Business Mathematics
Model Examination Paper

Section A
(Multiple Choice Questions) (20 Marks)

1. Choose the best answer for the following.
   i. **Number system depends on two basic concepts.**
      Binary and decimal   Digits and position   Binary and digits   Binary and position
   
   ii. **The value of x in the following.**
       \[
       \frac{101+x}{11} = 110
       \]
       \[
       1001 \quad 1011 \quad 1101 \quad 1010
       \]
   
   iii. **If \[
           \begin{bmatrix}
           2 \times 4 \\
           6 \times 2
           \end{bmatrix}
           \]
       is a singular matrix, then x is equal to:
       \[
       2 \quad 4 \quad 6 \quad 12
       \]
   
   iv. **The product of a matrix and its multiplicative inverse is a/an:**
       Identity Matrix   Singular Matrix   Non Singular Matrix   Diagonal Matrix
   
   v. **The order of matrix A is 4 x 5 and order of matrix B is 5 x 3, then order of (AB)\(^t\) is:**
       4 x 3   4 x 5   5 x 4   3 x 4
   
   vi. **The y-intercept of the parabolic curve \(y = 3x^2 + 2x - 7\) is:**
       \[
       7 \quad -7 \quad 0 \quad 1/7
       \]
   
   vii. **If the number of rows and columns are equal, then matrix is called:**
       Singular Matrix   Square Matrix   Rectangular Matrix   Null Matrix
   
   viii. **If \[
          \begin{bmatrix}
          x + y \\
          2
          \end{bmatrix}
          = \begin{bmatrix}
          5 \\
          2
          \end{bmatrix}
          \]
       then x and y are:
       \[
       2 \& 3 \quad 3 \& 2 \quad 2 \& 5 \quad 5 \& 3
       \]
   
   ix. **(AB)\(^t\) is equal to:**
       \[
       A^{-1} \times B^{-1} \quad B^{-1} \times A^{-1} \quad (BA)^{-1} \quad \text{None of these}
       \]
   
   x. **\(2^{2x+5} = 64\)**
       \[
       2 \quad ½ \quad 3/2 \quad 2/3
       \]
   
   xi. **The effective rate of interest on 16% compounded quarterly is:**
       16.90%   16.98%   16.99%   16.96%
   
   xii. **If \(f(x) = 7x - 5\) then the value of \(f(x + 3)\) is:**
       \[
       7x - 2 \quad 7x + 16 \quad 7x - 16 \quad 7x + 2
       \]
   
   xiii. **If x and y intercepts of the line are 3/2 and 5/4 respectively then the equation of the line is:**
10x + 12y = 15  
12x + 10y = 15  
10x – 12y = 15  
12x – 10y = 15

xiv. The ratio between 3 days and 40 hours is:
5 : 9  4 : 9  9 : 5  5 : 4

xv. The time in which Rs. 65000 would be earned on Rs. 50000 at 20% per annum is:
5.6 years  6.5 years  1.5 years  4.5 years

xvi. The point (-6/5, -5/6) would lie in:
1st Quadrant  2nd Quadrant  3rd Quadrant  4th Quadrant

xvii. The direction of the parabolic curve 7x² + 2x – 15 = 0 is:
Upward  Downward  Left  Right

xviii. When the principal remains same for the entire period, the interest is:
Simple interest  Compound interest  None of these

xix. X⁰ = ?
0  1  2  3

xx. The highest degree of the linear equation is:
0  1  2  3
SECTION B
(Short-Answer Questions)

Attempt any eight of the following. (40 Marks)

2.
  i. If \( y = -x(x + 5) + 6 \) then find vertex and roots.
  ii. Find \( 11101 \times 110 - 10101 \times 101 \)
  iii. Find the effective rate of interest if the nominal rate of interest is 8.4\% compounded quarterly.
  iv. If a straight line passing through two points (-2, 3) and (4, 5) then find the equation of the line and the distance between points.
  v. Find \( x:y \) if \( 25x^2 - 60xy + 36y^2 = 0 \)
  vi. If \( A = \begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix} \) then verify that \( A^{-1}A = I \)
  vii. Mr. Babar invests Rs. 150000 in a scheme for 8 years @ 6.5\% compounded semi-annually. Find how much he gain at the end of 8 years.
  viii. Solve the following equations.
      \[ \sqrt{3x+1} - 2 = 2x - 8 \]
  ix. 30 workers complete a work in 50 days work 10 hours a day. Find in how many days 25 workers complete this work, working 12 hours a day.
      \[
      \begin{vmatrix}
      x & 2 & x + 2 \\
      \end{vmatrix} = 5
      \]
  x. If \( \begin{vmatrix}
      1 & -1 & 1 \\
      2 & 1 & 3 \\
    \end{vmatrix} \) then find the value of \( x \).
SECTION C
(Detailed-Answer Questions)

Attempt any four of the following. (40 Marks)

3. (a) Solve the following equations by using Cramer’s Rule.

\[\begin{align*}
2x - 2y &= 11 \\
7x - 4y &= 27
\end{align*}\]

(b) Mr. Babar sold an item for Rs. 6954 at a loss of 8.5%. Find the selling price of the item if he sold at 20% profit on sale.

4. (a) Mr. Irshad deposit Rs. 9500 at the end of each month for 5 years @ 9% compounded monthly. Find the sum of annuity and present value.

(b) Solve

\[\frac{3x - 1}{x + 3} + \frac{3x + 2}{x + 1} = 3\]

5. Solve the following equations by using inverse matrix method.

\[\begin{align*}
x - 2y + z &= 4 \\
x - y - z &= -2 \\
2x + y + z &= 5
\end{align*}\]

6. (a) Distribute Rs. 150000 among A, B and C in the ratio 2 : 3 : 5.

(b) If \(a : b = 4 : 5\), \(b : c = 3 : 4\) and \(c : d = 6 : 7\) then find \(a : b : c : d\).

7. If \(A = \begin{bmatrix} 2 & 7 \\ 4 & 5 \end{bmatrix}\) and \(B = \begin{bmatrix} 3 & 6 \\ 8 & 7 \end{bmatrix}\) then find the following.

(a) \(A^t \times B\)    (b) \(3B^t + 4A^t\)    (c) \((A - B)^t\)