MURANG'A UNIVERSITY COLLEGE

A Constituent College of Jomo Kenyatta University of Agriculture and Technology

University Examination 2015/2016

YEAR III SUPPLEMENTARY EXAMINATION FOR THE DIPLOMA IN ELECTRICAL ENGINEERING

SEE 1306: ENGINEERING MATHEMATICS VI

DATE: June 2016 **TIME: 2 Hours**

Instructions: Attempt question **One** and **Two** other questions

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Question One (30 Marks)

(a) In each of the following, state the amplitude and the period.

(i) $y = 5\ sin\,7x$

(ii) $y = cos\,8x$

(iii) $y = Sin\left(\frac{x}{4}\right)$ (6 marks)

(b) Sketch the graphs of the following function, inserting relevant values.

(i) $f(x) = \begin{cases} 4 & 0 < x < 5 \\ 0 & 5 < x < 8 \\ f(x+8) & \end{cases}$ (2 marks)

(ii) $f(x) = \begin{cases} 2 - x & 0 < x \leq 2 \\ x^2 - 4 & 2 < x < 4 \\ f(x+4) & \end{cases}$ (2marks)

(c) A function f (x) is defined by

$f(x) = 2x \quad 0 < x < \pi$

$f(x + 2\pi) = f(x)$

Obtain a half –range Cosine series to represent the function (10marks)

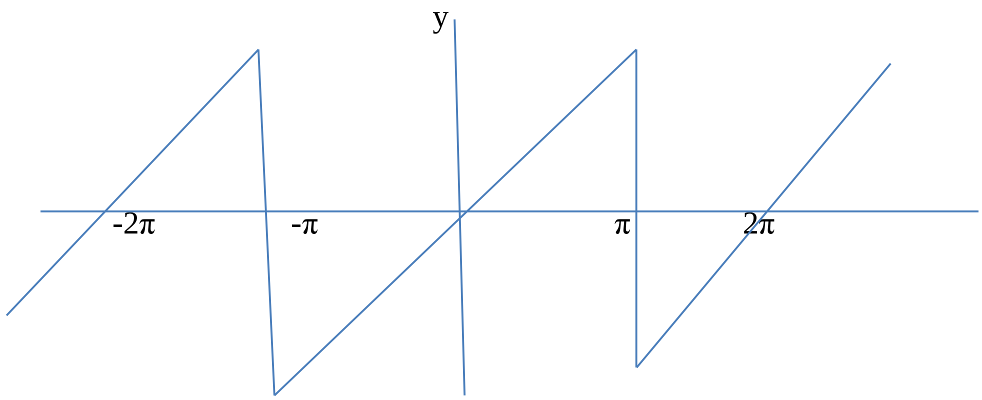
(d) State whether each of the following products is odd, even or neither.

(i) $x^2\ Sin\,4x$

(ii) $3\ Sin\,x\ Cos\,4x$

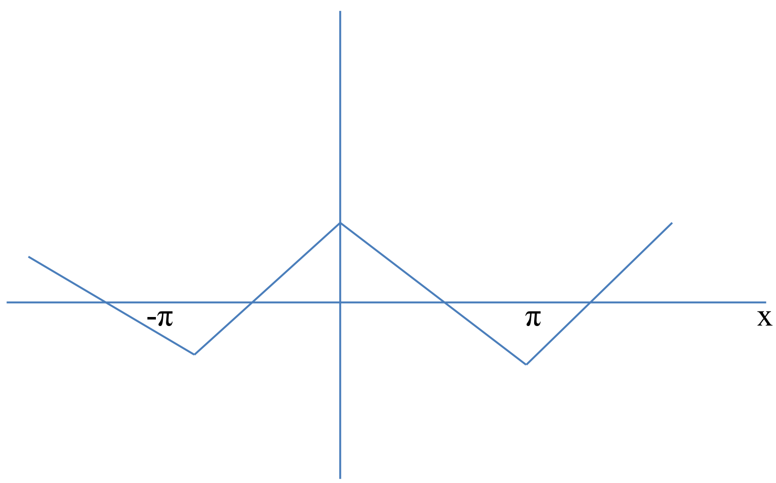
(iii) $Sin^2 x\ Cos\,5x$ (6 marks)

(e) State whether each of the following functions is even, odd, or neither.



(2 marks)

(ii)



(2 marks)

<u>QUESTION TWO (20 MARKS)</u>

(a) A function $f(x)$ is defined by

$$f(x) = 1 + x \qquad 0 < x < \pi$$

Obtain a half-range sine series to represent the function (10 marks)

(b) A function f(t) is defined by

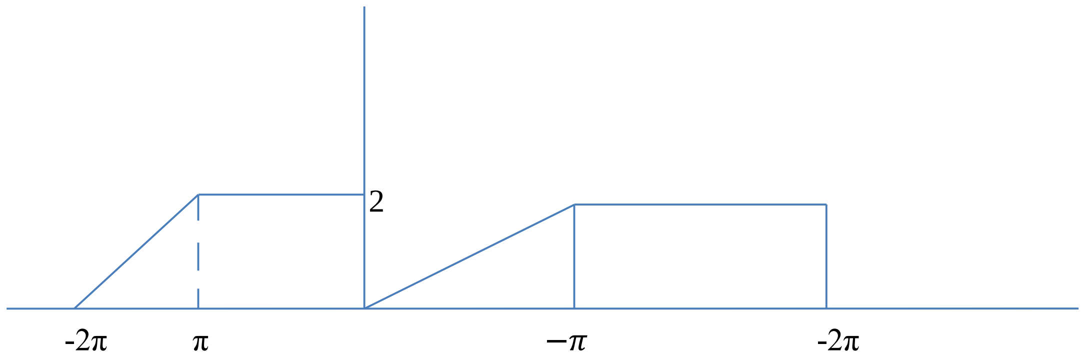
$$f(t) = 3 + t \qquad 0 < t < 2$$

$$f(t + \pi) = f(t)$$

Obtain the half-range Sine series for the function in this range (10 marks)

QUESTION THREE (20 marks)

Determine the Fourier series for the function



(20 marks)

QUESTION FOUR (20 marks)

A hemispheres defined by $x^2 + y^2 + z^2 = 4\,(z \geq 0)$. A Vector field

$\vec{F} = 2y\underset{\sim}{i} - x\underset{\sim}{j} + xz\underset{\sim}{k}$ exists over the surface and around its boundary C.

Verify Stokes's theorem that $\int Curl\,\vec{F} \cdot ds = \int \vec{F} \cdot dr$ (20 marks)

QUESTION FIVE (20 Marks)

Verify Cauchy's theorem by evaluating the integrals $\int f\,(z)\,dz$

Where $f\,(z) = z^2$ around the square formed by joining the points $z = 1,\ z = 2,$

$z = 2 + j,\quad z = 1 + j$ (20 marks)