TB162500B **Reg. No: ....**

Name: ....

B. A. DEGREE EXAMINATION, MARCH 2017
(2016 Admission - Regular & 2015 Admission – Supplementary/Improvement)
SEMESTER II - COMPLEMENTARY COURSE (MATHEMATICS)
MT2CE02B - EXPONENTIAL, LOGARITHMIC FUNCTIONS, LINEAR ALGEBRA AND ADVANCED CALCULUS
(For Economics)

Time: Three Hours **Maximum Marks: 80**

PART A

I. Answer all questions. Each question carries 1 mark.

1. Express $log_a(69x^3)$ as sum of two terms.
2. Write the expression $log_{64}8 = \frac{1}{2}$ in exponential forms.
3. Write the Augmented matrix corresponding to the system of equations.
   $5x_1 + 12x_2 = 32, \quad 7x_1 - 3x_2 = 25$
4. Give the identity matrix of order 4.
5. Find the first order partial derivatives of $z = ln(8x+11y)$
6. Find the second order derivatives z_{xy} and z_{yx} then show that $z_{xy} = z_{yx}$, where
   $z = 7x^3 - 4xy + 12y^4$

(6x1=6)

PART B

II. Answer any seven questions. Each question carries 2 marks.

7. Differentiate $7e^{8-3x^2}$
8. Differentiate $y = 7xe^{4x}$
9. Convert the matrix $\begin{bmatrix} 3 & 10 \\ 2 & 9 \end{bmatrix}$ into identity matrix of order 2 using elementary row transformations.
10. Find, where $A = \begin{bmatrix} 3 & 4 \\ -2 & 1 \end{bmatrix}$ where I is the identity matrix of order 2.
11. Find AB for the matrices $A = \begin{bmatrix} 3 & 5 \\ 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 5 & 6 \end{bmatrix}$
12. Give the number of basic solutions for a given system of n consistent equations and v variables and $v > n$
13. Define slack and surplus variable in a linear programming problem.
14. If $z = (8x - 5y)(3x + 4y)$, find z_x and z_y
15. Find $\frac{dy}{dx}$ if $x^2 + y^2 = 9$
16. If $Q = 14 + 4P^3$, find $\frac{dP}{dQ}$

(7x2=14)

PART C

III. Answer any five questions. Each question carries 6 marks.

17. Differentiate $y = \frac{e^{6x}}{2x+1}$

18. Find AB and BA, if exists where $A = \begin{bmatrix} 7 & 1 \\ 2 & 5 \\ 4 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 4 & 5 \\ 2 & 6 \end{bmatrix}$
19. Solve using Gaussian elimination $-13x + 9y = 15, 7x - 2y = -28$
20. Using Cramer's rule solve $4x + 5y = 92, 7x + 6y = 128$
21. Solve the following LPP in graphical method.
    Minimize $C = 20x_1 + 15x_2$ subject to $3x_1 + 2x_2 \geq 36, 6x_1 + 2x_2 \geq 84$, $x_1, x_2 \geq 0$
22. Find the total number of basic solutions that exists for the following LPP
    Maximize $\pi = 14x_1 + 12x_2 + 18x_3$ subject to
    $2x_1 + x_2 + x_3 \leq 2, x_1 + x_2 + 3x_3 \leq 4, x_1 \leq 6$, $x_1, x_2, x_3 \geq 0$
23. A department store has found that its value of sales Z depends on the number of advertisements in circulars x and in newspapers y , given by $Z = 420x - 2x^2 - 3xy - 5y^2 + 640y + 1725$. If the price per add is Rs.1/- in circulars and Rs.4/- in newspapers and the advertisement budget is Rs.180/-. Find the number of adds in circulars and newspapers that will maximize the sales subject to given conditions.
24. Find the maximum of the output function subject to the given constraint if production function $q = K^{0.3}L^{0.5}, P_K = Rs. 12/-, P_L = Rs. 8/-$ and the product budget is Rs.1280/-

(5x6=30)

PART D

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

25. Determine the present value of Rs.5000/- to be paid in 3 years time if current interest of 10% is compounded (i) annually (ii) semi annually (iii) quarterly (iv) continuously.
26. Use cramer's rule to solve $10x - 2y - \lambda = 0, -2x + 16y - \lambda = 0, 60 - x - y = 0$
27. Solve using Graphical method Minimize $C = 7y_1 + 4y_2$ subject to
    $3y_1 + 2y_2 \geq 48, 9y_1 + 4y_2 \geq 108, 2y_1 + 5y_2 \geq 65, y_1, y_2 \geq 0$
28. Optimize the following function, $f(x, y) = 120x - 2x^2 - xy + 160y - 3y^2 + 7$
    subject to the constraint $3x + y = 480$

(2x15=30)