ELIZADE UNIVERSITY,

ILARA-MOKIN,

ONDO STATE

FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2nd **SEMESTER EXAMINATIONS**
2015 / 2016 **ACADEMIC SESSION**

COURSE CODE: MTH 102

COURSE TITLE: General Mathematics II

DURATION: 2 Hours

Course Leaders: Mrs T. Akinwumi & Mr. I. Olopade

HOD's SIGNATURE

INSTRUCTION:

1.   YOU ARE TO ANSWER ANY **FOUR** QUESTIONS FROM THE **SIX** QUESTIONS

Question One

a) If $f(x) = 2x^2 - 3x + 4$ and $g(x) = 7x + 2$. Find   **2marks**
   (i) $(f \circ g)(x)$ **2marks**
   (ii) $(g \circ f)(-1)$
   (iii)   Find the domain of definition of the function

                                    2marks

$$y = \frac{10x^2 + 5x - 2}{\sqrt{4 - x^2}}$$

b) Evaluate the following limits

   (i) $\displaystyle\lim_{x \to \infty} \frac{x^3 + 5x^2 + 6}{x^3 + 8}$ **2marks**

   (ii) $\displaystyle\lim_{x \to 1} \left(\frac{\log_e^x}{x^2 - 1} \right)$ **2marks**

c) (i) When do we say a function f(x) is continuous   **3marks**
   (ii)   Find the point of discontinuity of the function

      $f(x) = \frac{x^2 - 1}{x - 1}$ and remove the discontinuity.   **2marks**

Question Two

a. Compute the derivative of $y = \cos x$ from the first principle.   **5 marks**

b. Given that $y = (3x^2 + 4x)^{15}$ find $\frac{dy}{dx}$ **3 marks**

c. (i) If $y^2 + 3xy + 2x^2 - x^2y - 8 = 2x^2$. Find the derivative of y with respect to x.
                                           4marks
   (ii)   Differentiate $y = \log_e \sin2x$ with respect to x   **3 marks**

Question Three

a. Evaluate $\int \cos x \sin^5 x \, dx$ **4 marks**

b. (i) Evaluate $\int x^2 e^x dx$ **3 marks**
   (ii) Evaluate $\int \frac{7x + 8}{(2x + 5)(x + 3)} dx$ **5 marks**

c. The point on the curve $xy = 8$ from y = 2 to y = 4 is rotated about y-axis, find the volume generated.
                                           3 marks

Question Four

(a)   Evaluate   (i) $\int \dfrac{x^2+1}{x^3+3x-4}dx$ **3 marks**

(ii) Evaluate $\int \dfrac{dx}{x^2+9}$ **4marks**

(b) Find y in terms of x if $\dfrac{d^2y}{dx^2}=6x-4$, given that when y = 0, x = 0 and $\dfrac{dy}{dx}=3$

4 Marks

(c) Find $\dfrac{dy}{dx}$ of the parametric equation if $y=\dfrac{t}{1+t^2}$ and $x=\dfrac{t^3}{1+t^2}$ **4 Marks**

Question Five

a. Find the stationary points of the function below and determine the stationary values $f(x)=4x^3+15x^2-18x+7$

   6 marks

b. Evaluate $\int_1^2 \int_2^4 (x^2y)\,dxdy$ **5 marks**

c. Evaluate $\int_1^2 (x^2+3x+4)dx$ **4 marks**

Question Six

a.   A particle starts from rest at the origin and moves along the x-axis. The acceleration of the particle after time t is given by $\dfrac{d^2x}{dt^2}=12t^2-60t+32$ find an expression for x at time t. Hence find the times at which the particle again passes through the origin.

   6 marks

b. Find $\dfrac{dy}{dx}$ if $y=\cos^{-1}\left(\dfrac{1-x}{1+x}\right)$ **6 marks**

c. Differentiate $y=x^3$ with respect to x from the first principle.

   3 marks