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Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Open Course

MAT 5D 19—MATHEMATICS FOR SOCIAL SCIENCES

Time : Two Hours

Maximum : 40 Marks

Section A

Answer all the six questions.

Each question carries 1 mark.

1. Solve the equation $5x + 6 = 9x - 10$.
2. When a function is said to be differentiable.
3. Evaluate $\lim_{x \rightarrow 4} \frac{3x^2 - 5x}{x + 6}$.
4. Find the partial derivative $\frac{\partial z}{\partial x}$ if $z = 5x^3 - 3x^2y^2 + 7y^5$.
5. Find the marginal revenue function if the total revenue function $TR = 75Q - 4Q^2$.
6. Convert the logarithmic form $\log_e (0.8) = -0.22314$ to exponential form.

(6 × 1 = 6 marks)

Section B

Answer any five out of seven questions.

Each question carries 2 marks.

7. Solve the quadratic equation $5x^2 + 23x + 12 = 0$.
8. Which of the following equations are functions and why :

(a) $y = x^2$.

(b) $x^2 + y^2 = 16$.

Turn over

9. Evaluate $\lim_{x \rightarrow 6} \frac{x^2 - 2x - 24}{x - 6}$.

10. Verify whether the function $f(x) = \frac{x-3}{x^2-9}$ is continuous at $x = 3$.

11. Find the derivative of $y = \frac{3x^8 - 4x^7}{4x^3}$.

12. Evaluate $\int_0^1 \left(\frac{1-t}{1+t} \right) dt$.

13. Find the total revenue between 0 and 10 units of output (x) from the marginal revenue given by
 $MR = 3\left(x^2/20\right) - 10x + 100$.

(5 × 2 = 10 marks)

Section C

Answer any **three** out of five questions.

Each question carries 4 marks.

14. Graph the equation $3y + 15x = 30$ and indicate their slope and intercepts.

15. Test whether the function $f(x) = (5x^2 - 8)^2$ is concave or convex at $x = 3$.

16. Find the derivative $\frac{dy}{dx}$ of the implicit function $3x^4 - 7y^5 - 86 = 0$.

17. Find the first order partial derivatives of $z = \frac{5x}{6x - 7y}$.

18. Find the relative extrema for the function $f(x) = -7x^2 + 126x - 23$.

(3 × 4 = 12 marks)

Section D

Answer any **two** out of three questions.

Each question carries 6 marks.

19. Optimize the function $f(x) = 2x^3 - 30x^2 + 126x + 59$.

20. Evaluate $\int_2^5 \frac{3x}{(x+1)^2} dx$.

21. A company makes a profit of Rs. 5 on each unit of its product sells. If it spends an amount of Rs. A per week on advertising, then the number of items per week it sells is given by $x = 2000(1 - e^{-KA})$, where $K = 0.001$. Find the value of A that will maximize the net profit.

(2 × 6 = 12 marks)