



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2016/2017 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: 25/09/17

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 COMPULSORY (30 MARKS)

- (a) Define the following terms (3 mks)
- (i) Definite integral
 - (ii) Indefinite integral
 - (iii) Improper integral
- (b) Evaluate
- (i) $\int (3x^3 - 7x^2 + 2x - 15) dx$ (3 mks)
 - (ii) $\int_0^{\pi} \cos 3x \sin 7x dx$ (4 mks)
- (c) Compute
- (i) $\int_1^2 2e^{5x} dx$ (3 mks)
 - (ii) $\int \cos (3\theta - 5) d\theta$ (3 mks)
- (d) Find the area enclosed by the curves $y = 4x - x^2$ and the line $y = x$ (7 mks)
- (e) The area bounded by the curves $x^2 = 4y$ and $y = 2x$ revolves around the y-axis. Show that the volume generated is $\frac{512\pi}{3}$ cubic units (7 mks)

QUESTION TWO (20 MARKS)

- (a) Evaluate the integral $\int \frac{2x+1}{2x^2+2x+7} dx$ (5 mks)
- (b) Express $\frac{2x^2+12x+13}{(x-3)^3}$ into partial fractions. Hence find the value of $\int_5^6 \frac{2x^2+12x+13}{(x-3)^3} dx$ (10 mks)
- (c) A private car travelling at 90 km/h when breaks are applied causing a deceleration of 6 ms^{-2} . What is the distance travelled before the car comes to a complete stop. (5 mks)

QUESTION THREE (20 MARKS)

Evaluate

- (a) $\int x^2 e^{-4x} dx$ (4 mks)
- (b) $\int_0^{\pi} 3t \cos t^2 dt$ (6 mks)
- (c) $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \cos \frac{1}{2} x \sin \frac{3}{2} x dx$ (5 mks)
- (d) $\int_1^e t^3 \ln t dt$ (5 mks)

QUESTION FOUR (20 MARKS)

(a) Find $\int (4\sin x + \frac{3x^4 - \sqrt{x}}{x}) dx$ (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 $a(t) = 6t + 4$. Its initial velocity is $v(0) = -6 \text{ cm/s}$ and its initial displacement is $s(0) = 9 \text{ cm}$. Find the function of its position $s(t)$ (9 mks)

QUESTION FIVE (20 MARKS)

(a) Evaluate the integral $\int \cos^5 x dx$ (10 mks)

(b) Show that the volume generated when the area bounded by x-axis, the curve $y = 3 + 2\sin x$ and the lines $x = 0$ and $x = \pi$ is $\pi(24 + 11\pi)$. The rotation is about x-axis (10 mks)