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INTERNATIONAL COLLEGE PENANG (507232-U)
LAUREATE INTERNATIONAL UNIVERSITIES

RESIT
Examination Paper

(COVER PAGE)

Session : AUGUST 2016

Programme : FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY

Course : MAT1215: FUNDAMENTALS OF MATHEMATICS

Date of Examination : 13 December 2016 (Tuesday)

Time : 11:00am - 1:00pm Reading Time : Nil

Duration : 2 Hours

Special Instructions :

This paper consists of SIX (6) questions.

Answer any FIVE (5) questions in the answer booklet provided.

All questions carry equal marks.

Materials permitted :

Non-programmable scientific calculator

Materials provided :

Formula Booklet 1 & Graph Paper

Examiner(s) : Chan Ah Wah

Moderator : Dr. Ch'ng Pei Eng

This paper consists of 6 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG
 FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY (CFPI)
 MAT1215 : FUNDAMENTALS OF MATHEMATICS
 FINAL EXAM : AUGUST 2016 SESSION

Instructions

This paper consists of SIX (6) questions. Answer any FIVE (5) questions in the answer booklet provided. All questions carry equal marks. Show complete workings .

Question 1

- (a) Given that $A = \left\{ \sqrt{11}, -2, -1.2, 0, \frac{6}{2}, 1.23, \sqrt{36}, -17, \frac{19}{3} \right\}$, list down the elements of A that belong to the following sets:

- (i) Set of even integer(s)
 (ii) Set of irrational number(s)

[2 marks]

- (b) Simplify each of the following expressions:

(i) $(2x^2 - 3x - 1) + (3x^2 + 4x - 3) - (x^2 + x + 7)$

[2 marks]

(ii) $5\sqrt{24} - 3\sqrt{96} + 4\sqrt{6}$

[2 marks]

- (c) Factorize each of the following expressions:

(i) $x^2 + 4y - xy - 4x$

[2 marks]

(ii) $8x^2 - 50$

[2 marks]

- (d) Rationalize the denominator of $\frac{8\sqrt{3}}{1 - 7\sqrt{3}}$.

[3 marks]

- (e) Simplify $\frac{(2x^3y^{11})(z^{-5})^4}{5x^{-12}(xz)^{-2}}$ and express your answer in positive exponents only.

[3 marks]

- (f) Use scientific notation to simplify $\frac{(320,000)^2(0.0009)}{12,000^2}$ and write you answer in scientific notation.

[4 marks]

Question 2

(a) Find the domain of the following functions:

(i) $f(x) = \sqrt{2x - 3}$ [2 marks]

(ii) $f(x) = \frac{x + 1}{x - 1}$ [2 marks]

(b) Find the equation of the line passing through $(1, -1)$ and parallel to the line $y = 4x + 9$. [3 marks]

(c) Given $f(x) = -x^2 + 4x - 1$

(i) Find the vertex of $f(x)$. [2 marks]

(ii) Find the x and y intercepts. Hence, sketch the graph of $f(x)$. [4 marks]

(d) The total cost of producing a product is given by $C(x) = 100x + 2000$ and the selling price for each unit is given by $u(x) = -0.02x + 400$. Find

(i) the profit function, [2 marks]

(ii) the marginal profit at $x = 15$ and interpret your answer, [3 marks]

(iii) the quantity of the product that has to be produced in order to maximize the profit. [2 marks]

Question 3

(a) Differentiate the following functions with respect to x:

(i) $y = 2x + \frac{6}{x^3}$ [2 marks]

(ii) $y = (1 - 2x)^2$ [2 marks]

(b) Integrate the following functions with respect to x:

(i) $\int \frac{x^4 + x^3 - 1}{x^3} dx$ [2 marks]

(ii) $\int_1^3 \frac{4}{(5x + 2)^2} dx$ [3 marks]

(c) Find the area enclosed by the curve $y = 1 - x^2$ and $y = x - 1$. [3 marks]

- (d) Find T_{30} of an arithmetic progression in which $T_5 = 13$ and $T_9 = 25$.
[3 marks]
- (e) State the number of terms for the geometric progression $1, 4, \dots, 1024$.
[2 marks]
- (f) Express $4.75757575\dots$ as a fraction in its lowest terms.
[3 marks]

Question 4

- (a) Kelvin has invested a sum of money 10 years ago in a savings account that has since paid interest at the rate of 6% per year compounded continuously. His investment is now worth RM1822.12. How much did he originally invest?
[3 marks]
- (b) Mr. Amir invested RM5,000 in a savings account four years ago. His investment is now worth RM12,300. Find the rate of interest per year if the money was compounded quarterly.
[5 marks]
- (c) A recreational vehicle costs RM80,000. You pay 10% down payment and amortize the rest with equal monthly payments over a 7 year period. The interest is 9.25% compounded monthly.
- What is the loan amount?
[2 marks]
 - What will the monthly payment be?
[3 marks]
 - How much is the total interest paid?
[2 marks]
- (d) USG Annuity & Life offered an annuity that pays 7.25% compounded monthly. If RM1,000 is deposited into this annuity every month, how much is in the account after 15 years? How much is the interest earned?
[5 marks]

Question 5

- (a) Evaluate the following:

(i) $\sum_{j=1}^5 \frac{1}{j}$ [2 marks]

(ii) $\sum_{k=1}^3 (3k^2 + 1)$ [2 marks]

(b) Suppose $A = \begin{bmatrix} 1 & -1 \\ -5 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 6 \\ -1 & 4 \end{bmatrix}$.

Perform the indicated operations below:

(i) $A+B$

[2 marks]

(ii) AB

[2 marks]

(c) Solve the following:

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

[4 marks]

(d) The system of equations below can be written as $Ax = b$.

$$2x + 3y - 2z = 6$$

$$x - y + 2z = 3$$

$$4x + 2y + 5z = 1$$

(i) List the matrices A , x , and b .

[3 marks]

(ii) Evaluate $|A|$.

[3 marks]

(iii) Does A^{-1} exist? Explain.

[2 marks]

Question 6

(a) Solve the following linear programming problem graphically :

Maximize : $P = 7x + 8y$

Subject to :

$$x + 2y \leq 300$$

$$3x + 2y \leq 480$$

$$x \geq 0$$

$$y \geq 0$$

[6 marks]

(b) A group of 9 people consisting of 2 boys, 3 girls, and 4 adults. In how many ways can a team of 4 be chosen if

(i) both boys are in the team,

[2 marks]

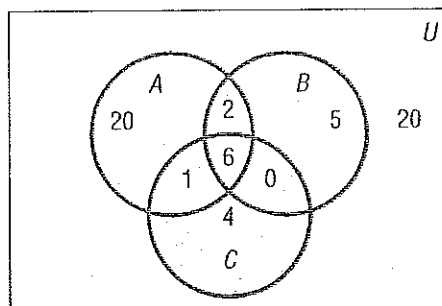
(ii) the adults are either all in the team or all not in the team,

[3 marks]

(iii) at least 2 girls are in the team.

[3 marks]

(c) For the given Venn Diagram, answer the following questions:



(i) How many are in A?

[1 mark]

(ii) How many are in A or B?

[1 mark]

(iii) How many are in A and C?

[1 mark]

(iv) How many are not in B?

[1 mark]

(v) How many are in neither A nor C?

[1 mark]

(vi) How many are in B but not in C?

[1 mark]

End of Paper

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