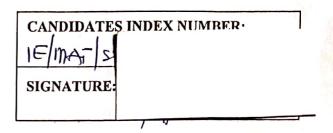
JANUARY 2023 EMA 112SW TEACHING AND LEARNING CALCULUS FOR CONCEPTUAL UNDERSTANDING 1 HOUR, 20 MINUTES



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

FIVE-SEMESTER BACHELOR OF EDUCATION (SANDWICH) PROGRAMME LEVEL 300, END-OF-SECOND SEMESTER EXAMINATION, JANUARY 2023

8TH JANUARY 2023

TEACHING AND LEARNING CALCULUS FOR CONCEPTUAL UNDERSTANDING

9:40 AM - 11:00 AM

SECTION B (60 Marks)

Answer THREE questions in this section.

1.

a. The diffusion of a chemical in a clinical trial is represented by $f(t) = (t+3)(2t^2-5t)$ grams. Determine the rate of diffusion of the chemical at t=2 secs

5 marks

- A farmer has 120 m length of fencing. He wants to use it to fence three sides of a rectangular enclosure against an existing wall, which produces the fourth side. Find the maximum area he can enclose.
- c. If the gradient of the curve $x^2 3ay 2x + 3 = 0$ at T(-1, -2) is 12, find the value of a. 5 marks

2.

- a. Given that $y = Ax^2 + B\frac{1}{x} + C$. If K(1,5), $\frac{dy}{dx} = 12$ and $\frac{dy^2}{d^2x} = 18$, find the values of A and B.
- b. A 4% error is made in measuring the radius of a sphere. Find the percentage error in the surface area.7 marks
- c. Fin the value of k for which the line y = 2x + k is normal to the curve $y = x^2 1$ 5 marks

- 3.
- a. Evaluate the definite integrals $\int_{1}^{2} \left(t^{2} + 2t + \frac{1}{t^{2}}\right) dt$.

10 marks

- b. Find the gradient of the curve $x^2 + 2xy = 2y^2 + x + 2$ at the point (-4, 1). 10 marks
- 4. A particle Q is projected from a point with velocity 30m/s and it moves in a straight line in such a way that its velocity after t seconds is given by $v = a + 7t + bt^2$, where a and b are constants. If one second after projection, the acceleration of the particle is 5m/s^2 . Find:

6 marks

 β). The time when the particle is momentarily at rest

5 marks

- γ). The distance travelled by the time it is momentarily at rest (correct your answer to two decimal places).9 marks
- 5.
- a. Using the trapezium rule with interval of 0.5, calculate the approximate value of $\int_{1\frac{1}{2}}^{4\frac{1}{2}} \sqrt{(n^2+1)} \ dn.$ 10 marks
- b. Given that $y = \frac{4}{\sqrt{x^3 + 1}}$, show that $2(x^3 + 1)\frac{dy}{dx} = -3x^2y$.

10 marks