Model Question Paper 1 [2018-19]

Unit 1 - Sets and Functions

Subject: BUSINESS MATHEMATICS **Class: XI**

Time: 1.30 Hours **Marks: 45**

Part I

Choose the Best Answer **10 X 1 = 10**

1. The value of x if $\begin{vmatrix} 0 & 1 & 0 \\ x & 2 & x \\ 1 & 3 & x \end{vmatrix} = 0$ is

(a) 0, −1 (b) 0, 1 (c) −1, 1 (d) −1, −1

2. The cofactor of −7 in the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ is

(a) −18 (b) 18 (c) −7 (d) 7

3. If A is square matrix of order 3 then | kA |is

(a) k A (b) −k A (c) k^3 A (d) $-k^3$ A

4. The number of Hawkins -Simon conditions for the viability of an input-output analysis is

(a) 1 (b) 3 (c) 4 (d) 2

5. The inventor of input - output analysis is

(a) Sir Francis Galton b) Fisher (c) Prof. Wassily W. Leontief (d) Arthur Caylay

6. If A is a square matrix of order 3 and A 3 = then adjA is equal to

(a) 81 (b) 27 (c) 3 (d) 9

7. If any three rows or columns of a determinant are identical then the value of the determinant is

(a) 0 (b) 2 (c) 1 (d)

8. [6 2 -3] is a matrix of order

(a) 3 × 3 (b) 3 × 1 (c) 1 × 3 (d) Scalar matrix

9. When the number of rows and the number of columns of a matrix are equal, the matrix is

(a) square matrix (b) row matrix (c) column matrix (d) None of these

10. The value of $\begin{vmatrix} 1 & -1 \\ 0 & 0 \end{vmatrix}$ is

(a) 0 (b) -1 (c) 1 (d) None of these

Part II

Answer the Following Questions 4 X 2 = 8

Q.No 16 Compulsory

11. Evaluate: $\begin{vmatrix} 2 & 4 \\ -1 & 4 \end{vmatrix}$

12. Find the minor and cofactor of all the elements in the determinant $\begin{vmatrix} 1 & -2 \\ 4 & 3 \end{vmatrix}$

13. Find the adjoint of the matrix A= $\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$

14. Show that $\begin{vmatrix} 1 & 2 \\ 2 & 4 \end{vmatrix}$ is a singular matrix.

15. Find the inverse of the matrices $\begin{pmatrix} 3 & 1 \\ -1 & 3 \end{pmatrix}$

16. Solve by matrix inversion method : $2x + 3y - 5 = 0$; $x - 2y + 1 = 0$

Part III

Answer the Following Questions 4 X 3 = 12

Q.No 22 Compulsory

17. Solve: $\begin{vmatrix} 7 & 4 & 11 \\ -3 & 5 & x \\ -x & 3 & 1 \end{vmatrix} = 0$

18. Evaluate: $\begin{vmatrix} 3 & -2 & 4 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$

19. Find the inverse of the matrices $\begin{pmatrix} 1 & 2 & 3 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{pmatrix}$

20. If $A^{-1} = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ then, find A.

22. The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.50 & 0.30 \\ 0.41 & 0.33 \end{bmatrix}$.
Test whether the system is viable as per Hawkins Simon conditions

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Part IV

Answer all the Questions **4 X 5 = 20**

23. a) Evaluate $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$ $=(a-b)(b-c)(c-a)$ **(or)**

b) Evaluate: $\begin{vmatrix} 1 & a & a^2-bc \\ 1 & b & b^2-ca \\ 1 & c & c^2-ab \end{vmatrix}$

24. If $A=\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B=\begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ then, verify that $(AB)^{-1} = B^{-1}A^{-1}$ **(or)**

If $X = \begin{bmatrix} 8 & -1 & -3 \\ -5 & 1 & 2 \\ 10 & -1 & -4 \end{bmatrix}$ and $Y = \begin{bmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \\ 5 & p & q \end{bmatrix}$ then, find p, q if $Y = X^{-1}$

25. a) Solve by matrix inversion method : $x - y + 2z = 3$; $2x + z = 1$; $3x + 2y + z = 4$. **(or)**

b) The cost of 4 kg onion, 3 kg wheat and 2 kg rice is `320. The cost of 2kg onion, 4 kg wheat and 6 kg rice is `560. The cost of 6 kg onion, 2 kg wheat and 3 kg rice is `380. Find the cost of each item per kg by matrix inversion method.

26. a) Two commodities *A* and *B* are produced such that 0.4 tonne of *A* and 0.7 tonne of *B* are required to produce a tonne of *A*. Similarly 0.1 tonne of *A* and 0.7 tonne of *B* are needed to produce a tonne of *B*. Write down the technology matrix.If 6.8 tonnes of *A* and 10.2 tonnes of *B* are required, find the gross production of both of them. **(or)**

b) Suppose the inter-industry flow of the product of two sectors *X* and *Y* are given as under.

Production sector	Consumption Sector		Domestic demand	Gross output
	X	Y		
X	15	10	10	35
Y	20	30	15	65

Find the gross output when the domestic demand changes to 12 for X and 18 for Y.

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