

TECHNICAL UNIVERSITY OF MOMBASA Faculty of Applied & Health

Sciences

DEPARTMENT OF MATHEMATICS & PHYSISCS

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 13J) DIPLOMA IN MEDICAL ENGINEERING (DME)

AMA 2350: ENGINEERIGN MATHEMATICS V

END OF SEMESTER EXAMINATION SERIES: DECEMEBER 2014 TIME ALLOWED: 2 HOURS

Instructions to Candidates: You should have the following for this examination - Answer Booklet This paper consist of **FIVE** questions Answer question **ONE (COMPULSORY)** and any other **TWO** questions Maximum marks for each part of a question are as shown This paper consists of **THREE** printed pages

Question One (Compulsory)

a) Solve the differential equation:

$$(y^{2} + 2)\frac{dy}{dx} = 5y \qquad y = 1 \qquad x = \frac{1}{2}$$
given and (7 marks)

$$x\frac{dy}{dx} = \frac{x^{2} + y^{2}}{y}$$
b) Find the particular solution of the equation
(10 marks)
(c) Determine the Laplace transforms:

$$\{se^{2t} - 3e^{-t}\}$$
(d) Determine the Fourier series for the periodic function of period defined by

$$ft = \begin{cases} 0, when -1 \le t \le 0 \\ 1 & when & 0 \le t \le \frac{\pi}{2} \\ -1 & when & \frac{\pi}{2} \le t \le \pi \end{cases}$$
(7 marks)
Question Two
(8 marks)
(8 marks)
(12 marks)
Question Three
a) Solve the differential equation:

$$2y(1-x) + x(1+y)\frac{dy}{dx} = 0$$
give x = 1 when y = 1 (12 marks)

b) Determine the equation of the curve which satisfies the equation:

$$xy\frac{dy}{dx} = x^2 - 1$$

and which passes through the point (1, 2) (8 marks)

Question Four

a) Determine the Fourier series for the periodic function defined by:

$$fx = \begin{pmatrix} -2 & when & -\pi < x < \frac{\pi}{2} \\ 5 & when & \frac{-\pi}{2} < x < \frac{\pi}{2} \\ -2 & when & \frac{\pi}{2} < x < \pi \end{pmatrix}$$

and has a period of 2

f(x) = 3x $0 \le x \le \pi$ **b)** Find the half-range Fourier sine series to represent the function in the range

Question Five

a) Find the particular solution of the differential equation:

$$\left(\frac{2y-x}{y+2x}\right)\frac{dy}{dx} = 1$$
given that y = 3 when x = 2
(14 marks)

$$\frac{dy}{dx} = x(1-2y)$$

b) Solve the differential equation

(6 marks)

(12 marks)

(8 marks)