

(DBBM 11)

B.B.M.(Previous) DEGREE EXAMINATION, MAY 2006
Part II - Business Management
PAPER - II - BUSINESS MATHEMATICS

Time: Three hours

Maximum: 100 marks

Answer any FIVE questions
All questions carry equal marks.

1. (a) What do you mean by a mathematical model of a real situation? Explain the principles of modelling. Describe the role of computers in building models.
(b) A man walks a distance 48 kms in a given time. If he walks 2 kms an hour faster, he will perform his journey 4 hours before. Find the normal rate of walking.
2. (a) Out of 6 gentlemen and 6 ladies a committee of 5 is to be formed. In how many ways can this be done, when this committee consists of (i) exactly 2 ladies and (ii) atleast 2 ladies.

(b) If the coefficient of x in the expansion of $\left(x^2 + \frac{k}{x}\right)^5$ is 270, find the value of k .

3. (a) If A, B are subsets of X, show that

(i) $(A \cap B)' = A' \cup B'$

(ii) $A - (A - B) = A \cap B$

(iii) $A \cap (B - C) = (A \cap B) - (A \cap C)$

(b) Evaluate $\lim_{x \rightarrow 3} \frac{x^3 - 6x - 9}{x^4 - 81}$.

4. (a) If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar vectors, prove that the points $\vec{a} - 2\vec{b} + 3\vec{c}, -2\vec{a} + 3\vec{b} - \vec{c}$ and $4\vec{a} - 7\vec{b} + 7\vec{c}$ are collinear.

(b) If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar vectors, show that the vectors $\vec{a} - 2\vec{b} + 3\vec{c}, -2\vec{a} + 3\vec{b} - \vec{c}, -\vec{b} + 2\vec{c}$ are coplanar.

5. (a) If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 4 & 1 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 1 & 0 \\ 2 & -3 & 1 \\ 1 & 1 & -1 \end{bmatrix}$ verify that $(AB)' = B'A'$.

(b) Compute the adjoint and inverse of the matrix $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 0 & 1 \\ 1 & 2 & 1 \end{bmatrix}$.

6. (a) Determine the rank of the matrix $\begin{bmatrix} 2 & 1 & 3 \\ 1 & 1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$.

(b) Solve the system of equations $3x + y + 4z = 2$, $x - y + 2z = 1$ and $2y + z = -4$ using the matrix inversion method.

7. (a) Differentiate the following functions w.r.t. x .

(i) $\frac{x^2(x+4)}{x+1}$

(ii) $\frac{x^2-2}{x-3}$

(b) The revenue function for a product is $R = 600q - 0.5q^2$ and the cost function is $C = 1500 + 140q - 4q^2 + 0.5q^3$. Determine the profit function and the value of q for which profits are maximum.

8. Integrate and evaluate the following:

(a) $\int \frac{x^2-1}{x^2+1} dx$

(b) $\int \sin x \sin 2x dx$

(c) $\int x^2 \log x dx$

9. (a) Define operations research. Give its main characteristics and its limitations, as applicable to business and industry.

(b) Solve the following L.P.P. using simplex method:

Maximize $z = 3x_1 + 2x_2$

subject to constraints: $x_1 + x_2 \leq 4$,

$x_1 - x_2 \leq 2$ and

$x_1, x_2 \geq 0$.
