



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR FIRST SEMESTER
SPECIAL/ SUPPLEMENTARY EXAMINATION
FOR THE DEGREE OF BACHELOR OF EDUCATION AND
BACHELOR OF SCIENCE
MATHEMATICS

COURSE CODE: MAT 221

COURSE TITLE: CALCULUS II

DATE: 15/10/18

TIME: 11.30 AM -1.30 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 3 Printed Pages. Please Turn Over.

Question ONE 30 marks

a) Evaluate $\int_0^1 x\sqrt{x+3}dx$ (5mks)

b) State the mean value theorem (2mks)

c) Evaluate the integral $\int \cos^3 x dx$ (5mks)

d) Evaluate $\int \frac{3x+11}{x^2-x-6} dx$ (5mks)

e) Find the length of a curve $y = \sqrt{a^2 - x^2}$ from $x = 0$ to $x = \frac{a}{2}$ (5mks)

f) A curve $y = x^2 - 1$ is rotated about x-axis through 360° , find the volume of the solid generated. (5mks)

g) State the fundamental theorem of calculus (2mks)

Question Two 20 marks

2 (a) Evaluate $\int \sin^5 x \cos^6 x dx$ (5mks)

(b) Evaluate $\int \frac{\sin^7 x}{\cos^4 x} dx$ (5mks)

(c) Show that $\int_0^\infty x^2 e^{-x} dx = 2$ (5mks)

(d) Evaluate $\int \sqrt{16 - x^2} dx$ (5mks)

Question Three 20 marks

3. a) Determine the surface area of the solid obtained by rotating $y = \sqrt{9 - x^2}$ about x-axis for $0 \leq x \leq 1$ (7mks)

b) Find the length of the arc of the curve $y = 3x^{3/2} - 1$ from $x=0$ to $x=2$ (7mks)

c) Find the volume generated by rotating about x-axis the area enclosed by the curve $y = x^2 + 1, y = 0, x = 0, x = 2$. (6mks)

Question Four 20 marks

4. a) Show that $\int_0^{\infty} \frac{2x dx}{1+x^4} = \frac{\pi}{2}$ (5mks)

b) Show that $\int_1^{\infty} e^{-x} \sin x dx = \frac{1}{2}$ (5mks)

c) Evaluate $\int_0^{\infty} e^{-x} dx$ (5mks)

d) Evaluate $\int x^2 \sin(x^3) dx$ (5mks)

Question Five 20marks

(a) Find $\int (4s \cos x + \frac{7x^4 - \sqrt{x}}{x}) dx$ (3 mks)

(b) $\int \frac{5x^3 - 3x^2 + 2x - 1}{x^4 + x^2} dx$ (8 mks)

(c) A particle moves in a straight line such that its acceleration is given by $a(t) = 8t + 4$. Its initial velocity is $v(0) = -12 \text{ cm/s}$ and its initial displacement is $s(0) = 10 \text{ cm}$. Find the function of its position $s(t)$ (9 mks)