UNIVERSITY OF PERADENIYA

CENTRE FOR DISTANCE AND CONTINUING EDUCATION

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கலைத்தேர்வுப் பரீட்சை (வெளிவாரி–புதிய பாடத்திட்டம்) 100 வது தேர்ச்சி மட்டம் – 2020

Bachelor of Arts (External - New Syllabus) Take-Home Open Book Examination 100 Level
2020

(FNDE 102 Basic Mathematics)

Instructions:

1. Answer All questions
2. Total Marks: 100

1. (a) Simplify the following expressions.

   (i) $3^3 \times 3^{-2}$

   (ii) $\dfrac{\left(\sqrt{2x}\right)^4}{(4x^2y^2)^3}$

   (iii) $(5^2)^0$

   (iv) $3\left(\sqrt[3]{y}\right)^6$

   (v) $\sqrt{49x^6y^4}$

   (01 marks each)

   (b) Factorize the following polynomials.

   (i) $x^2 + 8x + 15$

   (ii) $9x^2 - 27x^2 - 36$

   (iii) $16y^3 - 54$

   (iv) $x^3 + 5x^2 + 6x$

   (v) $2x^2 + 11x + -6$

   (02 marks each)

2. (a) Solve the following
   (i). $x^2 + 5x - 3 = 0$
   (ii). $3x^2 - 12 = 0$

   (04 marks)

   (b) Draw the following linear inequalities in a number line
   (i). X<10
   (ii). $-2 \le X < 3$
   (iii). $-2 \le X \le 2$

   (03 marks)

   (c) Solve the following system of inequalities using graphs and shade the solutions
   (i) $6X + 4Y \le 120$ and $3X + 10Y \le 180$, $X, Y \ge 0$
   (ii) $X + Y \le 1$ and $-3X + 2Y \le 4$, $X \ge 0$

   (08 marks)

3. (a) Solve the following simultaneous linear equations algebraically
$$X + 2Y = 1$$
$$3X + 4Y = 2$$

(08 marks)

(b) Student A purchased 10 units of commodity X and 5 units of commodity Y at a cost of 700 rupees. Student B purchased 7 units of commodity X and 4 units of commodity Y at a cost of 510 rupees. What is the price of each X and Y.

(07 marks)

4. Consider the curve represented by the equation $y = 6x^2 + 5x$.

(a) Draw the graph the function.   (02 marks)

(b) Describe the shape of the graph.   (02 marks)

(c) Does this function as stationary points? If yes, indicate it.   (04 marks)

(d) Does this function symmetric to the x- axis?   (02 marks)

5. Evaluate the following limits.

(a) $\lim_{x \to 2} (x^2 + 6x + 5)$

(b) $\lim_{x \to \infty} \left(\frac{2}{x^2 + 1} \right)$

(c) $\lim_{x \to 0} \left(1 + \frac{1}{x^2} \right)$

(d) $\lim_{x \to 1} \left(\frac{x^2 + 1}{x^2 + x + 1} \right)$ (2.5 marks each)

6. Find the first derivative of each of the function with respect to x.

(a) $y = 2x^3 + 4x^2 - 5x + 2$

(b) $y = x^3 e^{3x}$

(c) $y = \left(\frac{x+1}{x-1} \right)^2$

(d) $y = \ln(x)$

(e) $y = \ln(3x)$ (03 marks each)

7. Evaluate the following integrals.

   (a) $\int (x^2 - \sqrt{x} + 4) dx$

   (b) $\int \sqrt{2 + 5y} \, dy$

   (c) $\int \frac{(x^3 - 1)}{x - 1} dx$

   (d) $\int 2e^{4x} dx$

(05 marks each)