UNIVERSITY EXAMINATIONS 2019/2020 ACADEMIC YEAR

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

END OF SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL/MECHANICAL AND BUILDING AND CIVIL ENGINEERING

ECU 0200 MATHEMATICS IV CALCULUS II

Year 2 sem 1 sept -dec 2019

QUESTION ONE (30mks)

a) Integrate

i) $\int cos6xcos4x \ dx$ (3mks)

ii) $\int \frac{1-3x}{(3x^2-2x)^2} \ dx$ (3mks)

iii) $\int cos^2 5t \ dt$ (4mks)

b) Evaluate the definite integrals

i) $\int_0^3 \frac{1}{\sqrt{(x^2+9)}} \ dx$ (4mks)

ii) $\int_0^1 (2x-1)^6 \ dx$ (3mks)

iii) $\int_0^1 2te^{4t^2-3} dt$ (3mks)

c) Determine $\int \frac{1}{x^2-a^2} dx$ hence evaluate $\int_1^2 \frac{1}{x^2-9} \ dx$ (5mks)

d)obtain $\int sin^4\theta cos^2\theta\ d\theta$ (5mks)

QUESTION TWO (20MKS)

Integrate

i)$\int \frac{1}{2x^2+4x+26}\ dx$ (6mks)

ii) $\int \frac{2x-3}{(x-1)(x-2)(x+3)}\ dx$ (5mks)

iii)$\int sin5xcos3x\ dx$ (3mks)

iv)$\int sin^4xcos^2x\ dx$ (6mks)

QUESTION THREE (20MKS)

a) Evaluate the integrals

i)$\int_1^2 xe^x\ dx$ (3mks)

ii)$\int_1^\pi x^2 sinx\ dx$ (8mks)

b) Use the reduction formula to integrate

$\int e^{5x} sin3x\ dx$ (6mks)

c) Given that $I = \int 8x^2 + 3x - 6x + 7\ dx$ find the value of I at $x = 2$ I if $I = 50$ (3mks)

QUESTION FOUR (20MKS)

Evaluate the integrals

i) $\int_0^2 \frac{x-1}{x(x+2)^2}$ (5marks)

ii) $\int_1^2 xe^x dx$ (5mks)

iii) $\int_0^2 \frac{1}{\sqrt{(16-x^2)}}\ dx$ (5mks)

iv) $\int_0^1 (2x-1)^6\ \ dx$ (5mks)

QUESTION FIVE (20mks)

a) Show that $\int_0^{\frac{\pi}{2}} \frac{1}{1+sinx}\, dx = 1$ (5mks)

b) Find the area bounded by the curve $y = 3x^2 - 6x + 5$ the x-axis and the ordinates $x = 1\ and\ x = 3$ (5mks)

c) If $I_n = \int x^n e^{2x}\, dx$ show that $I_n = \frac{x^n e^{2x}}{2} - \frac{n}{2} I_{n-1}$ and hence evaluate

$\int x^3 e^{2x}\, dx$ (10mks)