Mount Kenya University

UNIVERSITY EXAMINATION 2014/2015

SCHOOL OF PURE AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCES

BACHELOR OF EDUCATION
SCHOOL BASED

UNIT CODE: BMA1204 **UNIT TITLE: CALCULUS II**

DATE: APRIL/MAY 2015 **MAIN EXAM** **TIME: 2 HOURS**

INSTRUCTIONS: Answer question one and any other two

1. a) Integrate the following using the appropriate method;

   i) $\int (2x-5)^7 dx$ (4 Marks)

   ii) $\int \frac{1}{\sqrt{a^2-x^2}} dx$ (5 Marks)

   iii) $\int \frac{11-3x}{x^2+2x-3}$ (6 Marks)

   iv) $\int x\cos x dx$ (5 Marks)

   b) Determine the area enclosed between the curves $y=x^2+1$ and $y=7-x$ (10 Marks)

2. a) Determine $\int x\ln x dx$ (5 Marks)

   b) Find the area of the surface generated by the complete rotation of a quarter a circle in the first quadrant whose equation is $x^2+y^2=a^2$ about the x-axis. (8 Marks)

c) The curve $y=2x^2+3$ is rotated about
i) The axis between the limits x=0 an x=3
ii) The y-axis between the same limits.
Determine the volume generated in each case. (7 Marks)

3. a) Express $\frac{2x+3}{(x-2)^2}$ in partial fraction. Hence determine $\int \frac{2x+3}{(x-2)^2}dx$

(6 Marks)

b) Evaluate $\int_0^1 3e^{3t}dt$ (4 Marks)

c) Find the length of the curve of the semi-cubical parabola $x^3 = y^2$, between 4 (0,0) and B(1,1) (10 Marks)

4. a) Determine $\int \frac{1}{(a^2+x^2)}dx$ and use it to evaluate $\int_0^2 \frac{1}{4+x^2}dx$ (10 Marks)

b) Evaluate $\int_{0.2}^{1.0} \frac{\sin x}{x}dx$ using the simpson's rule (use 4 intervals)

(5 Marks)

c) Evaluate the following improper integral without using tables $\int_0^\infty \frac{dx}{x^2+1}$

(5 Marks)

5. a) Evaluate $\int_1^3 \frac{\ln x}{x}dx$ using the mid-ordinate rule (use four intervals)

(6 Marks)

b) Use integral test to show that $\int_0^1 \frac{dx}{\sqrt{1-x}}$ converges. (8 Marks)

c) Determine $\int \frac{2}{x(x^2+1)}dx$ (6 Marks)

-1.61
1.0