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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2017/2018 ACADEMIC YEAR**  
**DIPLOMA IN BUSINESS INFORMATION TECHNOLOGY**

**DBT 1103 - COMPUTATIONAL MATHEMATICS**

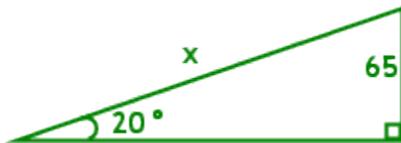
Date: 1<sup>st</sup> August, 2017.  
Time: 9.00am – 11.00am

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

- a) Convert the following numbers to the required base
- i)  $101100101_2$  to the corresponding base-ten number. (3 Marks)
  - ii)  $357_{10}$  to the corresponding base-eight number. (3 Marks)
  - iii)  $357_{10}$  to the corresponding hexadecimal number. (3 Marks)
  - iv)  $165_{16}$  to the corresponding decimal number. (4 Marks)
- b) Graph the solution to inequality  $y \leq 2x + 3$ . (4 Marks)
- c) Simplify  $10x^3 - 14x^2 + 3x - 4x^3 + 4x - 6$  (3 Marks)
- d) In the triangle shown below, find the value of  $x$ , accurate to three decimal places. (4 Marks)

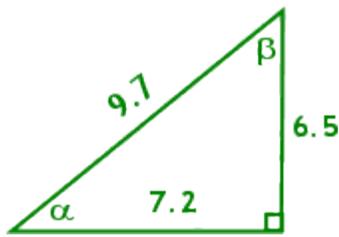


- e) Simplify the following expression  $25 - (x + 3 - x^2)$  (4 Marks)
- f) Simplify the following: (2 Marks)

$$\frac{6!}{4!}$$

**QUESTION TWO (20 MARKS)**

- a) The velocity of an object fired directly upward is given by  $V = 80 - 32t$ , where  $t$  is in seconds. When will the velocity be between 32 and 64 feet per second? (6 Marks)
- b) calculate the values of the angles for the triangle below, accurate to three decimal places:

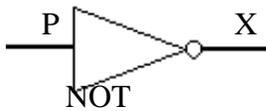


- i)  $\sin(\alpha)$  (2 Marks)
- ii)  $\cos(\alpha)$  (2 Marks)
- iii)  $\sin(\beta)$  (2 Marks)
- iv)  $\tan(\beta)$  (2 Marks)
- c) Convert F9BD to decimal notation. (4 Marks)
- d) Add the following matrices: (2 Marks)

$$\begin{bmatrix} 0 & 1 & 2 \\ 9 & 8 & 7 \end{bmatrix} + \begin{bmatrix} 6 & 5 & 4 \\ 3 & 4 & 5 \end{bmatrix}$$

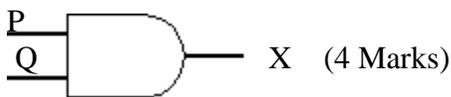
**QUESTION THREE (20 MARKS)**

- a) A six-meter-long ladder leans against a building. If the ladder makes an angle of  $60^\circ$  with the ground, how far up the wall does the ladder reach? How far from the wall is the base of the ladder? Round your answers to two decimal places. (8 Marks)
- b) Simplify  $((6x - 8) - 2x) - ((12x - 7) - (4x - 5))$  (4 Marks)
- c) Complete the truth tables for the two gates



(2 Marks)

Input	Output
P	X
0	
1	



Inputs		output
P	Q	X
0	0	
0	1	
1	0	
1	1	

**QUESTION FOUR (20 MARKS)**

- a) Simplify the following: (4 Marks)

$$\frac{(n+2)!}{(n-1)!}$$

- b) Expand  $(x^2 + 3)^6$  (4 Marks)

- c) Find the values of  $x$  and  $y$  given the following equation: (6 Marks)

$$\begin{bmatrix} -3 & x \\ 2y & 0 \end{bmatrix} + \begin{bmatrix} 4 & 6 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 7 \\ -5 & 1 \end{bmatrix}$$

- d) Find the product  $AB$  for the following matrices: (6 Marks)

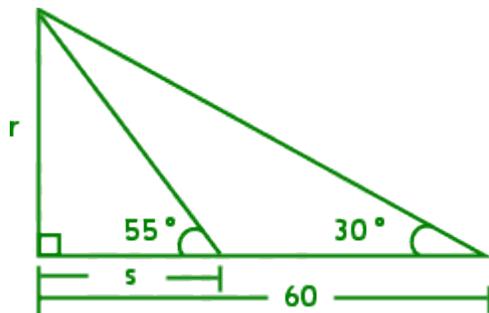
$$A = \begin{bmatrix} 1 & 0 & -2 \\ 0 & 3 & -1 \end{bmatrix}$$

$$B = \begin{bmatrix} 0 & 3 \\ -2 & -1 \\ 0 & 4 \end{bmatrix}$$

**QUESTION FIVE (20 MARKS)**

- a) Graph the solution to the following inequality  $2x - 3y < 6$ . (6 Marks)

- b) Find the angles and sides indicated by the letters in the diagram. Give each answer correct to the nearest whole number. (6 Marks)



- c) Find the determinant of the following matrix: (6 Marks)

$$\begin{bmatrix} 5 & -2 & 1 \\ 0 & 3 & -1 \\ 2 & 0 & 7 \end{bmatrix}$$

- d) Solve  $x/4 > 1/2$ . (2 Marks)