



KABARARAK

UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

**FOR THE DEGREE OF BACHELOR OF EDUCATION
SCIENCE**

COURSE CODE: MATH 121

COURSE TITLE: INTEGRAL CALCULUS II

STREAM: SESSION I

DAY: SATURDAY

TIME: 9.00 – 11.00 A.M

DATE: 27/11/2010

INSTRUCTIONS:

- Answer **QUESTION ONE** and **TWO** other questions
- Show all your working method and be neat

PLEASE TURNOVER

QUESTION ONE (30 MARKS)

(a) Evaluate the following

i) $\int (4e^x + 4\sin 3x - 9\sec^2 x) dx$ [3 marks]

ii) $\int \left(2 \sec t \tan t + \frac{1}{4t} \right) dt$ [3 marks]

iii) $\int \frac{2x+7}{(x+3)(x-5)} dx,$ [3 marks]

iv) $\int \sin^3 x dx$ [3 marks]

(b) Use the Simpson's Rule with $n=5$ to estimate

$\int_0^1 3x^6 dx$ then compare the result with exact value of the integral [3 marks]

(c) Evaluate the following integrals by substitution method

(i) $\int x^2 e^{-x^3} dx$ [3 marks]

(ii) $\int \sqrt{8^{5x}} dx$ [3 marks]

(iii) $\int \frac{dx}{1 + e^{-x}}$ [3 marks]

(iv) $\int \frac{2x+5}{x^2 + 5x + 6} dx$ [3 marks]

d) Compute the area between the functions $f(x)=x$ and $g(x)=\frac{x^3}{4}$ over the intervals $[-1, 2]$ [3 marks]

QUESTION TWO (20 MARKS)

a) Approximate $\int_0^2 \frac{1}{x^2 + 1} dx$ with $n=5$

(i) Trapezoidal Rule [4 marks]

(ii) Simpson's Rule [4 marks]

b) Evaluate the following by partial fractions

$$\int \frac{3x + 6}{x^3 + 2x^2 - 3x} dx$$
 [12 marks]

QUESTION THREE (20 MARKS)

Integrate the following

i) $\int \sqrt{\frac{u}{1-u}} du$ [15 marks]

ii) $\int (x^2 + \cos 6x)^9 (x - 3 \sin 6x) dx$ [5 marks]

QUESTION FOUR (20 MARKS)

a) Evaluate this double integral $\int_0^1 \int_0^1 xy^2(x+y) dx dy$ [5 marks]

b) Determine the reduction formula for $I_m = \int \sin^m x dx$ and hence use the result to determine I_5 [15 marks]

QUESTION FIVE (20 MARKS)

a) $\int \frac{1}{\sqrt{1-4x^2}} dx$ [10 marks]

b) $\int \frac{x^2 + x + 18}{(x^2 - 9)} dx$ [10 marks]