**11**

Reg. No. _____

# First Mid-Term Test - July, 2018

Time : 1.30 hrs. **BUSINESS MATHS** Max. Marks : 50

## PART - A

**I. Answer all questions** **10 x 1 = 10**

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

   a) 0 b) 20 c) –20 d) –27

2. The inverse of $\begin{bmatrix} 4 & 1 \\ 7 & 2 \end{bmatrix}$ is

   a) $\begin{bmatrix} 2 & -1 \\ -7 & 4 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$ c) $\begin{bmatrix} -4 & 7 \\ 1 & -2 \end{bmatrix}$ d) $\begin{bmatrix} 4 & 7 \\ 1 & 2 \end{bmatrix}$

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

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

4. If $A = \begin{pmatrix} -1 & 2 \\ 1 & -4 \end{pmatrix}$ then A(Adj A) is

   a) $\begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix}$ b) $\begin{pmatrix} -4 & -2 \\ -1 & -1 \end{pmatrix}$ c) $\begin{pmatrix} 4 & -2 \\ -1 & 1 \end{pmatrix}$ d) $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$

5. The value of $\begin{vmatrix} 3 & 3 & 3 \\ 2x & 2y & 2z \\ x & y & z \end{vmatrix}$ is

   a) 5 b) 4 c) 2 d) 0

6. If $nC_3 = nC_2$ then the value of $nC_4$ is

a) 2 b) 3 c) 4 d) 5

7. The number of diagonals in a hexagon is equal to
   a) 9 b) 18 c) 6 d) 12
8. The last term in the expansion of $(3+\sqrt{2})^8$ is
   a) 81 b) 16 c) $8\sqrt{2}$ d) $27\sqrt{3}$
9. The number of ways to arrange the letters of the word 'ANAND'
   a) 30 b) 60 c) 90 d) 120
10. Sum of the binomial coefficients is
    a) $2^n$ b) $n^2$ c) 2n d) n + 17

**PART - B**

**II. Answer 5 questions** **5 x 2 = 10**

**Questions number 16 is compulsory.**

11. Solve $\begin{vmatrix} x-1 & x & x-2 \\ 0 & x-2 & x-3 \\ 0 & 0 & x-3 \end{vmatrix} = 0$

12. Evaluate $\begin{vmatrix} 1 & 3 & 4 \\ 68 & 12 & 24 \\ 17 & 3 & 6 \end{vmatrix}$

13. Find the inverse of $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$

14. The technology matrix is an economic system is $\begin{bmatrix} 0.6 & 0.9 \\ 0.20 & 0.80 \end{bmatrix}$. Test whether the system is viable as per Hawkins - Simon conditions

15. If each objective type questions having 4 choices then find the total number of ways of answering the 4 questions.
16. If $nC_4 = nC_6$ find $12C_n$.
17. Find the rank of the word 'CHAT' in dictionary

**PART - C**

**III. Answer 5 questions** **5 x 3 = 15**

**Questions no.22 is compulsory.**

18. Find the minors and cofactors of all the elements of

$$\begin{vmatrix} 3 & -2 & 4 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$$

19. Prove that $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$

20. If $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ then show that inverse of A is A itself.

21. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ satisfies the equations $A^2 - KA + I_2 = 0$ then find 'K'.

22. Resolve into partial fractions. $\frac{3x+7}{x^2-5x+6}$

23. Find 'n' if $\frac{1}{9!} + \frac{1}{10!} = \frac{n}{11!}$

24. Find the middle terms in the expansion of $\left(3x + \frac{x^2}{2}\right)^8$

**PART - D**

**IV. Answer all questions.** **3 x 5 = 15**

25. Solve by matrix inversion method.
$3x - y + 2z = 13$ ; $2x + y - z = 3$ ; $x + 3y - 5z = -8$

**(OR)**

If $A = \begin{bmatrix} 1 & 1 & 1 \\ 3 & 4 & 7 \\ 1 & -1 & 1 \end{bmatrix}$ verify that $A(\text{Adj } A) = (\text{adj } A)A = |A| I_3$.

26. A committee of 5 is to be formed out of 6 gents and 4 ladies. In how many ways this can be done.
i) atleast two ladies are included
ii) atmost two ladies are included

**(OR)**

By mathematical induction, prove that

$$1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

for all $n \in N$

27. The data are about an economy of 2 industries A and B. The values are in crores of rupees.

| Producer | User | | Final demand | Total output |
|---|---|---|---|---|
| | A | B | | |
| A | 50 | 75 | 75 | 200 |
| B | 100 | 50 | 50 | 200 |

Find the output when the final demand changes to 300 for A and 600 for B.

**(OR)**

Resolve into partial fractions $\frac{2x+1}{(x-1)(x^2+1)}$.