

Roll No. _____

[Total No. of Pages : 3

SIS - N 065 B-17

B.A./B.Sc. Ist Semester Degree Examination

Mathematics

(Algebra and Vectors)

Paper : 1.1

(New)

Time : 3 Hours

Maximum Marks : 60

Instructions to Candidates :

Answer all the sections.

SECTION - A

I. Answer any TEN of the following. (10×2=20)

1. Show that the only matrix which is both symmetric and skew symmetric is zero matrix.
2. If iA is a skew Hermitian matrix, then show that A is Hermitian matrix.
3. Let A be $n \times n$ orthogonal matrix then prove that A' is orthogonal.

4. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 5 & 7 \end{bmatrix}$ by reducing in to echelon form.

5. Define consistent and inconsistent for system of linear equation.

6. Find the EIGEN values and Eigen vectors of the matrix $\begin{bmatrix} -3 & 8 \\ -2 & 7 \end{bmatrix}$

7. If $\vec{a}, \vec{b}, \vec{c}$ are three non coplanar vectors then show that $\vec{b} \times \vec{c}, \vec{c} \times \vec{a}, \vec{a} \times \vec{b}$ are non coplanar.

8. Find the set of vectors reciprocal to the vectors $i+2j+3k$; $5i-j-k, i+j-k$.

9. Increase the roots of the equation $x^4-24x^2-13x+35=0$ by 2.

10. Show that the equation $2x^7-x^4+4x^3-5=0$ has at least four complex roots.

11. If a/b and $b < a$ where 'a' and 'b' are non - negative integers then prove that $b=0$.

12. Define g.c.d and relatively prime numbers.

SECTION - B

II. Answer any Four of the following.

(4×5=20)

13. Find the rank of the matrix A by reducing into its normal form where

$$A = \begin{bmatrix} 1 & 2 & 4 \\ -1 & -2 & -4 \\ 2 & 4 & 8 \\ 3 & 6 & 9 \end{bmatrix}$$

14. Find the inverse of the matrix A by elementary transformation where.

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$$

15. Find the value of λ for which the given system has non-trivial solution.

$$7x + 4y + 3z = 0$$

$$x + 2y + \lambda z = 0$$

$$x + 3y + 2z = 0$$

16. Test the following system for consistency and solve if it is consistent.

$$x + 2y - z = 3$$

$$3x - y + 2z = 1$$

$$2x - 2y + 3z = 2$$

17. If λ is an eigen value of the matrix A then prove that

i) λ^2 is an eigen value of A^2

ii) $\frac{1}{\lambda}$ is an eigen value of A^{-1} Provided A is non - singular.

18. Verify Caylay - Hamilton theorem for the matrix $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ hence find A^{-1}

SECTION - C

III. Answer any four of the following.

(4×5=20)

19. Find the value of λ , so that the vectors $2i-j+k$; $i+2j-3k$; $3i-\lambda j+5k$ are co-planar.

20. If $\vec{a}, \vec{b}, \vec{c}$ and $\vec{a}^1, \vec{b}^1, \vec{c}^1$ are reciprocal system of the vectors, then show that

$$\vec{a}^1 \times \vec{b}^1 + \vec{b}^1 \times \vec{c}^1 + \vec{c}^1 \times \vec{a}^1 = \frac{\vec{a} + \vec{b} + \vec{c}}{[\vec{a} \vec{b} \vec{c}]} [\vec{a} \vec{b} \vec{c}] \neq 0$$

21. Define Mobius function and prove that the function ' μ ' is multiplicative function.

22. For any positive integer 'm' prove that $\phi(m^2) = m\phi(m)$

23. Solve by Descart's method $x^4 + 8x^3 + 9x^2 - 8x - 10 = 0$

24. Solve the equation $x^3 - 15x - 126 = 0$ by Cardon's method.



<http://www.karnatakastudy.com>

Whatsapp @ 9300930012

Your old paper & get 10/-

पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से