Sri Lanka Institute of Information Technology

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

Repeat

~~Final~~ Examination
Year 1, Semester I (2017)

MA140 – Mathematics for Information Technology

Duration: 2 Hours

December 2017

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 7 pages without the cover page.

- ◆ Calculators are not allowed.

a) Assume that $A = \begin{bmatrix} 1 & 2 \\ 0 & 0 \end{bmatrix}$. Find $3A - A^2 + 5I$.   (6 marks)

b) Find the Eigen values and eigenvectors of $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$.   (8 marks)

c) Consider the following system of linear equations.

$$3x + 2y = -1$$
$$4x - 5y = 14$$

    i. Write the above 2 equations in matrix form $Ax = b$.   (2 marks)

    ii. Find the inverse of the coefficient matrix.   (5 marks)

    iii. Using (ii), solve the above linear equations.   (4 marks)

Question 02   25 marks

a) Consider the following function $f(x)$;
$$f(x) = -x^2 + 36$$

    i)   Find the critical values of the above function.   (5 marks)

    ii)   Find the slope of the tangent line at the point (0, 36).   (4 marks)

    iii)   Find the intervals in which f(x) is increasing or decreasing.   (6 marks)

    iv)   Draw the graph of $f(x)$ on the interval [-6, 6].   (6 marks)

b) If $\theta = 45^o$ and $r = 4$ then find the length of the subtending arc.   (4 marks)

Question 03   25 marks

a) Evaluate the following indefinite integral $\int (x^3 - 10\sqrt{x} + 20)dx$.   (5 marks)

b) Evaluate the following definite integral $\int_4^6 (x^2 + x + 5) + |x - 5| \, dx$.   (6 marks)

c) Use Simpson's rule to approximate the value of $\int_0^2 (x^2 - x + 3)dx$ when $n = 4$.

(9 marks)

d) Find the exact value of $\int_0^2 (x^2 - x + 3)dx$.

(5 marks)

Question 04   25 marks

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

$$x + 2y - z = 2$$
$$2x + 2y + 2z = 12$$
$$x - y + 2z = 5$$

(8 marks)

b) Consider the following system of linear equations.

$$4x + 5y - 2z = -14$$
$$7x - y + 2z = 42$$
$$3x + y + 4z = 28$$

i) Write the above 3 equations in matrix form $Ax = b$ (2 marks)

ii) Find the inverse of the coefficient matrix A. (10 marks)

iii) Find the solution of the above linear system of equations using (ii). (5 marks)

End of the Paper