Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree
In
Information Technology

Final Examination
Year 1, Semester 1 (2018)

IT1020 - Introduction to Computer Systems

Duration: 2 Hours

October 2018

Instruction to Candidates:

- This paper is preceded by 10 minutes reading period. The supervisor will indicate when answering may commence.
- This paper has 4 questions.
- Answer all questions in the booklet given.
- The total marks for the paper is 100.
- This paper contains 4 pages, including the cover page.
- Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.

Question 1 **[25 Marks]**

Components of the computers and Operating Systems

I. The Central Processing Unit (CPU) of a computer is comprised of three main parts. Briefly explain these three (3) parts. (6 Marks)

II. Briefly explain the types and characteristics of primary and secondary memory. (4 Marks)

III. Explain four (4) storage device features. (4 Marks)

IV. Using the examples explain the Random Access and Sequential Access. (4 marks)

V. What is an Operating System? (2 Marks)

VI. Explain three (3) operating system functions. (3 Marks)

VII. Explain two (2) differences when you compare Windows and Linux operating systems. (2 Marks)

Question 2 **[25 Marks]**

K-Maps and Digital Logic Circuits.

I. What is Karnaugh Map (K-Map) Format? Why K-Map is used with Boolean Expressions. (2 Marks)

II. Draw a Logic Circuit for the Boolean Expression given bellow.

1. $Y = \overline{ABC} + \overline{B}C + \overline{A}B$ (2 Marks)

III. Simplify the above mentioned Boolean Expression using K-map method. (2 Marks)

[Hint: $X + \overline{X} = 1$]

IV. A Boolean function is listed as follows:

$F(A,B,C,D) = \sum m\,(0,2,3,5,7,8,10,15)$ and Don't care conditions: $d(A,B,C,D) = \sum m\,(9, 11, 13)$

(a) Derive a truth table for the above Boolean function. (2 Marks)

(b) Obtain the Boolean function in SOP (Sum-of-product) form. (2 Marks)

(c) Simplify the above function in b using K-map. (4 Marks)

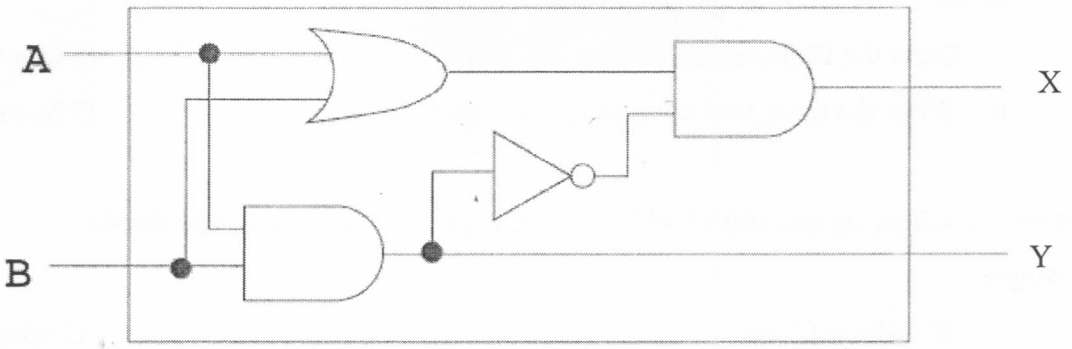
(d) Draw the circuit diagram for the simplified expression in c using basic logic gates. (2 Marks)

V. Draw the logic gates and derive the truth tables for the following logic gates.

(a) NOR
(b) NAND

(2 Marks)

VI. What are the possible output values for X and Y of the following logic circuit?



(2 Marks)

(a) Design a logic circuit to get the same output for the X and Y using only XOR gate and AND Gate.

(2 Marks)

(b) Extend your circuit and use two 2-to-4 decoders and convert it to a full adder circuit.

(3 Marks)

Question 3 [25 Marks]

I. What are the main components involved in data transmission? (4 Marks)

II. Draw how the devices are inter connected in ADSL connections in home environment. (5 Marks)

III. State and draw two types of antennas used in wireless data transmission. (5 Marks)

IV. Write the differences between the hub and the Switch. (4 Marks)

V. State three main transmission impairments. (3 Marks)

VI. Compare and contrast virus, worms and Trojan horses. (4 Marks)

Question 4 **[25 Marks]**

I. ISO/OSI seven Layer Architecture.

a. Draw the ISO/OSI 7 layer architecture. (3 Marks)

b. Write the main functions of Layer 3 and Layer 6. (3 Marks)

II. Consider the following classful IP address: 172.18.0.25. Provide answers for the followings.

a. IP address Class (1 Mark)

b. Prefix (1 Mark)

c. Subnet Mask (1 Mark)

d. Network Address (1 Mark)

e. Direct Broadcast Address (1 Mark)

f. First two usable IP addresses (2 Marks)

g. Last two usable IP addresses (2 Marks)

h. Maximum number of devices in the network (2 Marks)

III. Briefly describe the following terms (8 Marks)

a. Multicasting

b. Encryption

c. Protocol

d. Full duplex Transmission

***** END OF PAPER *****