

B. A. DEGREE (C.B.C.S.S) EXAMINATION, APRIL 2018
(2014 Admission Supplementary)
SEMESTER II – COMPLEMENTARY COURSE (MATHEMATICS)
MAT2CELF – CALCULUS, EXPONENTIAL AND LOGARITHMIC FUNCTIONS
(For Economics)

Time: Three Hours

Maximum marks: 80

PART A**I. Answer all questions. Each question carries 1 mark.**

1. What is the derivative of a constant.
2. If $y = e^x + x^2$, find $\frac{dy}{dx}$.
3. Find $\lim_{x \rightarrow 2} (x^4 + 5x)$.
4. Simplify $e^{2 \log x}$.
5. Convert into logarithmic forms $64 = 8^2$.
6. Simplify $\log 2 + \log 4 + 3 \log 5$
7. Evaluate $\int_0^1 x^4 dx$.
8. If $z = (4x^2 + 9y^3)$, find $\frac{\partial z}{\partial y}$.
9. If $z = 3x^2y^2$, find $\frac{\partial z}{\partial x}$.
10. Define partial derivative of $z = f(x, y)$ with respect to y.

(10x1=10)**PART B****II. Answer any eight questions. Each question carries 2 marks.**

11. Find $\frac{d^2y}{dx^2}$ where $y = 50x^4 + 3x^3 + 8$.
12. Find the average cost of $TC = Q^3 + 7Q^2 + 8Q$ at $Q = 2$.
13. If Total revenue $TR = -3Q^2 + 95Q$ Find the marginal revenue MR at $Q = 7$.
14. Solve $7e^{3x} = 630$.
15. If $y = (e^{4x} + e^{-3x})$, find $\frac{dy}{dx}$.
16. Given a principal P of Rs. 1000 at 6% interest for 3 years, find the amount when the principal is compounded annually.
17. Evaluate $\int (x^5 + \frac{7}{x^2} + 3) dx$.
18. Evaluate $\int (7x^2 + 1)^2 x dx$.
19. Find $\int_1^2 (x + 1)^2 dx$.
20. Find z_x if $z = 16x - 9xy + 13y$.
21. Find $\frac{dP}{dQ}$ if $Q = 87 - 4P$.
22. Find $\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}$ if $z = 7x^2y$.

(8x2=16)

PART C

III. Answer any six questions. Each question carries 4 marks.

23. Find $\frac{dy}{dx}$ if $y = \frac{(4x^2-7)(6x+5)}{3x}$.
24. Find the relative extrema of average cost function AC if the total cost function $TC = Q^3 - 24Q^2 + 600Q$.
25. Find the second derivative of the function $f(x) = (3x^4 - 7)^2$.
26. Differentiate $f(x) = (7e^{4x} - 9e^{-5x})^5$.
27. Find the value A of a principal $P = Rs. 3000$ set out an interest rate $R=8\%$ for a time of $t = 6$ years when compounded annually.
28. Evaluate $\int \frac{72x}{(9x^2+2)^5} dx$.
29. Find the area between the curve $y = 3 - x^2$ and $y = -x + 6$ from $x = -1$ to $x = 2$.
30. Find the critical values at which the function $z = 4x^2 - 5xy + 6y^2$ is optimized subject to the constraint $x + y = 30$.
31. Find the second order partial derivatives z_{xx} and z_{yy} for the function $z = x^2 + xy + x^3y$.

(6x4=24)

PART D

IV. Answer any two questions. Each one carries 15 marks.

32. Maximize profit function π where $TR = 440Q - 3Q^2$ and $TC = 14Q + 225$.
33. Find the value of A of a principal $P = Rs. 5000$ set out at an interest rate $r = 10\%$ for time $t = 8$ years when compounded (a) annually (b) Semi annually (c) quarterly (d) continuously.
34. Integrate the following functions (a) $\int x(x - 8)^3 dx$ (b) $\int \frac{\log x}{x} dx$.
35. Use Lagrange's multiplier method to optimize the function $z = 4x^2 + 3xy + 6y^2$ subject to the constraint $x + y = 56$.

(2x15=30)