MAY 2022
EBS 301
CALCULUS
1 HOUR 30 MINUTES

Candidate's Index Number:
Signature:

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

COLLEGES OF EDUCATION
FOUR-YEAR BACHELOR OF EDUCATION (B.ED)
THIRD YEAR, END-OF-FIRST SEMESTER EXAMINATION, MAY 2022

MAY 18, 2022 CALCULUS 9:30 AM – 11:00 AM

SECTION B
[60 MARKS]

Answer only THREE questions from this Section.

1.

a. State the conditions for a function $f(x)$ to be continuous at $x = c$. Hence, determine at $x = 2$, the continuity of the function $g(x) = \begin{cases} \frac{x^2-x-2}{x-2}, & if\ x \neq 2 \\ 1, & if\ x = 2 \end{cases}$ **(10 marks)**

b. Show that the linearization of $f(x) = (1 + x)^k$ at $x = 0$ is $L(x) = 1 + kx$ and use it to estimate the value of $(1.0002)^{50}$. **(10 marks)**

2.

a. Find an equation of the tangent line to the graph of $y = g(x)$ at $x = 5$ if $g(5) = -3$ and $g'(5) = 4$. **(8 marks)**

b. Find the slope of the tangent line to the parabola $y = 4x - x^2$ at the point $(1, 3)$ using differentiation from the first principle. **(12 marks)**

3.

a. Use l'Hospital rule to evaluate $\lim_{x\to\infty} \frac{5x^3-2x}{7x^3}$. **(8 marks)**

b. Evaluate $\int_1^5 \frac{x}{\sqrt{2x-1}} dx$. (Hint let $u = \sqrt{2x-1}$). **(12 marks)**

4.

a. A point moves in the plane according to equations $x = t^2 + 2t$ and $y = 2t^3 - 6t$. Find $\frac{dy}{dx}$ when $t = 0, 2$ and 5. **(10 marks)**

b. A particle moves along a straight line and is initially 5 meters from a fixed point O. Its velocity after t seconds is $3t^2 + 2t + 1$. Find:

i. the displacement of the particle from 0 after 2 seconds. **(5 marks)**

ii. the acceleration of the particle after 2 seconds. **(5 marks)**