UNIVERSITI KUALA LUMPUR

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE	:	IGD 20203
COURSE NAME	:	MATHEMATICS FOR IT
PROGRAMME LEVEL	:	DIPLOMA
DATE	:	24 MAY 2016
TIME	:	9.00 am – 11.30 am
DURATION	:	2 1/2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of TWO (2) sections; Section A and Section B. Answer ALL questions.
4. Please write your answers on the answer booklet provided.
5. Please write your answer using PEN.
6. Formulas are appended for your reference.

THERE ARE 6 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Translate the following symbolic form into sentences, letting:

k : I will study hard

s : I will score A in this subject

u : Mathematics is my favorite subject

a) $s \rightarrow u$

[1 mark]

b) $\neg u$

[1 mark]

c) $\neg k \oplus s \rightarrow \neg u$

[4 marks]

Question 2

Prove the statement $\neg(\neg k \wedge s) \wedge (k \vee s)$ by using the *Law of Logic*

[6 marks]

Question 3

Prove the following statement by using direct proof:

"The product of any two rational numbers are rational"

[10 marks]

Question 4

Given two sets $\xi = \{a, b, c, d....j\}$, $A = \{b, e, f, g, h, i\}$, $B = \{a, b, c, d, e, j\}$ and $C = \{a, g, h, i, j\}$.

Determine the following:

a) The cardinality of set *A*

[1 mark]

b) $C - A$

[2 marks]

c) $|P(B)|$

[2 marks]

d) $|A \cup B|$

[2 marks]

e) $B' \cap C$

[3 marks]

Question 5

An electrical engineer wants to design a logic circuit having tree inputs, A, B and C that will have its output HIGH only when a majority of the inputs are HIGH.

a) The sum-of-product (SOP) from the output given by

$$x = \overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$$

Simplify the output expression by using Karnaugh map.

[11 marks]

b) Hence the answer from **part (a),** design the circuit.

[4 marks]

Question 6

Consider the Figure 1 below:

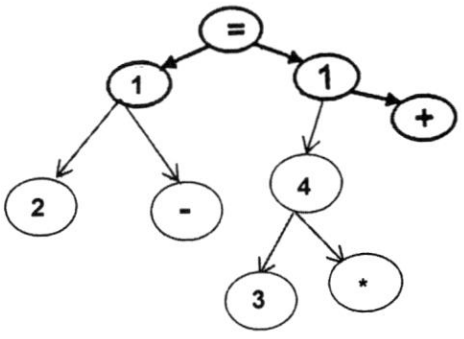

Figure 1: Algebraic expression tree

Determine:

a) The height of the vertex '**4**'

[1 mark]

b) The descendants for '**1**'

[4 marks]

c) Postfix for the tree and evaluate the expression.

[6 marks]

SECTION B

INSTRUCTION: Answer ALL questions.

Question 1

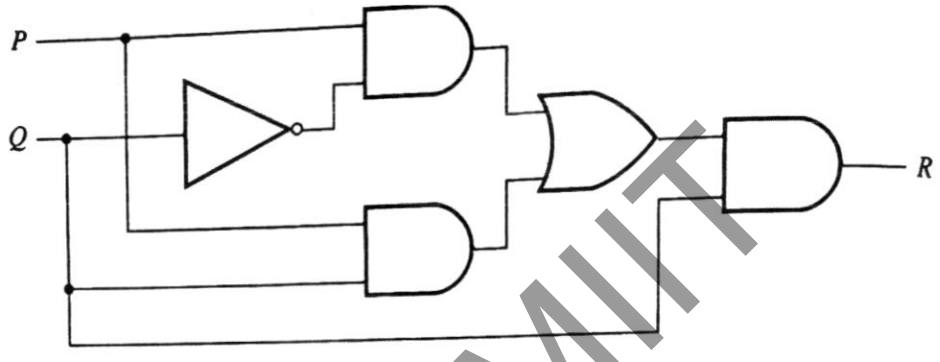

Figure 2

a) Write the output of P and Q in table 1 by using the combinatorial circuit in figure 2

Input		Output
p	*q*	
1	1	
1	0	
0	1	0
0	0	0

[10 marks]

b) Hence draw a logic circuit by using only **ONE LOGIC GATE** that represents the same output

[4 marks]

Question 2

Here is an example using integers. Someone discovered a formula that seems to work for the sum of the integers:

$$6 + 12 + 18 + \ldots 6n = \frac{6n(n+1)}{2}$$

He could check lots of cases, but no matter how long he worked, he could never check that the formula holds for every integer greater than 1. With mathematical induction, you can help him to solve his problem.

a) for the smallest $n = 1$

[2 marks]

b) When $n = k$

[2 marks]

c) When $n = (k+1)$

[9 marks]

Question 3

a) Draw Venn diagrams and shade the region of the notation below:

i. $A' \cup B'$

ii. $A' \cap B$

[6 marks]

b) In a survey of 120 passengers, an airline found 48 enjoyed *juice* with their meals, 78 enjoyed *mixed drinks* and 66 enjoyed *iced tea*. In addition, 12 enjoyed each pair of these 3 beverages and 24 passengers enjoyed them all.

i. Draw a Venn diagram to illustrate the information above and fill all the regions.

ii. How many passengers are not enjoyed with all drinks?

[9 marks]

END OF QUESTION

MALAYSIA INSTITUTE OF INFORMATION TECHNOLOGY

FINAL EXAMINATION

SUBJECT CODE : IGD 20203
SUBJECT TITLE : MATHEMATICS FOR IT
LEVEL : DIPLOMA

Law of Double Negation	$\neg\neg p \Leftrightarrow p$
De Morgan's Laws	$\neg(p \vee q) \Leftrightarrow \neg p \wedge \neg q \quad \neg(p \wedge q) \Leftrightarrow \neg p \vee \neg q$
Commutative Laws	$p \vee q \Leftrightarrow q \vee p \quad p \wedge q \Leftrightarrow q \wedge p$
Associative Laws	$(p \wedge q) \wedge r \Leftrightarrow p \wedge (q \wedge r) \quad (p \vee q) \vee r \Leftrightarrow p \vee (q \vee r)$
Idempotent Laws	$p \vee p \Leftrightarrow p \quad p \wedge p \Leftrightarrow p$
Negation Laws	$p \vee \neg p \Leftrightarrow t \quad q \wedge \neg q \Leftrightarrow c$
Identity Laws	$p \vee c \Leftrightarrow p \quad p \wedge t \Leftrightarrow p$
Distributive Laws	$p \wedge (q \vee r) \Leftrightarrow (p \wedge q) \vee (p \wedge r)$ $p \vee (q \wedge r) \Leftrightarrow (p \vee q) \wedge (p \vee r)$