KISII UNIVERSITY

SCHOOL O PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS & ACTUARIAL SCIENCE

BSc/BED/BAs

MATH 211: CALCULUS II

FINAL EXAM –MAY AGUST 2020

INSTRUCTIONS

1. ***Do not write anything on this question paper.***
2. ***Answer questions ONE and any other TWO questions.***

SECTION A (30 MARKS)

1.

a. Integrate $\int_2^5 xlnxdx$ (5 marks)

b. Use integration by substitution to solve $\int_{-\frac{1}{2}}^{\frac{1}{2}} \frac{1}{\sqrt{1-y^2}}\, dy$ (5 marks)

c. Use integration by partial fractions to solve $\int \frac{2x^3-4x^2-x-3}{x^2-2x-3} dx$ (5 marks)

d. Use integration by parts to solve $\int_0^{\pi}[x^3 cosx]dx$ (5 marks)

e. Find the Taylor series for

$f(x) = sin2x \;\; at\; x_0 = 0$ to the 7th approximation (10 marks)

SECTION B (40 MARKS)

2.

a. Find $\int_0^e \frac{\sqrt{1+lnx}}{x}\, dx$ (5 marks)

(5 marks)

b. Find the area between the x axis, the curve $y = \frac{1}{x}$ and the lines $x = -e^3$ and $x = -e$. (5 marks)

c. States MV Theorem and check if it is satisfied in $\frac{x^2-5x}{x-3}$, on [0,5] (5 marks)

3.

a. Let $P(t)$ denote the population of bacteria in a certain colony at time t. Suppose that $P(0) = 100$ and that P is increasing at a rate of $20e^{3t}$ bacteria per day at time t. How many bacteria are there after 50 days? (5 marks)

b. Evaluate $\int_0^1 sin^3 x cosx dx$ (5 marks)

c. Integrate $\int \left\{\frac{1}{x} + \sin\left(\frac{1}{4}x\right) + \sqrt{4x} - e^{-3x} - \frac{6x}{3x^2-5}\right\} dx$ (10marks)

4.

a. $\lim_{x\to 0} \frac{tan3x}{tan2x}$ (5 marks)

b. Solve $\int_0^{\frac{\pi}{2}} cos3x sin2x dx$ (5 marks)

c. State Rolle's Theorem (5 marks)

d. Integrate $\int_0^1 \frac{dt}{t^2-6t+10}$ (5 marks)

5.

a. Differentiate giving examples between definite and indefinite integration. (5 marks)

b. Find the area between the graphs of $cosx$ and $sinx$ on $[0, \frac{\pi}{4}]$ (5 marks)

c. Evaluate $\int_{-\pi}^0 \sin^4 x\, dx$ (5 marks)

d. $\int \frac{x}{1+x^4} dx$ (5 marks)