JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF …… SCHOOL BASED PROGRAM

SMA *200*: CALCULUS II

Date: …….. August, 2013 ***Time: ……. - ……***

INSTRUCTIONS:

1. This examination paper contains five questions. Answer **question one,** and **any other two** questions.
2. Start each question on a fresh page.
3. Indicate question number clearly at the top of each page.

QUESTION ONE (COMPULSORY) (30 marks)

a) Evaluate the integral

$$\int_{-2}^{2}\left(x^3-2x+3\right)dx \text{ (4 marks)}$$

b) Verify by differentiation that the formula is correct

$$\int\frac{dx}{\sqrt{a^2-x^2}}=\sin^{-1}\left(\frac{x}{a}\right)+C \text{ (6 marks)}$$

c) Using appropriate substitution, evaluate the indefinite integral

$$\int\left(x+2\right)\sin\left(x^2+4x-6\right)dx \text{ (4 marks)}$$

d) By separating the fraction and using a substitution (if necessary) to reduce to standard form, evaluate

$$\int_{0}^{1}\frac{1-x}{\sqrt{1-x^2}}dx \text{ (6 marks)}$$

e) By multiplying by a form of 1, evaluate

$$\int\frac{1}{1-\sin x}dx \text{ (5 marks)}$$

f) Using appropriate substitution, evaluate

$$\int_{-\pi/2}^{\pi}\left(\sin y\right)e^{\cos y}dy \text{ (5 marks)}$$

QUESTION TWO (20 marks)

a) By reducing the improper fraction and using a substitution (if necessary) to reduce it to standard form, evaluate

$$\int\frac{4x^3-x^2+16x}{x^2+4}dx \text{ (5 marks)}$$

b) Evaluate $\int\left(\sec x+\cot x\right)^2dx$ using trigonometric identities and substitution to reduce to standard form (5 marks)

c) Making the appropriate substitution for u :

i. express the following integral in terms of u

ii. evaluate the integral as function of x

$$\int\left(x+1\right)^2\sqrt{x-2}dx \text{ (6 marks)}$$

d) Using appropriate substitution to reduce to standard form, evaluate

$$\int_{1}^{2}\frac{18x}{\sqrt{9x^2+1}}dx \text{ (4 marks)}$$

QUESTION THREE (20 marks)

a) Express the integrand as a sum of partial fractions and evaluate the integral

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

b) Evaluate the following integral by using a substitution prior to integration by parts

$\int x^2 e^{3x}dx$ (7 marks)

c) Evaluate the following improper integral

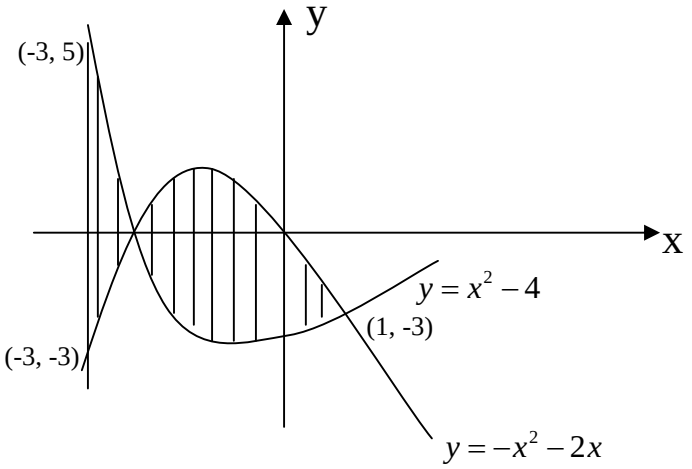
$\int_1^{\infty} \frac{x^2}{x^3+2}dx$ (6 marks)

QUESTION FOUR (20 marks)

a) Find the volume of the solid generated by revolving the region bounded by the line $y = 2 - x$ and the curve $y = 4 - x^2$ about the x-axis. (7 marks)

b) Determine the area of the surface generated by revolving the curve $y = x^3/9$, $0 \le x \le 2$ about the x-axis. (6 marks)

c) Find the total area of the shaded region



(7 marks)

QUESTION FIVE (20 marks)

a) Using eleven ordinates, apply Simpson's rule to evaluate the integral

$\int_1^2 \left(1/x\right)dx$ (7 marks)

b) For what value of x is the series $\sum_{n=1}^{\infty} \frac{(x-3)^n}{n}$ convergent. (6 marks)

c) Use a Taylor polynomial of degree 8 to approximate

$\int_0^1 e^{-x^2}dx$ (7 marks)