

**Bachelor of Business Administration
Annual Examinations – 2006**

**Paper BBAD – 401
Mathematics for Business & Economics**

Time allowed: Three hours

Maximum Marks: 100

Answer any five questions from Section A
Answer any five questions from Section B

SECTION – A

Marks

1. If the demand equation is $x_d = 100 - 8p$ and supply equation is $x_s = 3p^2$, find equilibrium values of price and quantity. 5

2. Let $a = \begin{bmatrix} -2 \\ 0 \end{bmatrix}$ and $b = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$. Find $a + b$ and $a - b$. Show these vectors on a diagram 5

3. Evaluate the following limits: 5

$$\lim_{x \rightarrow a} \frac{x^2 - a^2}{x - a}$$

4. Find $\frac{dy}{dx}$ for the following function 5

$$y = \frac{1 - 2x}{1 + x^2} (1 - x^2)$$

5. Find elasticity of demand of the function, $x = 100 - 5p$ at
a) $p = 10$
b) $p = 15$ 5

6. Show that the function $y = x^2 - 2x + 3$ has a minimum at $x = 1$. Find the minimum value of the function 5

7. Evaluate the following integral: 5

$$\int_0^3 (3x^2 + 5x + 2) dx$$

8. Maximise $z = 3x_1 + 4x_2$
subject to $5x_1 + 8x_2 \leq 2,000$
 $3x_1 + 10x_2 \geq 1,000$
and $x_1, x_2 \geq 0$ 5

SECTION – B

1. A company decided to set up a small production plant for manufacturing electronic clocks. The initial setup cost is Rs 9 lakhs. The additional cost for producing each clock is Rs. 300. Each clock is sold at Rs. 750. 15
 - (i) Determine the total cost function $c(x)$ and the revenue function $R(x)$
 - (ii) Determine the break – even point.

2. Define Transpose of a Matrix. Also explain the properties of Transpose with suitable examples. 15
3. Solve the following equations by Cramer's Rule 15

$$\begin{aligned} 2x + y + z &= 7 \\ 3x - y - z &= -2 \\ x + 2y - 3z &= -4 \end{aligned}$$
4. Show that the function $f(x) = \frac{x^2 - 4}{x + 2}$ is discontinuous at $x = -2$. What is the nature of discontinuity? 15
5. Show that the polynomial $y = ax^3 + bx^2 + cx + d$ has only one point of inflexion. 15

Under what conditions

 - a) the curvature changes from convex to concave
 - b) the point of inflexion is stationary.
6. Find all the first and second order partial derivatives of $z = x \log y - x^2 e^{xy}$ and verify Young's theorem. 15
7. A discriminating monopolist is able to separate its customers into two markets with respective demand functions as $x_1 = 16 - 0.2p_1$ and $x_2 = 9 - 0.05p_2$. The cost function of monopolist is $C = 20 + 20x$, where $x = x_1 + x_2$. Find the profit maximizing values of x_1 & x_2 . Find the prices charged in each market. 15
8. What do you understand by a linear programming problem? Give a brief description of the problem with illustrations. 15
9. A manufacturing company produces two products A and B. Each product passes through three processes. The processing time (in hrs) per unit for each of the products in each process is 15

	A	B
Process 1	2	5
Process 2	1	2
Process 3	4	2

The total hours available for each process in a week are 30, 24 and 20 respectively. Product A gives a profit of Rs. 18 per unit and product B gives a profit of Rs. 15 per unit. Find the quantities of A & B to be produced to give maximum profit.