



**UNIVERSITY OF COLOMBO, SRI LANKA**



**UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING**



**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)**

**Academic Year 2014/2015 – 2<sup>nd</sup> Year Examination – Semester 3**

***IT3305: Mathematics for Computing-II***

***PART 2 - Structured Question Paper***

**15<sup>th</sup> March 2015**

**(ONE HOUR)**

**To be completed by the candidate**

BIT Examination Index No: .....

**Important Instructions:**

- The duration of the paper is **1 (One) hour**.
- The medium of instruction and questions is English.
- This paper has **3 questions** and **11 pages**.
- **Answer all questions.**
- **Question 1 carries 40% marks and the other questions carry 30% marks each.**
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.  
If a page is not printed, please inform the supervisor immediately.

**Questions Answered**

Indicate by a cross (×), (e.g. ☐ × ☐) the numbers of the questions answered.

<b>To be completed by the candidate by marking a cross (×).</b>	1	2	3	
To be completed by the examiners:				

1)

(a) Consider three matrices,  $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ ,  $B = \begin{bmatrix} 3 & 0 \\ -2 & 1 \end{bmatrix}$  and  $C = \begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix}$ .

Verify that

by evaluating both the matrix expressions separately

**(10 marks)**

(b)

(i). Define the inverse of a matrix.

(05 marks)

**ANSWER IN THIS BOX**

(ii). Let  $A = \frac{1}{3} \begin{pmatrix} 2 & -2 & 1 \\ 1 & 2 & 2 \\ 2 & 1 & -2 \end{pmatrix}$ .

(I) Show that the product of the two matrices A and  $A^T$ , is commutative.

(05 marks)

**ANSWER IN THIS BOX**

(II) Find  $A^{-1}$ .

(5 marks)

**ANSWER IN THIS BOX**

(c) Consider the following system of linear equations.

$$2x + y - z = 3$$

$$x + 3y + 2z = -1$$

$$2x + 2y + z = 2$$

Solve the above equations using matrix operations.

(15 marks)

**ANSWER IN THIS BOX**

- 2) (a) To which value does the sequence  $x_n = \frac{2n-1}{2n+1}$  converge, as  $n$  tends to infinity? Justify your answer. (10 marks)

**ANSWER IN THIS BOX**

- (b) If  $\sin x \approx x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040}$ , find an approximate expansion for  $\cos x$ . (10 marks)

**ANSWER IN THIS BOX**

- (c) Find the area in the first quadrant bounded by the  $x$ -axis,  $y$ -axis and the curve  $y = 4 - x^2$ .

(10 marks)

**ANSWER IN THIS BOX**

3)

The number of emails received per day by a first year undergraduate student in a certain university is a discrete random variable with the following probability distribution function.

X	0	1	2	3	4	5	6	7	More than 7
Probability	a	2a	0.15	0.10	a	0.15	0.10	b	0

- (a) It is given that the probability of  $X$  is less than or equals 2, is 0.3. Calculate the values of  $a$  and  $b$ .

(05 marks)

**ANSWER IN THIS BOX**

**For a particular day, calculate the following for questions (b) to (f).**

(b) Calculate the probability of getting at least one email.

**(05 marks)**

**ANSWER IN THIS BOX**

(c) Calculate the probability of getting at most 3 emails.

**(05 marks)**

**ANSWER IN THIS BOX**

(d) Calculate the probability of getting more than 4 emails.

**(05 marks)**

**ANSWER IN THIS BOX**



(e) Calculate the probability of getting between 2 and 5 exclusive emails.

(05 marks)

**ANSWER IN THIS BOX**

(f) Calculate the expected number of emails.

(05 marks)

**ANSWER IN THIS BOX**

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