



THE COUNCIL OF COMMUNITY COLLEGES OF JAMAICA

BACHELOR OF SCIENCE EXAMINATION

SEMESTER I – 2015 DECEMBER

PROGRAMMES: MANAGEMENT INFORMATION SYSTEMS

COURSE NAME: CALCULUS II
CODE: (MATH4702)

YEAR GROUP: THREE

DATE: TUESDAY, 2015 DECEMBER 8

TIME: 1:00 P.M. – 4:00 P.M.

DURATION: 3 HOURS

EXAMINATION TYPE: FINAL

This Examination paper has 4 pages

INSTRUCTIONS:

SECTION B: ANSWER ANY THREE (3) QUESTIONS FROM THIS SECTION.

SECTION B

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

Question 1

a. Draw the graph for $f(x) = \frac{x^2 - 9}{x^2 - 3x + 2}$ (10 marks)

b. Given the equation $x^3 = 2 - 2x$ show that the equation has a root in the interval $[0,1]$.
Hence, find the root to two decimal places. (15 marks)

(Total 25 marks)

Question 2

a. Let $f(x) = \frac{1}{(x+1)^2}$, determine the Maclaurin expansion of $f(x)$ up to and including the term in x^4 (12 marks)

b. By applying the trapezium rule with 5 trapezia, find an approximate value for the integral $\int_1^2 \frac{1}{\sqrt{x^2 + 1}} dx$ correct to 5 decimal places (13 marks)

(Total 25 marks)

Question 3

a. Differentiate the following:

i. $(x+1)(x^2+1)^2$ (4 marks)

ii. $\frac{\sqrt{x+5}-3}{x-4}$ (5 marks)

iii. $\frac{(x+2)}{(x+1)^2}$ (4 marks)

b. Find the derivative of the function f at the given point, if:

i. $f(x) = x^3 \ln x$, for A(1,0) (3 marks)

ii. $f(x) = \frac{3x+5}{1+3x}$, for B(2,3) (5 marks)

iii. $f(x) = e^{3x} \ln 2x$, for C(1,-1) (4 marks)

(Total 25 marks)

Question 4

a. Given that $f = (3x+6y)(2x-12y)$, find:

i. f_x (2 marks)

ii. f_y (2 marks)

iii. f_{xy} (2 marks)

iv. f_{yy} (3 marks)

b. Given $f(x, y) = x^2 + 3xy + 4y^2 - 26x - 60y + 52$:

i. find the critical point(s) where the function is optimized (8 marks)

ii. determine whether at these point(s) the function is maximized or minimized (8 marks)

(Total 25 marks)

Question 5

a. Evaluate $\int x\sqrt{x+3} dx$. t. x (5 marks)

b. Solve the following differential equations

i. $\frac{dy}{dx} = 2y + e^x$ (5 marks)

ii. $x^2 \frac{dy}{dx} = 4 - x^4$ when $x = 1$ and $y = 2$ (5 marks)

c. Complete the following:

i. Sketch the curve $y = x^2 + 1$

ii. Find the volume obtained by rotating the portion of the curve between $x = 0$ and $x = 1$ through 360° about the y-axis. (10 marks)

(Total 25 marks)

END OF EXAMINATION