19U506 (Pages: 2) Name: ……..…….……..

Reg. No: …….

FIFTH SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS-UG)

CC19U MTS5 D01 - APPLIED CALCULUS

(Mathematics – Open Course)

(2019 Admission - Regular)

Time: 2 Hours Maximum: 60 Marks

Credit: 3

Section A

Answer ***all*** questions Each question carries 2 marks.

1. Find $f(3)$ if $f(x) = x^2 + 4$
2. Find the domain and range of the function $g(t) = \sqrt{t-2}$
3. Find the composite function $f(g(x))$, where $f(u) = x^2$ and $g(x) = x + 1$
4. Find the slope of the line $3y + 2x = 6$
5. Find $\lim_{x \to -1} 3x^2 - 4x + 8$
6. Differentiate the polynomial $y = 5x^3 - 4x^2 + 12x - 8$
7. Find the derivative of the function $f(x) = \sqrt{\sin x}$
8. Define critical point of a function
9. Determine the interval of concavity of the function $f(x) = x^2$
10. State second derivative test
11. Simplify $(4^{\frac{1}{3}})(2^{\frac{1}{3}})$
12. $\int e^{-3x}\, dx$

(Ceiling: 20 Marks)

Section B

Answer ***all*** questions. Each question carries 5 marks.

13. Suppose the total cost in dollars of manufacturing q units of a certain commodity is the function $C(q) = 3q^2 + q + 500$
    i) Use marginal analysis to estimate the cost of manufacturing the 41st unit.
    ii) Compute the actual cost of manufacturing the 41st unit.
14. Find the equation of the line passes through the points $(3, -2)$ and $(1,6)$
15. Find $\lim_{x \to 1} \frac{\sqrt{x}-1}{x-1}$
16. Find the derivative of the function $Q(x) = \frac{x^2-5x+7}{2x}$

17. Find the intervals of the increase and decrease of the function

$$f(x) = 2x^3 + 3x^2 - 12x + 7$$

18. Find all inflection points of the function $g(x) = x^{\frac{1}{3}}$

19. If $f(x) = 5^{x^2+2x}$, find all values of x such that $f(x) = 125$

(Ceiling: 30 Marks)

Section C

Answer any ***one*** question. The question carries 10 marks.

20. Sketch the graph the function $f(x) = x^4 + 8x^3 + 18x^2 - 8$

21. Evaluate

    i) $\int x^3 e^{x^4+2} \quad dx$

    ii) $\int \frac{x^2+3x+5}{x+1} dx$

(1 × 10 = 10 Marks)

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