



UNIVERSITY OF PERADENIYA

CENTRE FOR DISTANCE AND CONTINUING EDUCATION



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கலைத்தேர்வுப் பரீட்சை (வெளிவாரி-புதிய பாடத்திட்டம்) 100 வது தேர்ச்சி மட்டம்

ஐப்பசி / கார்த்திகை 2025

Bachelor of Arts (External - New Syllabus) Examination 100 Level

October/ November 2025

FNDE 102: Basic Mathematics

Instructions:

1. There are **Eight (08)** questions in this paper. Answer **any five (05)** questions.
2. Time: Three (03) hours
3. Calculators are not allowed
4. Total Marks: 100

1. (a) Simplify the following expressions.

i. $\frac{5^4 \times 8 \times 16}{2^5 \times 125}$

ii. $-3 \div \left(\frac{7}{9} - \left(-3\frac{1}{5} \right) \right)$

iii. $(4y^3)^3 \div 2y^3$

iv. $\frac{\sqrt{64x^8y^2}}{2xy}$

(02 marks each)

- (b) Factors each of the following polynomial.

i. $2x^2 + 7x - 15$

ii. $3y^2 - 6xy + 9x^2$

iii. $81a^4 - 16b^4$

iv. $x^6 - 1$

(03 marks each)

(Total 20 marks)

2. (a) Solve and graph the following inequalities.

i. $-1 \leq \frac{4-3x}{5} < \frac{1}{2}$

ii. $3(x-2) + 5 > 2(3x+5) + 1$

(06 marks)

- (b) Solve the following system of equation using graphical method.

$6y - 9x = 24$

$-6y = -14 - 4x$

(06 marks)

- (c) Solve following linear equations using Cramer's rule.

$a - 3b - 2c = 5$

$4a + b - 11c = -2c$

$6b + 5c = 47$

(08 marks)

(Total 20 marks)

3. (a) Find and graph the equation of the line that passes through the points with coordinates $(-1, -2)$ and $(2, 3)$. (05 marks)
- (b) Find the equation of the line with a slope of 3 that passes through the point $(-1, 6)$. (05 marks)
- (c) Determine and graph the equation of the line that passes through $(-4, 1)$ and perpendicular to the line $y = -3 + 2x$ (05 marks)
- (d) Determine and graph the equation of the line that passes through $(-2, 4)$ and is parallel to the line $y = 4 - 2x$ (05 marks)
- (Total 20 marks)**

4. (a) Solve $-x^2 + 2x + 3 = 0$ by using the quadratic equation formula. (05 marks)
- (b) Consider the quadratic function given below: $y = -2x^2 + 5x + 4$
- i. Use the vertex formula to find the vertex and the axis of symmetry of the function. (04 marks)
- ii. Sketch the Graph $f(x)$ and find the minimum or maximum point of $f(x)$. (06 marks)
- (c) Find the minimum or maximum point of the quadratic function (f) given below
- $f(x) = (x + 3)^2 + 1$ (05 marks)
- (Total 20 marks)**

5. Evaluate the following limits.

a. $\lim_{x \rightarrow \infty} \frac{3x^2}{4x^2 + 2x - 1}$

b. $\lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{x - 9}$

c. $\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{-(x - 2)}$

d. $\lim_{x \rightarrow 1} \frac{2x + 3}{4x^2 + 12x + 9}$

(05 marks for each)
(Total 20 marks)

6. Differentiate following functions with respect to x .

(a) $y = 3x^4 + 4x - 5$

(b) $y = x^9 + 4\sqrt{x} - \frac{1}{x^2}$

(c) $y = (x^2 + 5x)^4$

(d) $y = 2 \ln(4x^3 + 1)$

(e) $y = e^{x^3 + 10x}$

(04 marks each)
(Total 20 marks)

7. (a) Evaluate the following integrals.

i. $\int_1^4 (2x^{-3} + 2) dx$

ii. $\int_0^1 \left(x^{\frac{1}{2}} + 2x^3 + \frac{2}{x} \right) dx$
(04 marks each)

(b) Integrate following functions.

i. $\int (2x^4 + 3x^5) dx$

ii. $\int (3x^2 - \sqrt{5x} + 3) dx$

iii. $\int e^{9x} dx$

(04 marks each)

(Total 20 marks)

8. In a town there are 3 supermarkets: A, B and C. 60% of the population shop at A, 36% shop at B, 34% shop at C, 18% shop at A and B, 15% shop at A and C, 4% shop at B and C, and 2% shop at all 3 supermarkets. A person is selected at randomly.

Determine the probability that the person shops at:

- (a) none of the supermarkets,
- (b) at least one of the supermarkets,
- (c) exactly one of the supermarkets,
- (d) either A or B,
- (e) Super market C, given that the person shops at either A or B or both.

(04 marks each)
(Total 20 marks)