

UNIVERSITY OF COLOMBO, SRI LANKA  
FACULTY OF ARTS  
FIRST YEAR EXAMINATION IN ARTS (SEMESTER I) – 2017/2018  
FND 1107 – BASIC MATHEMATICS

(Time: Two Hours)

**Answer any five (05) questions**

No. of questions: 07

No. of pages: 05

(Each question carries equal marks.)

Calculators are not permitted.

01.

i. Simplify and state whether each of the following is rational or irrational.

a)  $\frac{\sqrt{100}}{\sqrt{25}}$  (4 marks)

b)  $\sqrt{\frac{36}{9^2}}$  (3 marks)

c)  $\sqrt{\frac{36}{(x^2-2xy+y^2)}} \times \frac{\sqrt{x^2}-\sqrt{y^2}}{3}$  (5 marks)

ii. Simplify the followings.

a)  $\frac{3}{y} - \frac{1}{2y}$  (3 marks)

b)  $2\frac{7}{10} \div \frac{18}{25} - \left(4\frac{1}{2} - 1\right)$  (5 marks)

(Total : 20 marks)

**02.**

i. If  $x = 7, y = 10$  and  $z = 4$  then,

a) find  $A: A = x^2 + y^2$  (2 marks)

b) find  $B: B = x^2 + xy + y$  (3 marks)

c) find  $C: C = \frac{1}{x^2 + y^2}$  (3 marks)

d) find  $D: D = 2z + 3$  (2 marks)

ii. Make  $U$  as the subject of the following formula.

$$V^2 = U^2 + 2AS \quad (4 \text{ marks})$$

iii. Find the range of values of  $x$  satisfying the following inequality and represent your result on a number line.

$$x - 7 > -x + 5 \quad (6 \text{ marks})$$

(Total : 20 marks)

**03.**

i. Consider the following polynomial.

$$4x^4 + 4x + 7$$

a) What is the order of this polynomial? (2 marks)

b) What is the constant? (2 marks)

c) What is the coefficient of  $x^2$ ? (3 marks)

ii. Solve the following simultaneous equations.

$$2x + y = 5$$

$$x - y = 1$$

(7 marks)

iii. Solve the following equation.

$$|x + 5| = 1$$

(6 marks)

(Total : 20 marks)

**04.**

i. Simplify the followings without using log tables.

a)  $X = \log_{10} 70 - \log_{10} 7 + 1$

(3 marks)

b)  $Z = \frac{4000}{\lg 100} - \frac{300}{\log_4 64}$

(5 marks)

ii. Solve for  $x$ .

$$2 \log_a x = \log_a 4 + 2 \log_a 25$$

(6 marks)

iii. If  $\lg 3 = 0.4771$  and  $\lg 5 = 0.6990$ , then evaluate  $K = \lg(125) + \lg\left(\frac{\sqrt{25}}{9}\right)$ . (6 marks)

(Total : 20 marks)

**05.**

i. A businessman obtains a simple interest loan of Rs. 15 000 at a rate of 12% per annum. What is the total amount the businessman will repay if the loan is for 10 years?(5 marks)

ii. In a school, the number of students has increased from 540 to 1040 during a year. Express the increment of the number of students as a percentage. (5 marks)

iii. In a bag of red and green apples, the ratio of red apples to green apples is 5:4. If the bag contains 144 green apples, how many red apples are there? (5 marks)

iv. Nirasha can eat 72 fish buns in 18 minutes. How many minutes, it would take her to eat 108 fish buns if she can keep up the same pace? (5 marks)

(Total : 20 marks)

06.

- i.  $\epsilon = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$   
 $A = \{3, 6, 9\}$   
 $B = \{2, 4, 6, 8, 10\}$

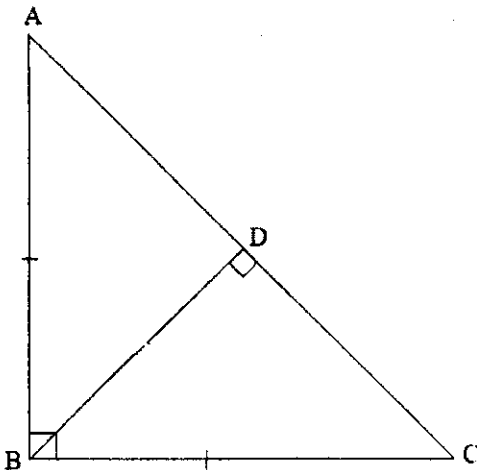
- a) Display the above data in a Venn diagram. (6 marks)  
b) Find  $n(A)$ ,  $n(A \cap B)$ ,  $n(A^c \cup B^c)$ ,  $n(A \cup B)$  and  $n[(A \cap B)^c]$ . (6 marks)  
c) Verify that  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$  for the given  $A$  and  $B$  sets. (3 marks)

- ii. Let  $A$  and  $B$  be two mutually exclusive events such that  $P(A) = 0.3$  and  $P(A \cup B) = 0.8$ .  
a) Find  $P(A \cap B)$ . (3 marks)  
b) Find  $P(B)$ . (2 marks)

(Total : 20 marks)

07.

- i. Consider the following triangle.



- a) Find the values of  $\hat{BAC}$  and  $\hat{ACB}$ . (3 marks)
- b) Find  $\hat{ABD}$ . (2 marks)
- c) If  $BD = 4 \text{ cm}$ , then find the lengths of  $AB$  and  $AC$ . (5 marks)

ii. Consider the co-ordinates of the points A, B and C given below.

$$A = (2, 1)$$

$$B = (5, 1)$$

$$C = (2, 5)$$

- a) Find the length of the straight line joining the points A and C. (5 marks)
- b) Find the gradient of the straight line joining the points A and B. (5 marks)

(Total : 20 marks)

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