



Sri Lanka Institute of Information Technology

**B.Sc. Special Honors Degree/ Diploma  
in  
Information Technology**

**Final Examination  
Year 1, Semester I – June Intake (2018)**

**IT 1030 – Mathematics for Computing**

**Duration: 2 Hours**

**October, 2018**

**Instructions to Candidates:**

- ◆ This paper contains 4 questions.
- ◆ **Answer all** the questions in the paper itself.
- ◆ Total marks for the paper is 100 and the paper carries 50% weight for the final mark.
- ◆ This paper contains 8 pages without the cover page.
- ◆ Calculators are not allowed.

**Question 01****25 marks**

- a) For instance, suppose you are working at a health food store, and you need to mix almonds worth \$5/lb. with cashews worth \$9/lb to make 10lb of a mixture worth \$7/lb. Following 2 equations can be used to find the number of pounds of almonds and cashew to put in the mixture.

$$x + y = 10$$

$$5x + 9y = 70$$

- i) Write down the above 2 equations in matrix form  $A\mathbf{x} = \mathbf{b}$ . (2 marks)

- ii) Find the inverse of the coefficient matrix  $A$ . (4 marks)

- iii) Show that  $AA^{-1} = I$ . (Show the calculations.) (3 marks)

- iv) Using answer in (iii) find the number of pounds of almonds and cashew to put in the mixture. (4 marks)

- b) Suppose that a department contains 10 men and 15 women. How many ways are there to form a committee with six members if it must have the same number of men and women? (6 marks)

- c) Expand the following using Binomial Theorem.  
 $(2x - 3)^4$

(6 marks)

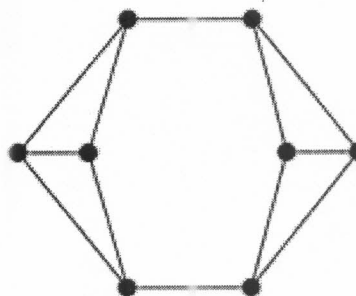
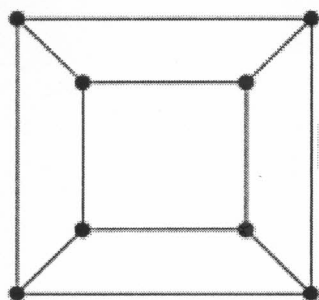
**Question 02****25 marks**

- a) Find the inverse of the following function

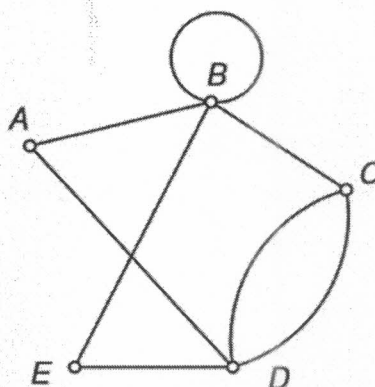
(8 marks)

$$f: R \rightarrow R \quad f(x) = \frac{x+5}{3}$$

- b) Determine whether the following graphs are isomorphic. If they are not give an isomorphic invariant that they do not share. (4 marks)



- c) Determine whether the given graph has a Hamilton circuit, Hamilton path, Euler circuit and Euler path. Write down the answer in the following table. If it does not exist give reasons. (8 marks)



Hamilton circuit	
Hamilton path	
Euler circuit	
Euler path	

- d) Draw a graph with the degree sequence 4, 4, 3, 2, 1. If a graph cannot be drawn give reasons. (5 marks)

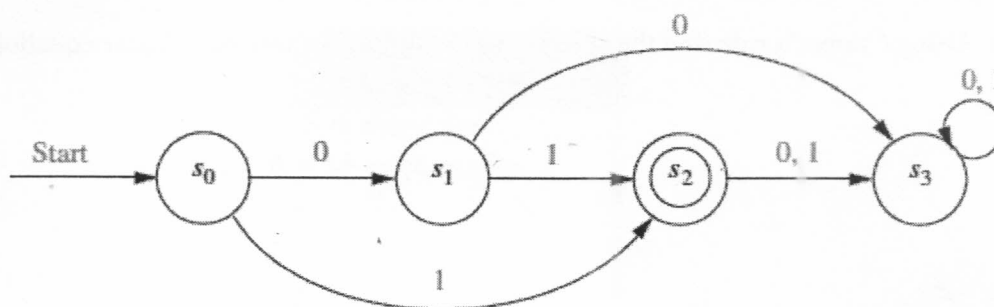
**Question 03**

**25 marks**

- a) Evaluate the following definite integral  $\int_1^2 \left| \frac{(x-4)}{2} \right| dx$ . (8 marks)

b) Consider the following finite state machine.

(12 marks)



i) What is the initial state of A?

(1 marks)

ii) What are the states of A?

(2 marks)

iii) What are the input symbols of A?

(2 marks)

iv) What are the accepting states of A?

(2 mark)

v) Find the annotated next state table for A.

(5 marks)

c) Draw the graph for the following adjacency matrix.

(5 marks)

$$A = \begin{pmatrix} 1 & 0 & 2 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{pmatrix}$$

**Question 04****25 marks**

a) Using Cramer's rule find the solution of the following system of linear equations.

$$2x - 2y + z = 0$$

$$x + y + z = 2$$

$$-3x + 3y + 4z = 0$$

(10 marks)

b) Consider the following linear system.

$$x + y + z = -1$$

$$-2y + z = 0$$

$$x + z = 0$$



i) Write down the augmented matrix of the above system of linear equations. (2 marks)

ii) Reduce the augmented matrix into its echelon form. (7 marks)

iii. Find the solution using the answer in (ii). (6 marks)

*End of the Paper*