

APRIL, 2021
MAT 302SW
ADVANCED CALCULUS II
1 HOUR 20 MINUTES

CANDIDATE'S INDEX NUMBER:

SIGNATURE:

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
SCHOOL OF EDUCATIONAL DEVELOPMENT AND OUTREACH
INSTITUTE OF EDUCATION

FIVE-SEMESTER BACHELOR OF EDUCATION (SANDWICH) PROGRAMME
SECOND YEAR, END-OF-THIRD SEMESTER EXAMINATION, APRIL, 2021

APRIL 30, 2021

ADVANCED CALCULUS II

9:40 AM - 11:00 AM

SECTION B

Answer any TWO questions from this Section.

1. a. Find the derivative of $r(t) = at \cos(3t) i + b \sin^3 t j + c \cos^3 t k$. 7 [8 marks]
b. Evaluate $\int_C y^2 dx + x dy$, where C is the line segment from $(-5, -3)$ to $(0, 2)$. [12 marks]
13
2. a. If $f(x, y) = \sin x + e^{xy}$, then find [8 Marks]
i. $\nabla f(x, y)$ 7
ii. $\nabla f(0, 1)$
b. Find the directional derivative $D_u f(x, y, z)$ for $f(x, y, z) = \sin(yz) + \ln x^2$ in the direction of the vector $v = \langle 1, 1, -1 \rangle$. Hence find $D_u f(1, 1, \pi)$. [12 marks]
13
3. Evaluate $\int_C 2x ds$, where C consists of the arc C_1 of the parabola $y = x^2$ from $(0, 0)$ to $(1, 1)$ followed by the vertical line segment C_2 from $(1, 1)$ to $(1, 2)$. [20 marks]
4. a. Evaluate $\oint_C (3y - e^{\sin x}) dx + (7x + \sqrt{y^2 + 1}) dy$, where the region D enclosed by C is given by $D = \{(r, \theta): 0 \leq r \leq 3, 0 \leq \theta \leq 2\pi\}$. [8 marks]
b. Evaluate $\iint_S y dS$, where S is the surface $z = x + y^2, 0 \leq x \leq 1, 0 \leq y \leq 2$. [12 marks]