



Name :

Roll No. :

Invigilator's Signature :

CS/MCA/SEM-1/MCA-101/2012-13

2012

**COMPUTER ORGANISATION AND
ARCHITECTURE**

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 : $10 \times 1 = 10$
 - i) 'Cycle Stealing' is associated with
 - a) Data transfer among registers
 - b) DMA
 - c) Pipelining
 - d) Microprogramming.
 - ii) The largest integer that can be represented in signed @'s complement representation using n bits is
 - a) $2n - 1$
 - b) 2^n
 - c) 2^{n-1}
 - d) $2^n - 1$.
 - iii) Using an additional NOT gate, a JK flip-flop can be converted into
 - a) T flip-flop
 - b) RS flip-flop
 - c) Master Slave flip-flop
 - d) D flip-flop.



- iv) A microprocessor has a data bus with 64 lines and an address bus with 32 lines. The maximum number of bits that can be stored in this memory is
- a) 32×2^{32} b) 32×2^{64}
c) 64×2^{32} d) 64×2^{64} .
- v) The expression 'delayed load' is used in context of
- a) Processor-printer communication
b) Memory-monitor communication
c) Pipelining
d) Computer arithmetic.
- vi) Break point is used for
- a) Stopping a program at a desired place
b) Manipulating the stack
c) Executing each instruction individually
d) Calling a subroutine.
- vii) A truth table of n variables has minterms.
- a) n^2 b) $(n - 1)^2$
c) 2^n d) 2^{n-1} .
- viii) Which of the following shift operations divide a signed binary number by 2 ?
- a) Logical left shift b) Logical right shift
c) Arithmetic left shift d) Arithmetic right shift.
- ix) Dual of $a + b * c$ is
- a) $(a + b) * (a + c)$ b) $a * (b + c)$
c) $a' * (b' + c')$ d) $(a' + b') * (a' + c')$.
- x) A memory accessed by content is called
- a) Associative memory
b) Content associative memory
c) All of the above
d) None of these.

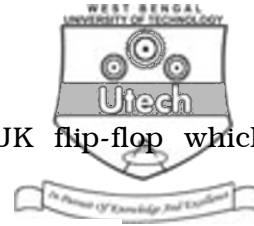
**GROUP – B****(Short Answer Type Questions)**Answer any *three* of the following. $3 \times 5 = 15$

2. a) Why NAND gate called universal logic gate ? 2
- b) Write the differences of 1's complement and 2's complement representations of the binary number system. 3
3. Convert a JK flip-flop into a D flip-flop. 5
4. Verify the de Morgan' theorem by means of truth table. 5
5. Why Grey code is called self-reflective code and Excess-3 code is called self-complementing code ? What are the problems with Grey code ? 5
6. Construct a 5×32 decoder with the help of 2×4 decoders. 5

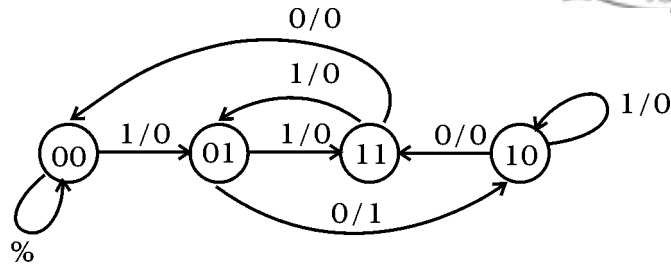
GROUP – C**(Long Answer Type Questions)**Answer any *three* of the following. $3 \times 15 = 45$

7. a) Write an algebraic function for the given function and simplify algebraically $F (X, Y, Z) = \Pi (0, 1, 4, 5)$
- b) Simplify algebraically $[X' (Y' + Z') (X + Y + Z')]$.
- c) Design a combinational circuit that can convert a BCD code to it's equivalent Grey code.
- d) Design a block diagram of a 4 – bit adder/subtractor circuit. $3 + 3 + 3 + 6$
8. a) Write down the advantage and disadvantage of Karnaugh map ? Why does 11 comes before 10 in Karnaugh map ?
- b) How many input line(s) must be present in a demultiplexer that has 32 possible output lines ?
- c) Why is gated D latched called "transparent" latch ?
- d) Construct a one bit BCD adder using two 4 — bit Binary adder and an additional external circuit.

 $(2 + 2) + 1 + 2 + 8$



9. a) Design a sequential circuit using JK flip-flop which realizes the following scale diagram :



- b) Draw a schematic diagram of JK Master-Slave flip-flop.
- c) Find out the value of R if $(125)_R = (203)_5$. 8 + 4 + 3
10. a) Design a 8 : 1 MUX using two 4 : 1 MUX.
- b) Design a MOD 10 synchronous counter.
- c) Design the circuit using Multiplexer.
11. Write short notes on any *three* of the following : 3 × 5
- Universal Gate
 - Addressing Mode
 - Cache Memory.
 - Von Neuman Architecture
 - 2's complement subtraction.

