THE COUNCIL OF COMMUNITY COLLEGES OF JAMAICA

ASSOCIATE OF SCIENCE EXAMINATION

SEMESTER III – 2017 AUGUST

PROGRAMME: BUSINESS STUDIES

COURSE NAME: BUSINESS CALCULUS

CODE : MATH2301

YEAR GROUP: TWO

DATE: FRIDAY, 2017 AUGUST 11

TIME: 1:00 P.M. – 4:00 P.M.

DURATION: 3 HOURS

EXAMINATION TYPE: FINAL

This Examination paper has **13** *pages*

INSTRUCTIONS:

1. THIS EXAMINATION PAPER CONSISTS OF TWO (2) SECTIONS: (A) AND (B)
2. ANSWER ALL QUESTIONS FROM SECTION A
3. SECTION B CONSISTS OF FIVE (5) QUESTIONS. CHOOSE ANY THREE (3)

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SECTION B

Instructions: Answer any THREE (3) questions from this section.

Question 1

A. Evaluate the following limits:

i. $\lim_{x\to 0}\frac{(3+x)^2-9}{x}$ ***(3 marks)***

ii. $\lim_{x\to 5}\frac{x^2-25}{5-x}$ ***(3 marks)***

iii. $\lim_{x\to \infty}\frac{5x^3+6x^2+2}{2x^2+6x+1}$ ***(3 marks)***

B Differentiate the following functions with respect to 'x'

i. $y=(3x^2+2x)(4x^2+4x)$ ***(4 marks)***

ii. $y=(3x^2-5)^5$ ***(3 marks)***

iii. $y=\frac{6x^2-4x}{5x^2-6}$ ***(4 marks)***

(Total 20 marks)

Question 2

A. Given the following function:

$$f(x)=\begin{Bmatrix}3x+6,\ if\ x\le 3\\ 10x+3, if\ 3<x\le 6\\ 2x^2-9.\ if\ x\ge 6\end{Bmatrix}$$

Determine whether *f(x)* is continuous at:

i. $x = 3$ ***(5 marks)***

ii. $x = 6$ ***(5 marks)***

B. Differentiate $f(x)=4x^2-7x+5$ from first principles hence find the gradient when $x = 2$

(10 marks)

(Total 20 marks)

Question 3

A. Integrate the following functions

i. $\int 3x^2+5x+6dx$ ***(3 marks)***

ii. $\int \frac{3}{x^3}+\frac{2}{\sqrt{x}}-\frac{1}{7x^2}dx$ ***(4 marks)***

iii. $\int_1^3 4x^3+9x^2+2$ ***(5 marks)***

B. The annual profit function for a watch company is given by $P(x,y)=-11x^2-11xy-22y^2+220x-44y-23$. Where 'x' is the number (in thousands) of gold watches produced per year, 'y' is the number (in thousands) of silver watches produced per year and P is profit (in thousands of dollars)
How many of each type of watch should the company produce per year to realize a maximum profit? ***(8 marks)***

(Total 20 marks)

Question 4

Given the function $f(x) = x^3 - 18x^2 + 60x + 20$:

A. Find the stationary points and the y – intercept ***(9 marks)***

B. Determine the nature of the stationary points ***(4 marks)***

C. Find the point of inflexion ***(3 marks)***

D. Make a sketch of the function, clearly showing the: ***(4 marks)***

i. stationary points
ii. y – intercept
iii. point of inflexion

(Total 20 marks)

Question 5

A. The total costs for a company are given by C(x) = 10x + 12 and total revenues are given by R(x) = 18x – x^2, both in thousands of dollars, where x is the number of units:

i. Determine the number of items that will maximize profit ***(5 marks)***

ii. Calculate the maximum profit ***(3 marks)***

B. Given that $f(x) = x^3 - 3x^2 + 3$. Find its critical point/s ***(4 marks)***

C. Evaluate

i. $\int_1^3 (4x^2 - 3)dx$ ***(3 marks)***

ii. $\int_0^1 \int_0^2 (3x^2 + 6xy^2)dxdy$ ***(5 marks)***

(Total 20 marks)

END OF EXAMINATION