FIFTH SEMESTER UG DEGREE EXAMINATION, NOVEMEBR 2020
(CUCBCSS-UG)
(Regular/Supplementary/Improvement)
CC15U MAT5 D19 - MATHEMATICS FOR SOCIAL SCIENCES
(Mathematics - Open Course)
(2015 Admission onwards)

Time: Two Hours   Maximum: 40 Marks

Section A
Answer **all** questions. Each question carries 1 mark.

1. Find the x-intercept and y-intercept of $5x - 3y = 45$.

2. Evaluate $\lim\limits_{x \to 3}(x^3 + 3x^2 - 4)$

3. Find the derivative of $4x^{-3} + e^x$.

4. Define an inflection point.

5. Solve for x in the equation $\log_5 x = 3$.

6. Find $\frac{\partial u}{\partial x}$ if $u = 6x^3 + 7x^2 y$.

$(6 \times 1 = 6 \text{ Marks})$

Section B
Answer any **five** questions. Each question carries 2 marks.

7. Find the equation of the line passing through $(-2, 5)$ and parallel to the line

   $y = 3x + 7$.

8. Find the derivative of $(6x + 8)(4x + 9)^5$.

9. Examine the continuity of $f(x) = \frac{x^2 + 7x + 5}{x - 2}$ $at\ x = 3$.

10. Is the function $f(x) = x^4 - 4x^3 + 10$ increasing or decreasing on the interval $(0, 3)$.

11. The cost of a new product is $6\sqrt{x} + 15$. Find the average cost of producing first 64 units.

12. Evaluate $\int_0^1 \frac{16x\ dx}{8x^2 + 2}$ by the method of substitution.

13. Find the amount compounded annually of a principal of Rs.10000 and at an interest rate of 8% for time 3 years.

$(5 \times 2 = 10 \text{ Marks})$

Section C
Answer any *three* questions. Each question carries 4 marks.

14. Solve the quadratic equation $3x^2 + 24x + 30 = 0$ by completing the square.

15. Find the second-order derivative of $y = \frac{x-1}{x+1}$.

16. Differentiate using logarithms: $f(x) = (x^2 - 3x)(x^3 + 2)$.

17. Find the cross partial derivatives for $z = 6x^4 + 5xy + 3y^6$.

18. Integrate $\int x^2 e^x dx$ by parts.

$(\textbf{3} \times \textbf{4} = \textbf{12 Marks})$

Section D
Answer any *two* questions. Each question carries 6 marks.

19. A ball is shot straight into the air has height in feet $S(t) = 288t - 16t^2$ after t seconds.

    Find (a) the velocity (1 mark)

       (b) the acceleration (1 mark)

       (c) the time t the object will hit the ground (2 mark)

       (d) the velocity with which it hits the ground. (2 mark)

20. If $f(x) = 2x^3 - 12x^2 + 30$,

    (a) Find the critical values (2 mark)

    (b) Test for concavity to determine relative maxima or minima (2 mark)

    (c) Find inflection points, if any. (1 mark)

    (d) Find the function value at the critical points. (1 mark)

21. (a) Evaluate $\lim\limits_{x \to \infty} \frac{3x+2}{4x-6}$. (3 mark)

    (b) Use the delta process to find the derivative of $f(x) = x^2 - 6$ at $x = -5$. (3 mark)

$(\textbf{2} \times \textbf{6} = \textbf{12 Marks})$

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