MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF TECHNOLOGY

UNIVERSITY ORDINARY EXAMINATION

2020/2021 ACADEMIC YEAR

SECOND YEAR **SECOND** SEMESTER EXAMINATION FOR, DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT CODE: EEE 057

UNIT TITLE: ENGINEERING MATHS IV

DURATION: 2 HOURS

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Solve the following differential equations.

i) $\frac{dy}{dx} = 3x^2 - 6x + 5$ (2 marks)

ii) $\frac{dy}{dx} = 3 + 2y$ (2 marks)

b) solve the equations

i) $\frac{dy}{dx} = \frac{2x}{y+1}$ (4 marks)

ii) $\frac{dy}{dx} = \frac{x^2+y^2}{xy}$ using the substitution $y = vx$ (6 marks)

c) Use the integrating factor method to solve.

$\frac{dy}{dx} + 3y = sinx$ (6marks)

d) Find the auxiliary equation of

$\frac{d^2y}{dx^2} + 14\frac{dy}{dx} + 49y = 4e^{5x}$ (4marks)

e) Solve the equation

$(D + 3)^2\{sin3x\}$ (6marks)

SECTION B – *ANSWER ANY TWO QUESTIONS IN THIS SECTION*

QUESTION TWO (20 MARKS)

a) Find the solution of $xy = (1 + x^2)\frac{dy}{dx}$ given that y = 1 when x = 0 (6 marks)

b) Solve for the value of *P* if $x^3\frac{dy}{dx} = P - x$ given that y = 0 when x = 2 and y = 0 when x = 6 (8 marks)

c) Determine the particular solution of $\frac{d\theta}{dx} = 2e^{3t-2\theta}$ given that t = 0 when θ = 0. (6 marks)

QUESTION THREE (20 MARKS)

a) Find the complete solution of $2\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = 0$ (10 marks)

b) Solve for the particular solution of $\frac{dy}{dx} = \frac{x^3 + y^3}{xy^2}$ given that x =1 when y = 4

(10 marks**)**

QUESTION FOUR (20 MARKS)

a) Solve $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 10y = 2sin2x$ (14 marks)

b) Find the general solution of $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = 0$ (6 marks)