COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NMMS105: MATHEMATICS FOR BUSINESS 2

END OF SECOND SEMESTER EXAMINATIONS

APRIL 2022

LECTURER: TARAMBAWAMWE P

DURATION: 3 HOURS

INSTRUCTIONS

Answer Question 1(Compulsory) and any other question

Credit will be awarded for logical, systematic and neat presentations

Question One

i. Solve the system of equations (8)

$-x_1 + 5x_2 = -8$

$-2x_1 + 5x_2 + 5x_3 + 2x_4 = 9$

$-3x_1 - x_2 + 3x_3 + x_4 = 3$

ii.

Given that $y = 2x^5 + 7 + \frac{1}{x^3}$, $x \neq 0$, find, in their simplest form,

(a) $\frac{dy}{dx}$, **(3)**

(b) $\int y\, dx$. **(4)**

iii. The chain rule states that dy/dx =(dy/dt)(dt/dx). Use the chain rule to

Find dy/dx in terms of t for: $x = te^{-2t}$ and $y = t+t^3$ and then find the slope of the curve defined by $x=te^{-2t}$ and $y = t+t^3$ at point$(e^{-2},2)$ [5 marks]

Question Two

i. Solve the (separable) differential equations

i. $x\frac{dy}{dx} - y = 2x^2y$ [5 marks]

ii. Solve: $3x(y^2 + 1)dx + y(x^2 + 2)dy = 0$ [5 marks]

iii. find the particular solution of $y^1 + 2y = 6$,given y=1 when x=0 [6 marks]

iv. . The population of fish in a pond is modelled by the differential equation
0.25(dP/dt) = 120-P
where time t is measured in years. Towards what number does the population of fish tend? If there are initially 10 fish in the pond, how long does it take for the number of fish to reach 90% of the eventual population? [14 marks]

Question Three

a. Find the general and particular solutions of the following and determine the general path of each solution

i. $\mathbf{Y_{t+1}} = 15Y_t - 25$, given $Y_0 = 20$ [7 marks]

ii. $\mathbf{P_{t+1}} = 0.95P_t + 9(2)^t$, given $P_0 = 2000$ [8 marks]

b. A person is repaying a loan of $30000 at $150 per month. The interest rate is 5% per month

i. Form a difference equation. [5 marks]

ii. Solve the difference equation and find how long it will take to repay the loan.

[10 marks]

END OF EXAMINATION