TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR:

DIPLOMAL IN INDUSTTRIAL MICROBIOLOGY AND BACTERIOLOGY TECHNOLOGY

AMA 2103: CALCULUS FOR SCIENCE

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2017

TIME: 2HOURS

DATE: Pick DateSep2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

a).Find :

i). $\lim_{x\to 3} x^{-2} + 3x - 5$ (2 marks)

ii). $\lim_{x\to -2} \frac{x^2-2x-8}{x+2}$ (3marks)

b).Using first principles differentiate

$y = 5x^{-3}$ (7marks)

c).Differentiate

i). $y = x^6 + 5x - 5$ (2marks)

ii).$y = \frac{x^2+2}{x+3}$ (5 marks)

iii) $y = 4x \sin x$ (3 marks)

iv) $x^2y^2 + 21y = 46$ at (1,2). (4 marks)

d).Simplify

$\int_1^2 \frac{x^3-7x+6}{x-1} dx$ (4 marks)

Question TWO

a). Given $f(x) = \frac{4x-15}{x-3}$

i). Express f(x) in the form $\frac{a}{x-3} + b$, and hence determine a and b (4 marks)

ii) $\int \frac{4x-15}{x-3}\ dx$ (3 marks)

b).A projectile is aimed vertically and its height after t seconds is, S meters where

$S = 25.2t - 4.9t^2$. Find :

i).Its height and velocity after 4 seconds (6 marks)

ii).acceleration at 4 seconds (2 marks)

iii).Maximum height attained (5 marks)

Question THREE

a).Determine the equation of the Normal to equation $y = 3x^2 + 2$ at $x = 2$ (7 marks)

b). Find the area enclosed by x-axis, x=2 ,x=4 and the curve $y = 2x^2 + 3$. (5 marks)

c).Find the greatest or least value of y, on the curve $y = 27x - x^3$ (8 marks)

Question FOUR

a).Find the equation of the tangent to the curve given by $y = t^3 + 1$ and $x = t + 1$ at (3,0). (6marks).

b).Integrate

i).$\int \tan x\ dx$ (5 marks)

ii). $\int_1^{\sqrt{5}} x\sqrt{x^2 - 2}\, dx$ (5 marks)

c).Find $\frac{d^2y}{dx^2}$ of $y = \frac{x^5}{10} + \frac{x^3}{6} - 7x + \sin x$ (4marks)

Question FIVE

a).Determine the gradient function of the line passing through the points $(x, 5)$ and $(2, y)$. (3 marks)

b).Express y in terms of x , given $\frac{dy}{dx} = \frac{3x-2}{x^3}$ at (1,1) (4 marks)

c) A 5% error is made in measuring the radius of a sphere. Find the percentage error in surface error. (6 marks)

d). $\int_4^9 (x^{\frac{3}{2}} + 2x^{\frac{1}{2}})dx$ (7 marks).