



বঙ্গবিশ্ববিদ্যালয়

WEST BENGAL STATE UNIVERSITY
B.Sc. Honours/Programme 4th Semester Examination, 2021



CMSHGEC04T/CMSGCOR04T-COMPUTER SCIENCE (GE4/DSC4)

COMPUTER SYSTEM ARCHITECTURE

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Question No. 1 is compulsory. In addition answer any four from the rest

1. Answer any **four** questions from the following: 2×4 = 8
 - (a) Differentiate between combinational circuit and sequential circuit.
 - (b) How to represent a binary floating point number?
 - (c) What is meant by instruction?
 - (d) What is propagation delay of a circuit?
 - (e) Why Gray Code is called a unit-distance code?
 - (f) What do you mean by addressing mode?
 - (g) Draw a NAND gate using only NOR gates.
 - (h) Differentiate between a latch and a flip-flop.

2. Define signed and unsigned binary numbers. What are the advantages of using 2's complement representation over 1's complement representation of binary numbers? Perform the following: 3+3+2

$$(1011)_2 + (1100111)_2 = (?)_{16}$$

3. Simplify the following expression into SOP using K map 4+4
 $F(w, x, y, z) = \sum m(0, 1, 2, 4, 5, 12, 13, 14) + \text{don't care conditions } \sum d(6, 8, 9)$.
 Realize it using only NAND gates.

4. (a) What is the role of Program Counter? 4+4
 (b) Realize a full adder circuit using half adders.

5. (a) Implement a 8-to-1 MUX using two 4-to-1 MUX. 4+4
(b) What is magnitude comparator? Write the truth table and draw the logic circuit of a single-bit magnitude comparator.
6. (a) What is JK flip-flop? Draw a JK flip-flop using only NAND gates. 4+2+2
(b) What is a Race Around condition in JK flip-flop?
(c) Why JK flip-flop is preferred over SR flip-flop?
7. (a) Define the terms Instruction Cycle, Fetch Cycle, Execute Cycle. 6+2
(b) What is a System Bus?
8. Write short notes on (any *two*): 4×2 = 8
(a) Cache Memory
(b) Memory Hierarchy
(c) Synchronous Counter vs. Asynchronous Counter
(d) Direct addressing mode vs. Indirect addressing mode.

N.B. : Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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