

UNIVERSITY OF COLOMBO, SRI LANKA
FACULTY OF ARTS
FIRST YEAR EXAMINATION IN ARTS (SEMESTER II) – 2016/2017
FND 1207 – 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.

(a) $(-1)^5 + (-1)^0$ **(3 marks)**

(b) $\left(1\frac{1}{2} + \frac{3}{6}\right)$ of $\frac{2}{7}$ **(7 marks)**

ii. Consider the following function.

$$f(x) = 3x^2 + x - 1$$

(a) What is the order of x ? **(2 marks)**

(b) What is the coefficient of x^3 ? **(2 marks)**

(c) What is the constant? **(2 marks)**

(d) Find $f(x - 1)$. **(4 marks)**

(Total : 20 marks)

02.

i. The following equation describes the time value of money.

$$F = P \left(1 + \frac{r}{m}\right)^{mt}$$

Here, F - future value

P - present value

r - annual interest rate

m - number of compounding periods in a year

- (a) Make t as the subject in the above equation. **(4 marks)**
- (b) If the present value is Rs. 1000, future value is Rs. 1100, annual interest rate is 10% and there is only one compounding period per year, then calculate t in the equation. **(6 marks)**
- ii. In a company, 300 workers have taken 30 days to complete a certain task. In there, Rs. 2000 is paid for a 1 man-days.
- (a) Calculate the work amount which has done by 300 workers within 30 days. **(3 marks)**
- (b) How much has been spent by the administration of the company for the above work? **(3 marks)**
- (c) The administration has decided to reduce the company expense by 15%. For that, if they have taken action to reduce the number of workers, then how many workers will be remained in the company? **(4 marks)**
- (Total : 20 marks)**

03.

- i. Consider the following expression.

$$x^2 - 10x + 21$$

- (a) Find the factors of the above expression. **(4 marks)**
- (b) Hence, find the solutions of $x^2 - 10x + 21 = 0$. **(3 marks)**
- (c) Using the above results of (a) and (b), solve the following inequality and represent the solution on a number line. **(10 marks)**

$$x^2 - 10x + 21 < 0$$

- ii. Consider the following number.

$$1 - \sqrt{7}$$

- (a) Is it rational or irrational? **(1 marks)**

(b) Write the conjugate of that number.

(2 marks)

(Total : 20 marks)

04.

i. Consider the following sets.

$\varepsilon = \{\text{Letters in the English alphabet}\}$

$A = \{\text{Letters of the word "ECONOMICS"}\}$

$B = \{\text{Letters of the word "ECONOMETRICS"}\}$

(a) List the elements of the above sets A and B .

(4 marks)

(b) Calculate $n(A \cup B)$ and $n(A \cap B)$.

(4 marks)

(c) Verify that $n(A) + n(B) = n(A \cup B) + n(A \cap B)$ for the given A and B sets.

(4 marks)

(d) Write down the relationship between the above sets A and B .

(2 marks)

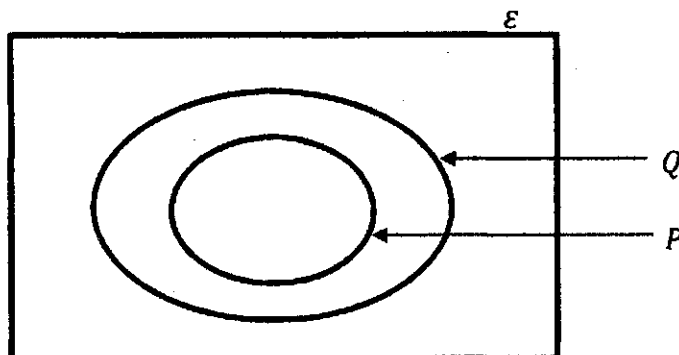
ii. Copy the following diagram into your answer sheet and dark the following areas separately.

(a) $P \cup Q$

(3 marks)

(b) $P' \cap Q$

(3 marks)



(Total : 20 marks)

05.

i. Two dice are rolled. Calculate the probabilities for the following incidents with regarding to this.

(a) Sum of the two obtaining numbers is equal to 7.

(3 marks)

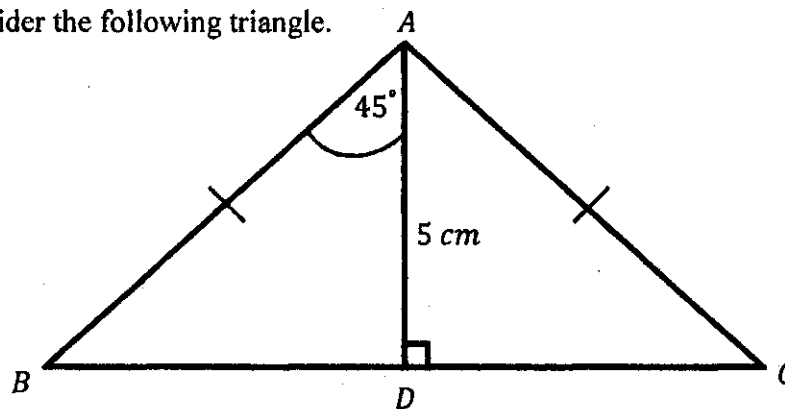
(b) Only one number is an odd and the other is a multiple of 3.

(2 marks)

- (c) Both numbers are greater than 4. (2 marks)
- ii. A campaign of 300 students, was conducted two sessions as morning and evening. For that, the students were grouped into three groups, red, yellow and blue. A student had not entered the same group in both morning and evening sessions.
- (a) Draw a tree diagram to represent the way of a student can get in a group in the campaign. (4 marks)
- (b) Calculate the probability of a student has entered in yellow group and blue group in morning session and evening session respectively. (2 marks)
- (c) Calculate the probability of a student has entered in red and blue groups. (4 marks)
- (d) Find the probability of a student was in red group in morning session, when he had randomly selected from blue group in evening session. (3 marks)
- (Total : 20 marks)

06.

- i. Consider the following triangle.



- (a) What can you say about $\hat{A}BC$ and $\hat{A}CB$? (2 marks)
- (b) Find the length of BD . (3 marks)
- (c) Using Pythagoras theorem, find the length of AB . (4 marks)
- (d) Write the value of $\hat{A}BD$. (2 marks)
- ii. An observer, observes a boat from a window, which is situated 21 m below from the top of a lighthouse of height 75 m , by a depression angle of $28^\circ 22'$.

(a) Draw a sketch diagram which describes the location of the lighthouse and the boat, and denote the depression angle on it. **(3 marks)**

(b) At that moment, determine the distance between the boat and the lighthouse. **(6 marks)**

(Total : 20 marks)

07.

i. In a factory, the total expense for the production is described by the following straight line.

$$y = 3x + 50$$

Here, y is the total expense for the x number of units.

(a) What is the gradient (slope) of the above straight line? **(2 marks)**

(b) What is the intercept of it? **(2 marks)**

(c) If the total income of the factory is given by the straight line, which is perpendicular to the straight line of describing total expense and it goes through the point of $(2,1)$, then find its equation. **(5 marks)**

(d) If the administrative expense is described by the straight line, which is parallel to total expense line and goes through the origin, then find its equation. **(4 marks)**

ii. Consider the following diagram.



(a) Calculate the length of PQ . **(3 marks)**

(b) Find the mid point of PQ . **(4 marks)**

(Total : 20 marks)

புறநிலை இயற்கைத் தாள்களின் NATURAL TANGENTS

Table of Natural Tangents for angles 0 to 44 degrees. Columns include angle in degrees, minutes, seconds and mean differences.

புறநிலை இயற்கைக் கோதாள்களின் NATURAL COTANGENTS

புறநிலை இயற்கைத் தாள்களின் NATURAL TANGENTS 6

Table of Natural Tangents for angles 45 to 89 degrees. Includes a section for 'Differences change rapidly' at the bottom.

புறநிலை இயற்கைக் கோதாள்களின் NATURAL COTANGENTS