Reg. No..... Name.....

BA/BSC/BCOM DEGREE END SEMESTER EXAMINATION - NOVEMBER 2024

UGP (HONS.) SEMESTER - 1 : DISCIPLINE SPECIFIC COURSE (MATHEMATICS)

COURSE: 24UMATDSC111 : FOUNDATION OF MATHEMATICS

(For Regular 2024 Admission)

TIME – 2 hours Max Marks – 70

PART-A

(Each question carries 2 marks. A maximum of 10 marks can be scored from this part.)

1. Define rank of a matrix.
2. Find the equivalent matrix using the operation $C_1 \to C_1 - 3C_2$ if $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 2 \\ 3 & 4 & 5 \end{bmatrix}$.
3. Find the determinant of the matrix $A = \begin{bmatrix} 0 & 2 \\ 5 & 15 \end{bmatrix}$.
4. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \\ 0 & -2 \end{bmatrix}$.
5. Check whether the vectors $(1,2), (2,3)$ are linearly independent or not?
6. Explain Gauss elimination method.
7. Write the converse of the propositions
   (a) If it rains, then the ground will be wet.
   (b) If a number is divisible by 4, it is divisible by 4.
8. Find the truth table for $\neg p \wedge q$.

PART-B

(Each question carries 5 marks. A maximum of 30 marks can be scored from this part.)

9. Find the normal form of $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$.
10. Find the inverse of the matrix $A = \begin{bmatrix} 8 & 9 \\ 7 & 6 \end{bmatrix}$ using E operations.
11. Find the Eigen values of $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{bmatrix}$.
12. Describe the method of Gauss Seidel iteration.
13. Use Gauss elimination method, solve the system of equations $3x + 4y - z = 8, -2x + y + z = 3, x + 2y - z = 2$.
14. Use Gauss Jordan method, solve the system $x + 2y - z = 3, 3x - y + 2z = 1, 2x - 2y + 3z = 2$.
15. Construct the truth table of the compound proposition: $(p \vee q) \to (p \oplus q)$.
16. Find the truth table for inverse, converse and contrapositive of $p \to q$.

PART-C

(Each question carries 15 marks. A maximum of 30 marks can be scored from this part.)

17. Find the normal form of $A = \begin{bmatrix} 2 & 1 & 4 \\ 8 & -3 & 2 \\ 4 & 11 & -1 \end{bmatrix}$ hence find the rank.
18. Find the Eigen values and Eigen vectors of $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$.
19. Check whether this system of equation $2x + y + z = 4, x + 2y + z = 4, x + y + 2z = 4$ can be solve by the method of Gauss Seidel, if yes find the solution .
20. (a) Show that $p \wedge (q \vee r)$ and $(p \wedge q) \vee (p \wedge r)$ are logically equivalent.

(b) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.