

Name :

Roll No. :

Invigilator's Signature :

CS / B.TECH(BME) / SEM-4 / EC-405 / 2010
2010

DIGITAL ELECTRONICS CIRCUIT

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

10 × 1 = 10

- i) Which of the following is a weighted code ?
 - a) Excess-3
 - b) Gray
 - c) 8421
 - d) None of these.
- ii) The octal equivalent of $(444.456)_{10}$ is
 - a) 674.735
 - b) 673.5136
 - c) 674.35136
 - d) None of these.
- iii) The decimal equivalent of $(1110.11)_2$ is
 - a) 15.75
 - b) 14.75
 - c) 13.33
 - d) 14.33.



- iv) The Gray code of $(110101)_2$ is
- a) 101111 b) 100110
c) 111010 d) 101011.
- v) The output (Y) of an XNOR gate with inputs A and B is expressed as
- a) $Y = A' B + AB'$ b) $Y = A + A' B$
c) $Y = B + A' B$ d) $Y = AB + A' B'$.
- vi) A decoder with enable input can be used as
- a) multiplexer b) encoder
c) parity generator d) demultiplexer.
- vii) The resolution of an 8-bit A/D converter is
- a) 0.62% b) 0.38%
c) 1.25% d) 0.39%.
- viii) The memory, which is ultraviolet erasable and electrically programmable is
- a) PROM b) EEROM
c) ROM d) EPROM.
- ix) A ring counter with 5 flip-flops will have
- a) 5 states b) 32 states
c) 10 states d) none of these.
- x) The flip-flop, free from race around problem is
- a) J-K flip-flop
b) Master-slave J-K flip-flop
c) R-S flip-flop
d) none of these.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Obtain the minimal SOP expression for the following function and implement the same using only NAND gates :

$$F (A, B, C, D) = \Sigma (1, 4, 7, 8, 9, 11) + \Sigma d (0, 3, 5).$$

2 + 3

3. What is the difference between combinational & sequential circuits ? Implement a full adder with a decoder. 2 + 3

4. What is Boolean algebra ? What are the basic laws of Boolean algebra ?

Simplify the expression :

$$A (A + B + C) (A' + B + C) (A + B' + C) (A + B + C')$$

1 + 2 + 2

5. Explain the race around condition. Realise an XOR gate with the minimum number of NAND gates. 2 + 3

6. What is the pulse triggered flip-flop ? Which has the most advantages — pulse triggered or edge triggered and why ?

2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. What is a multiplexer ?

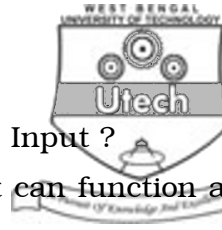
What is the function of a multiplexer's select line ?

Explain the difference between a DEMUX and MUX.

Design a 32 to 1 MUX using 8 to 1 Multiplexer.

State the application of MUX.

1 + 2 + 2 + 8 + 2



8. What is the function of a Decoder's Enable Input ?
Show that a Decoder with an Enable Input can function as a Demultiplexer.
What is meant by Edge Triggering ?
Give the difference between positive and negative edge triggerings.
Show how the JK Flip-flop can be operated as a Toggle Flip-flop.
What advantages does a JK Flip-flop have over an SR Flip-flop.
 $2 + 4 + 1 + 2 + 4 + 2$
9. What is a Ripple Counter ?
Explain the difference between the performance of asynchronous and synchronous counters.
What are the primary disadvantages of an asynchronous counter ?
Draw the logic diagram of the 4-bit binary ripple counter.
Design a mod-6 counter.
 $1 + 2 + 2 + 5 + 5$
10. What are the differences between Mealy Machine and Moore Machine ?
Write the definition of Finite State Machine.
What are the Glitches ?
How Glitches can be avoided using Clock suppression ?
 $3 + 2 + 2 + 8$
11. Write short notes on any *three* of the following : 3×5
- a) TTL NAND gate
 - b) Ring counter
 - c) Gray code
 - d) PLA.
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