ELIZADE UNIVERSITY, ILARA-MOKIN

FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2nd SEMESTER EXAMINATION
2017 / 2018 ACADEMIC SESSION

COURSE CODE: MTH 102

COURSE TITLE: Introduction to Problem Solving

COURSE LEADER: Dr. T. Akinwumi and Dr. I. O. Olopade

DURATION: 2 Hours

HOD's SIGNATURE

INSTRUCTION:

Candidates should answer **FOUR** questions

1.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 $\frac{d^2x}{dt^2} = 12t^2 - 60t + 32$ find an expression for x at time t. Hence find the times at which the particle again passes through the origin. **6 marks**

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

c. Differentiate $y = x^2$ with respect to x from the first principle. **3 marks**

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

(ii) $\int \frac{11}{22x+9}\,dx$ **4 marks**

b. Find the area between the curve $y = 6x^2 - 6x - 12$ and the values of x from $x = -3$ to $x = 3$ 4 Marks

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

3.a. Find the stationary point of the function below and determine the stationary value
$f(x) = 4x^3 + 15x^2 - 18x + 7$ 6 marks

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

c. Evaluate $\int_0^2 (2x^2 + 3x + 5)dx$ 4 marks

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

b. Given that $y = (8x^2 + 5)^{10}$ find $\frac{dy}{dx}$ 3 marks

c. (i) If $y^2 + 4y + 4x^2 - x^3 y - 28 = x^2$. Find the derivative of y with respect to x.   4marks
  (ii) Differentiate $y = \log_e \cos 4x$ with respect to x   3 marks

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

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

c. $\int \cos^3 x dx$ 3 marks

6.a. If $f(x) = 3x^2 - 4x - 2$ and $g(x) = 5x + 4$. Find
    (i) $(f \circ g)(x)$ 2marks
    (ii) $(g \circ f)(-1)$ 2marks

    (ii)   Find the domain of definition of the function
         $y = \frac{10x^2 + 5x - 2}{\sqrt{4 - x^2}}$ 2marks

b. Evaluate the following limits
    (i) $\lim_{x \to \infty} \frac{x^4 + 5x^3 - 3x^2 + 6}{x^4 + 18}$ 2marks

    (ii) $\lim_{x \to 2} \left(\frac{\ln 2x}{x^2 - 4} \right)$ 2marks

c. (i) When is a function f(x) said to be continuous   3marks

  (ii) Find the point of discontinuity of the function

         $f(x) = \frac{x^2 - 16}{x - 4}$ And remove the discontinuity.   2marks