Sri Lanka Institute of Information Technology

B. Sc. Special Honours Degree/ Diploma
in
Information Technology

Repeat Examination
Year 1, Semester 1 (2016)

IT100 – Computer Fundamentals

Duration: 2 Hours

Instructions to Candidates

- This paper contains 4 questions on 5 pages.
- This paper is preceded by a 10-minute reading period. The supervisor will indicate when answering may commence.
- Each question carries equal marks.
- Answer ALL questions.
- Read all questions before start answering.
- The total marks obtainable for this examination is 100.
- This examination accounts for 60% of the module assessment.
- This is a close book examination.

Question 1 – Data Representation and Number Systems (25 Marks)

a) Explain how a decimal number is converted to binary, octal and hexadecimal and vice versa. Give an example for each conversion. (show all steps in conversion.)

(6 Marks)

b) Perform the operation -35 - 40 using 2s complementary arithmetic.

(4 Marks)

c) Use the binary division and shift and adding methods to solve the following expressions (show all intermediate steps)
   a. 42 / 12
   b. 15 x 13

(6 Marks)

d) Give the binary number representation of decimal number 127.375 (show all steps)

(3 Marks)

e) What is the purpose of coding schemes? Explain two different coding schemes in brief.

(6 Marks)

Question 2 - Logic Circuits and Controls   **(25 Marks)**

a) Obtain the simplified equations for the following Karnaugh maps

(a)

AB \ CD				
1	1	0	1
0	0	0	1
0	0	0	0
1	1	0	1

(b)

AB \ CD				
1	0	0	0
1	1	0	0
1	1	0	1
1	0	0	0

(c)

AB \ CD				
1	0	0	0
1	1	1	1
1	0	0	1
1	0	0	0

(d)

AB \ CD				
1	1	0	0
0	1	1	1
1	1	1	0
1	0	1	0

                                               (8 Marks)

b) A combinational logic circuit takes a 3 binary inputs A, B and C where each combination represent decimal number. Here A is the most significant bit (MSB). For the decimal input 0, 2,3,4,5 and 6 the output S generate 1 and for all the other inputs, the circuit generate 0.

    i). Write down the truth table for the above-mentioned circuit.

                                                (3 Marks)

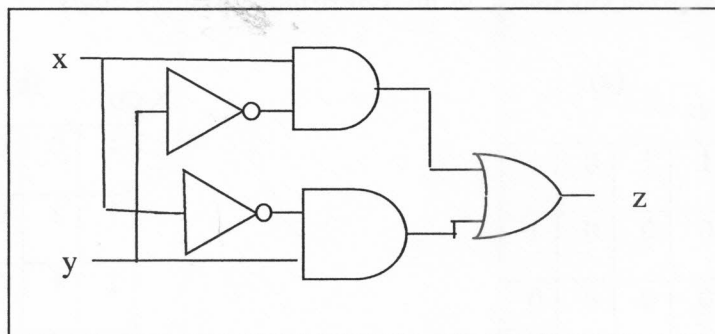   ii). Write the Boolean Expression for the output S in Sum-of-Product form (SOP).

                                                (2 Marks)

    iii). Simplify S you wrote in part (b) using laws and rules of Boolean algebra.

                                                (4 Marks)

18/05/2016

iv). Draw the circuit diagram for the simplified expression in part (b) using Basic Logic Gates.

(3 Marks)

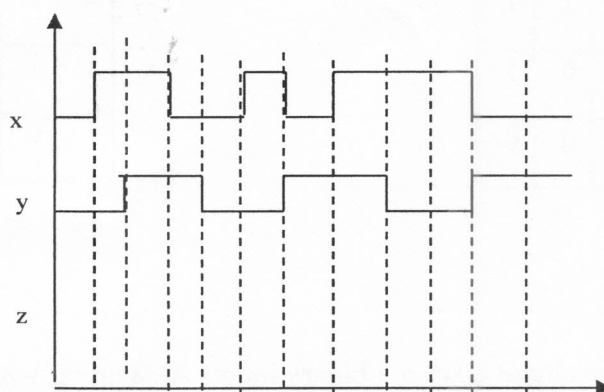c)   Consider the following combinational circuit.

i).   Draw the truth table for the above circuit.

(2 Mark)

ii). The inputs of the above circuit are given as X and Y in the following graph. Copy and complete the output of the circuit in the same graph.

(3 Marks)

18/05/2016

Question 3 - Logic Circuits and Controls   (25 Marks)

a) Write short notes about following Topics.
   i)   Clock Signal
   ii) Latch

                                                                              (4 Marks)

b) Write answers for following questions related to JK Flip Flop.
   i)   Draw the circuit diagram
   ii) Draw the truth table

                                                                              (6 Marks)

c) Design 3-8 decoder combining two 2-4 decoders and enable input.

                                                                              (4 Marks)

d) Draw the block diagram to implement 16X1 Multiplexer, by combining only 8X1 and
   2X1 Multiplexers.

                                                                              (4 Marks)

e) Draw a Programmable Logic Array to represent the result of following truth table.

X	Y	Z	F1	F2
0	0	0	0	0
0	0	1	1	0
0	1	0	0	0
0	1	1	1	0
1	0	0	1	1
1	0	1	0	0
1	1	0	0	0
1	1	1	0	1

                                                                              (7 Marks)

18/05/2016

Question 4 – Computer Organization and Memory   (25 Marks)

a) Briefly explain what is an Operating System with the aid of a diagram

(2 Marks)

b) List down 2 services that facilitate Information Management.

(2 Marks)

c) Differentiate internal and external memory with the aid of a diagram.

(4 Marks)

d) Following diagram illustrate 3 instructions (**Ins1, Ins2** and **Ins3**) which used to perform subtraction operation.
   Ex-55-25=30

Address	Memory
10	Load A 12 (Ins 1)
11	Sub A 14 (Ins 2)
12	Store A 13 (Ins 3)
13	55
14	
15	25

o **Ins 1**- Load Accumulator with the content stored in memory location 13
o **Ins 2**- Subtract the Accumulator content with the content stored in memory location 15
o **Ins 3**- Store the content of the accumulator at memory location 14

Briefly explain above subtraction process with aid of a diagram.

Hint: Use PC, MAR, MDR, CIR registers, Accumulator and necessary buses.

(10 Marks)

e) Write short notes about following topics.
   i)   Locality of reference principle
   ii)   Memory Refresh

(4 Marks)

f) If a PC has 2048 MB of main memory (RAM). How many bits are used to address the memory locations of the PC?

(3 Marks)

End of Question Paper

18/05/2016