division by the Base-Number. For example, the decimal number can be converted into the Caveman Number system by repeatedly dividing by 5, the Base number of the Caveman Number System. The Repeated Division method will be used in latter lectures to convert decimal into Hexadecimal and Octal Number Systems. In the Repeated-Division method the Decimal number to be converted is divided by the Base Number, in this particular case 2. A quotient value and a remainder value is generated, both values are noted done. The remainder value in all subsequent divisions would be either a 0 or a 1. The quotient value obtained as a result of division by 2 is divided again by 2. The new quotient and remainder values are again noted down. In each step of the repeated division method the remainder values are noted down and the quotient values are repeatedly divided by the base number. The process of repeated division stops when the quotient value becomes zero. The remainders that have been noted in consecutive steps are written out to indicate the Binary equivalent of the Original Decimal Number.

Question No: 18 (Marks: 1)

Briefly state the basic principle of **Repeated Multiplication-by-2** Method.

Repeated Multiplication-by-2 Method

An alternate to the Sum-of-Weights method used to convert Decimal fractions to equivalent Binary fractions is the repeated multiplication by 2 method. In this method the number to be converted is repeatedly multiplied by the Base Number to which the number is being converted to, in this case 2. A new number having an Integer part and a Fraction part is generated after each multiplication. The Integer part is noted down and the fraction part is again multiplied with the Base number 2. The process is repeated until the fraction term becomes equal to zero. Repeated Multiplication-by-2 method allows decimal fractions of any magnitude to be easily converted into binary. The conversion of Decimal fraction 0.625 into Binary equivalent using the Repeated Multiplication-by-2 method is illustrated in a tabular form. Table 2.4. Reading the Integer column from bottom to top and placing a decimal point in the left most position gives 0.101 the binary equivalent of decimal fraction 0.625

Question No: 19 (Marks: 2)

Draw the circuit diagram of a Tri-State buffer.

Question No: 20 (Marks: 3)

Add -13 and +7 by converting them in binary system your result must be in binary.

Question No: 21 (Marks: 5)

Explain "Sum of Weights" method with example for "Octal to Decimal" conversion

1. Sum-of-Weights Method

Sum-of-weights as the name indicates sums the weights of the Binary Digits (bits) of a Binary Number which is to be represented in Decimal. The Sum-of-Weights method can be used to convert a Binary number of any magnitude to its equivalent Decimal representation. In the Sum-of-Weights method an extended expression is written in terms of the Binary Base Number 2 and the weights of the Binary number to be converted. The weights correspond to each of the binary bits which are multiplied by the corresponding binary value. Binary bits having the value 0 do not contribute any value towards the final sum expression.

The Binary number 101102 is therefore written in the form of an expression having weights $2^0, 2^1, 2^2, 2^3$ AND 2^4 corresponding to the bits 0, 1, 1, 0 and 1 respectively. Weights 2^0 AND 2^3 do not contribute in the final sum as the binary bits corresponding to these weights have the value 0.

$10110_2 = 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$

= 16 + 0 + 4 + 2 + 0

= 22

Question No: 22 (Marks: 10)

Explain the Implementation of an Odd-Parity Generator Circuit i.e by drawing function table, maping it to K-map and then simplifying the expression.