ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE

FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2^{nd} **SEMESTER EXAMINATIONS**
2013 / 2014 **ACADEMIC SESSION**

COURSE CODE: MATH 102

COURSE TITLE: General Mathematics II

COURSE LEADER: Dr. Babatunde Omolofe / Mrs Akinwumi

DURATION: **2 Hours**

HOD's SIGNATURE

INSTRUCTION:

1. YOU ARE TO ANSWER THREE QUESTIONS FROM THE FIVE QUESTIONS ON THE EXAMINATION PAPER.
2. **CALCULATORS ARE NOT PERMITTED FOR THIS EXAMINATION**

Question One

a. i. Let f and g be the mapping defined on the set of real numbers defined by $f(x) = x + 1$ and $g(x) = \sqrt{x}$ find $f \circ g$ and $g \circ f$

2 marks

ii. Find the limiting value of $\frac{2x^3-5x^2+3x+2}{7x^3+2x^2-5x+7}$ as x approaches infinity

2marks

iii. The curve $y = ax^2 + bx + 5$ where a and b are constants has a turning point at the point $p(1,3)$. Find the values of a and b and determine whether p is a maximum or a minimum point.

5marks

b i. when do we say a function $f(x)$ is continuous. **3marks**

ii. Investigate the continuity of the function $f(x) = 3x^2 + 2x - 1$

4marks

iii. Find the point of discontinuity of the function $f(x) = \frac{x^2-25}{x-5}$ and remove the discontinuity. **4marks**

Question Two

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

5marks

b i. Find the differential coefficient of $y = \tan \theta$ **4marks**

ii. If $y = \frac{t}{1+t^2}$, $x = \frac{t^3}{1+t^2}$, find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ **8marks**

c If $y^2 + 5xy + 2x^2 - x^2y = 9$ Find the derivative of y with respect to x. **3marks**

Question Three

a i. Find $\frac{dy}{dx}$ if $y = \sin^{-1}\left(\frac{1-x}{1+x}\right)$ **7marks**

b A particle is projected in a straight line from a point O with a speed of $6ms^{-1}$. At time ts (seconds) later, its acceleration is $(1+2t)ms^{-2}$. For the time when t = 4, calculate for the particle

i. its velocity **3marks**

ii. its distance from O. **3marks**

c Find the stationary points on the curve $y = x^3 - 6x^2 + 12x - 8$ and distinguish between them. **7marks**

Question Four

a. Evaluate (i) $\int \frac{3x}{\sqrt{x^2+1}}dx$ (ii) $\int \frac{12x+14}{3x^2+7x}dx$ **8marks**

b. 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 $\frac{d^2x}{dt^2} = 12t^2 - 60t + 32$ find an expression for x at time t. Hence find the times at which the particle again passes through the origin.

7marks

c. Evaluate $\int \frac{dx}{\sqrt{(3+x)(3-x)}}$ **5marks**

Question Five

a. Given that $\frac{d^2y}{dx^2} = 3\sin x$ and that when $x = 0, \frac{dy}{dx} = -3$ and $y = 0$, find y in terms of x. Hence show that $\frac{d^2y}{dx^2} + y = 0$ **9marks**

b. Integrate $\int \frac{4x+3}{(x-3)(x+2)}dx$ **7marks**

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