

SOUTH EASTERN UNIVERSITY OF SRI LANKA

FIRST EXAMINATION IN BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY - 2016/2017

SEMESTER – I, SEPTEMBER/OCTOBER 2018

CMS11013 – Mathematics for ICT

Answer all Questions.

Time Allocated: 03 hours

Question No. 01

- a. Among a group of people, 40 liked red, 30 liked blue and 30 liked green. Liked both red and green, 5 liked both red and blue, 10 liked both green and blue. If 86 of them liked at least one colour, how many of them liked all three colours.

(25 Marks)

- b. Prove the following using the laws of Algebra.

- i. $(A' \cup B)' \cap A' = \phi$
- ii. $[(B-A)' \cap A] - A' = A$

(25 Marks)

- c. In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

(20 Marks)

- d. Represent each of the following sets in a separate venn diagram?

- i. $(A \cap B) \cup (A \cup B)'$
- ii. $(A' \cap B)'$
- iii. $A' \cup B'$

(30 Marks)

[Total: 100 Marks]

Question No. 02

- a. A firm wishes to have their safe protected by an alarm during night time. It must be possible to switch the alarm on or off. The alarm should ring if the safe door opens and it is dark.

A=0 Safe door opens; A=1: Safe door closes

B=0 It is dark; B=1: It is not dark

- i. Construct the truth table for the scenario.
- ii. Obtain the minimal Boolean expression
- iii. Design a logic circuit.

(60 Marks)

- b. Consider the following propositional variables

P: It is hot

Q: It is humid

R: It is raining

Represent the following symbolically.

- i. It is hot and humid
- ii. It is raining and it is not hot
- iii. It is neither hot nor humid
- iv. If it is humid, then it is hot

(30 Marks)

- c. Validate the equivalency of the proposition $\sim(p \wedge q)$ and $(\sim p) \vee (\sim q)$ using truth tables.

(10 Marks)

[Total: 100 Marks]

Question No. 03

- a. In a school, there are 880 students in total. If there is 20% more boys than girls, find the number of boys and girls in the school.

(20 Marks)

- b. The perimeter of the rectangle is 158 cm. If the length is 7 more than 3 times the width, find the area of the rectangle.

(20 Marks)

- c. Simplify the following expressions and provide the answers with rational denominators.

i.
$$\frac{(x+2)(3x-1)}{x^2}$$

ii.
$$\frac{3}{\sqrt{9-2\sqrt{2}}} - \frac{1}{\sqrt{10-\sqrt{5}}}$$

(30 Marks)

- d. Solve the following equations.

i. $6^4 = 36^{x+1}$

ii. $9 \times 3^{x+1} = 1/27$

(30 Marks)

[Total: 100 Marks]

Question No 4)

Given below is the distribution of birth weights, in kg, of 1000 babies. Answer the questions below (4(a)- 4(d)) based on the frequency table given below.

Gas Consumption (In Units)	Frequency (f)
0.0 – 0.5	1
0.5 – 1.0	2
1.0 – 1.5	7
1.5 – 2.0	10
2.5 – 3.0	625
3.5 – 4.0	320
4.5 – 5.0	30
5.0 – 5.5	3
5.5 – 6.0	2

a. Find the mean of the distribution?

(25 Marks)

b. Calculate the standard deviation and variance of the distribution?

(25 Marks)

c. What is the median of the distribution?

(25 Marks)

d. Find the quartiles (Q1, Q2 and Q3) and calculate the interquartile range of the distribution.

(25 Marks)

[Total: 100 Marks]

Question No 05

- a. A container opened at the top and made up of metal sheet is in the form of a frustum of a cone of height 16cm with radii of its lower and upper ends as 8cm and 20cm respectively.
- Find the cost of milk which can completely fill the container, at the rate of Rs.20 per litre.
 - Find the cost of the metal sheet used to make the container, if the cost of metal sheet is Rs.8 per 100cm^2 (Take $\pi = 3.14$).

(40 Marks)

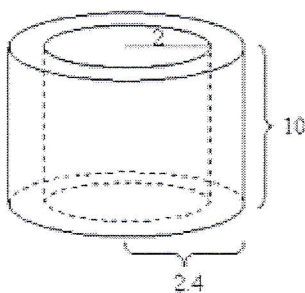
- b. Prove the following trigonometric equations.

i. $\frac{\tan x + \tan y}{\cot x + \cot y} = \tan x + \tan y$

ii. $\tan x + \cot x = \operatorname{Cosec} x \operatorname{Sec} x$

(30 Marks)

- c. The figure shows a section of a metal pipe. Given the internal radius of the pipe is 2 cm, the external radius is 2.4 cm and the length of the pipe is 10 cm. Find the total surface area of the pipe.



(30 Marks)

[Total: 100 Marks]

Question No 06

a. Differentiate with respect to x

i $y = \frac{(x+2)(3x-1)}{x^2}$

ii. $y = x^3 \sin x$

(30 Marks)

b. Calculate the following integrals

I $\int (x^2 + x - 1) dx$

ii $\int \sec(x/2) dx$

(30 Marks)

c. Differentiate $y = ax^2 + bx + c$ from first principles. This curve passes through the point $(0,1)$ and the gradient of the curve at the point $(-1/4, 7/8)$ is zero. Find the values of a , b and c .

(40 Marks)

[Total: 100 Marks]