IT Number: _____

Foundation Certificate
in
Information Technology

Final Makeup Examination
Term 2 (2021)

Mathematics II

Duration: 2.5 Hours

Instructions to Candidates:

- This is a closed book examination.
- This paper contains 3 questions on 2 pages without the cover page.
- Answer all questions on the given space on the paper itself.
- Read all questions before answering.
- The total marks obtainable for this examination is 100.

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Question One (30 marks)

1. Factorize the following. (5 x 3 marks)

   i. $2x^2 + 11x + 12 = 0$

   ii. $3x^2 + 16x + 2 = -3$

   iii. $x^2 + 11x = 26$

   iv. $x^2 = 2x + 15$

   v. $6x^2 = x + 12$

2. Simplify the following. (5 x 3 marks)

   i. $\frac{2-x}{x^2+4x-12}$

   ii. $\frac{v^2+7v-30}{-9v-90}$

   iii. $\frac{x^2-9}{2x+6} \div \frac{x-3}{2x}$

   iv. $\frac{x-2}{x^2-4} * \frac{x+2}{x^2-5x+6} * 2(x-3)$

   v. $\frac{x^2+7x+12}{x-5} \div \frac{x^2+9x+18}{x^2-7x+10}$

Question Two (30 marks)

1. Define the intersection operator for given set *A* and *B*? (2 marks)

2. Let the universal set be the set *R* and let $A = \{x \in R | -4 \leq x < 4\}$ and $B = \{x \in R | 4 \leq x \leq 8\}$. Find each of the following. (10 x 1.5 marks)

   i. $A \cup B$

   ii. $A \cap B$

   iii. $A - B$

   iv. $B - A$

   v. A^c

   vi. B^c

   vii. $A^c \cup B^c$

   viii. $A^c \cap B^c$

ix. $A \cup B^c$ x. $A \cap \varphi$

3. Suppose $A = \{a, b, c\}$ and $B = \{x, y\}$. Find each of the following. (4 x 1.5 marks)
   i. $A \text{ X } B$
   ii. $B \text{ X } A$
   iii. $P(A)$
   iv. $n(P(A \cap B))$

4. A guidance counselor is planning schedules for 30 students. 16 students say they want to take French, 16 want to take Spanish and 11 want to take Latin. 5 say they want to take both French and Latin and of these 3 wanted to take Spanish as well. 5 want only Latin and 8 want only Spanish. (7 marks)
   i. Use a venn diagram to illustrate above scenario.
   ii. How many students want Spanish and Latin?
   iii. How many students want Spanish and French?
   iv. How many students want French only?
   v. Of the Students who are taking French, how many also want Spanish?

Question Three (40 marks)

1. Differentiate the following function with respect to x (find $\frac{dy}{dx}$). (4 x 2.5 marks)
   i. $y = x^2 + 12x + 1$
   ii. $y = 3x^{1/3} - 2x^{-4}$
   iii. $y = 4x + \frac{4}{\sqrt{x}}$
   iv. $y = x - \frac{1}{x^2} + \frac{3}{\sqrt[3]{x}}$

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(6 x 5 marks)

2. Differentiate the following function with respect to x (find $\frac{dy}{dx}$).

   i. $y = (x^2 + 2x)(x^2 - 4x)$

   ii. $y = \sqrt{2x^2 + 3x + 1}$

   iii. $y = (x^2 - 1)\sqrt{4x^2 + 5x - 2}$

   iv. $y = (4x - 2)(x^2 - 1)^3$

   v. $y = \frac{-2x^2+x+5}{\sqrt{x-2}}$

   vi. $y = \frac{(4x-1)^2(x^2-2)}{\sqrt{-2x}}$

~~*End of* ***paper***~~