



# UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

## FIRST SEMESTER EXAMINATIONS, NOV 2018

**COURSE NO:** EL/CE/RN/MC/PE 265

**COURSE NAME:** ORDINARY DIFFERENTIAL EQUATIONS

**CLASS:** EL/CE/RN/MC/PE II

**TIME:** 3 HOURS

Name: \_\_\_\_\_ Index Number: \_\_\_\_\_

### ANSWER THREE QUESTIONS ONLY

#### QUE 1

- (a) Solve the linear differential equation

$$\frac{dy}{dx} - 3y = 0$$

- (b) Find the implicit solution for the initial value problem

$$\frac{dy}{dx} = \frac{3x^2 + 4x - 4}{2y - 4}; \quad y(1) = 3$$

#### QUE 2

- (a) Briefly, what is exact differential equation?

- (b) Determine a function  $M(x, y)$  for the differential equation to be exact and solve the resultant equation:

$$M(x, y)dx + \left( xe^{xy} + 2xy + \frac{1}{x} \right) dy = 0$$

#### QUE 3

- (a) Suppose that  $y_1(t) = e^{r_1 t}$  and  $y_2(t) = e^{r_2 t}$  are two solutions of second order linear homogeneous differential equation. Show that they form a fundamental set of solutions if  $r_1 \neq r_2$ .

- (b) State the principle of superposition theorem for second order linear homogeneous constant coefficients differential equation.

Solve

$$\frac{d^2 y}{dt^2} - 4 \frac{dy}{dt} - 12y = te^{4t}$$

#### QUE 4

- (a) Use the method of Laplace transform to solve the initial value problem

$$2 \frac{d^2 y}{dt^2} + 3 \frac{dy}{dt} - 2y = te^{-2t}, \quad y(0) = 0, \quad \frac{dy}{dt}(0) = -2$$

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