UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

JANUARY 2014 SESSION

SUBJECT CODE	:	FKD 22302
SUBJECT TITLE	:	MATHEMATICS FOR TECHNOLOGISTS 3
LEVEL	:	DIPLOMA
TIME / DURATION	:	12.45pm - 2.45pm (2 HOURS)
DATE	:	2 8 MAY 2014

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.

2. This question paper is printed on both sides of the paper.

3. Please write your answers on the answer booklet provided.

4. Answer should be written in blue or black ink except for sketching, graphic and illustration.

5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer two (2) question only.

6. Answer all questions in English.

7. Graph paper and Calculus formula are appended.

THERE ARE 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 30 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Given that $f(x, y) = x^3 + y^3 - 3xy$ .Determine the following:

a) $\dfrac{\partial^2 f}{\partial x^2}$ and $\dfrac{\partial^2 f}{\partial y^2}$ [4 marks]

b)   Evaluate $\dfrac{\partial^2 f}{\partial x^2} + \dfrac{\partial^2 f}{\partial y^2}$ at $x = 1, y = -2$ [2 marks]

Question 2

a)   Solve $\displaystyle\int_0^3\int_0^1 x\, dy\, dz$ [2 marks]

b)   Evaluate $\displaystyle\int_0^3\int_0^2\int_0^\pi \sin x\, dx\, dy\, dz$ [4 marks]

Question 3

Given that $a = 4i - 3j$, $b = 2i + 4j$ and $c = 22i - 11j$. Determine:

a) $2a - b$ [2 marks]

b) $|2a - b|$, leave your answer to 3 decimal places   [2 marks]

c) the value of constant m if $ma + b = c$ [4 marks]

Question 4

Refer the following data set

     5, 8, 12, 10, 5, 3, 7, 5, 20, 10

a) Determine the mode of the data set.   [1 mark]

b) Determine the range of the data set.   [1 mark]

c) Calculate the mean of the data set.   [2 marks]

d) Determine the median of the data set.   [2 marks]

Question 5

A box contains marbles of three different colours, red, green and blue. 15 of the marbles are blue. If a marble is picked at random, the probabilities of picking a blue marble and a green marble are $\dfrac{5}{12}$ and $\dfrac{1}{4}$ respectively.

a) Determine the total number of marbles in the box.   [2 marks]

b) Determine the probability of picking a red marble at random.   [2 marks]

SECTION B (Total: 20 marks)

INSTRUCTION: Answer TWO questions.

Please use the answer booklet provided.

Question 1

a) Let $A = 2i - j - k$, $B = 3i + 2j - 3k$

   i)   Determine $(A \times B)$ [3 marks]

   ii) Hence, show that $(A \times B).A = 0$ [3 marks]

b) Given $OA = 3\underset{\sim}{i} + 4\underset{\sim}{j}$ and $OB = 2\underset{\sim}{i} - 3\underset{\sim}{j}$.

   i)   Determine AB.   [2 marks]

   ii) Hence, determine the unit vector of AB.   [2 marks]

Question 2

Figure 1 below shows data about the mass, in kg, of a group of forty students.

Mass(kg)	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79
Number of students	8	12	9	7	4

Figure 1

a) Complete a cumulative frequency distribution table for the data set in **APPENDIX 1**.

                                         [3 marks]

b) Determine the modal class.   [1 mark]

c) Draw a histogram (in the graph paper provided) to represent the data set.   [3 marks]

d) From the graph, determine:

   i)   the mode of the data set.   [1 mark]

   ii) the number of students whose mass is less than 50kg .   [2 marks]

Question 3

The probability that a patient is allergic to medicine X is 0.3. Medicine X is administered to three patients P, Q and R. Determine the probability that:

a) a patient is not allergic to medicine X.   [1 mark]

b) all the them are allergic to medicine X.   [2 marks]

c) only patient P is allergic to it.   [2 marks]

d) two of them are allergic to it.   [3 marks]

e) none of them are allergic to it.   [2 marks]

END OF QUESTION

APPENDIX 1

STUDENT ID: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

SEAT NO: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

INSTRUCTION:
Please attach the APPENDIX 1 in the answer booklet provided.

Mass	Class Boundary	Frequency	Cumulative frequency
30 – 39			
40 – 49			
50 – 59			
60 – 69			
70 – 79			
		$\sum f =$	

Table of Differentiation

Trigonometric Functions – GENERAL FORM
$\dfrac{d}{dx}\left(\sin f(x)\right) = \cos f(x) \times f'(x)$
$\dfrac{d}{dx}\left(\cos f(x)\right) = -\sin f(x) \times f'(x)$
$\dfrac{d}{dx}\left(\tan f(x)\right) = \sec^2 f(x) \times f'(x)$
$\dfrac{d}{dx}\left(\csc f(x)\right) = -\csc f(x)\cot f(x) \times f'(x)$
$\dfrac{d}{dx}\left(\sec f(x)\right) = \sec f(x)\tan f(x) \times f'(x)$
$\dfrac{d}{dx}\left(\cot f(x)\right) = -\csc^2 f(x) \times f'(x)$

Exponential Function – GENERAL FORM
$\dfrac{d}{dx}\left(e^{f(x)}\right) = e^{f(x)} \times f'(x)$

Logarithmic Function – GENERAL FORM
$\dfrac{d}{dx}\left(\ln f(x)\right) = \dfrac{f'(x)}{f(x)}$

Table of Integration

Trigonometric Functions – GENERAL FORM Where : $f(x) = ax + b$
$\int \cos f(x) dx = \dfrac{\sin f(x)}{f'(x)} + C$
$\int \sin f(x) dx = \dfrac{-\cos f(x)}{f'(x)} + C$
$\int \sec^2 f(x) dx = \dfrac{\tan f(x)}{f'(x)} + C$
$\int \sec f(x) \tan f(x) dx = \dfrac{\sec f(x)}{f'(x)} + C$
$\int \csc f(x) \cot f(x) dx = \dfrac{-\csc f(x)}{f'(x)} + C$
$\int \csc^2 f(x) dx = \dfrac{-\cot f(x)}{f'(x)} + C$

Exponential Function – GENERAL FORM Where : $f(x) = ax + b$
$\int e^{f(x)} dx = \dfrac{e^{f(x)}}{f'(x)} + C$

Logarithmic Function – GENERAL FORM Where : $f(x) = ax + b$
$\int \dfrac{1}{f(x)} dx = \dfrac{\ln\left|f(x)\right|}{f'(x)} + C$