TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
V SEMESTER INTERNAL ASSESSMENT I EXAMINATIONS
LINEAR ALGEBRA QUESTION BANK

I. Multiple choice questions.

1. If a subspace of a vector space V is a subset H of V then [d]
a. Zero vector of V is in H b. H is closed under vector addition
c. H is closed under multiplication by scalars d. All the above

2. If A = [a_1, a_2, …………..a_n] then ColA = [c]
a. [a_1,a_2, ……….. a_n] b. {x:x is in R^n} c. Span {a_1,a_2 ……….a_n} d. None of theses

3. If T is a linear transformation from a vector space V into a vector space W then [c]
a. T(u+v) = T(u)+T(v) $\forall$ u, v$\in$V and scalar c b. Both a & b d. None of these

4. An indexed set of vectors {v_1, v_2,………. V_p} in V is said to linearly independent if $c_1v_1+c_2v_2+……c_pv_p=0$ has only [a]
a. Trivial solution b. Non-trivial solution c. No solution d. rational solution

5. If B = {b_1, b_2, ……… b_n} is a basis for a vector space V then the coordinate mapping x→$[x]_B$ is ______ linear transformation from V onto R". [b]
a. Onto b. One-one c. Both a & b d. None of these

6. Let B = {b_1, b_2, ……… b_n} be basis for a vector space V. For each xεV, there exists a unique set of scalars c_1,c_2,………..c_n such that x = $c_1b_1+c_2b_2+……….+c_nb_n$. This is called [d]
a. Spanning set theorem b. Basis theorem c. Rank theorem d. Unique representation theorem

7. H is subspace of V and B = {b_1, b_2, ……… b_n}εV is a basis for H if [c]
a. B is a linearly independent set b. H – Span {b_1, b_2, ……… b_n} c. Both a & b d. None of these

8. If V is a vector space and u, v and wεV and c,d are scalars then [d]
a. u+vεV b. (u+v)+w = u+(v+w) c. (c+d)u-cu + du d. All the above

9. Col A – R^m if and only if the equation [a]
a. Ax = b has a solution ∀ bεR^m b. Ax = 0 has only the trivial solution c. Nul A = {0} d. All the above

10. If vector space V is not spanned by a finite set then V is said to be [b]
a. Finite dimensional b. Infinite dimensional c. Finite and infinite dimensional d. None of these

11. The dimensions of the column space and the row space of an m x n matrix A are [a]
a. Equal b. Unequal c. Can't be said d. approximately equal

12. A is an invertible matrix of order n x n then [d]
a. Col A = R^n b. dim Col A = n c. rank A = n d. All the above

13. If A is an n x n matrix then A is invertible if and only if [c]
a. The number 0 is not an eigen value of A b. The determinant of A is not zero
c. Both a & b d. None of these

14. If A and B are n x n matrices then [d]
a. A is invertible if and only if det A≠0 b. $|AB| = |A||B|$ c. $|A'| = |A|$ d. All the above

15. If matrix A of order n x n is invertible then, [c]
a. $|AB| = |A||B|$ b. $|A| = 0$
c. A row replacement operation on A does not change of determinant d. None of these

16. If A is a 8 X 9 matrix with two dimensional null space then the rank of A is [c]
a. 5 b. 6 c. 7 d. 8

17. If A is an invertible matrix of order 8 X 8. Then dim Col A = [d]
a. 6 b. 7 c. 0 d. 8

18. A = $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 2 & 6 \\ 0 & 0 & 3 \end{bmatrix}$. The eigen values of A are [b]
a. 1,2,0 b. 1,2,3 c. 1,0,0 d. 0,6,3

19. A = $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 6 \\ 0 & 0 & 5 \end{bmatrix}$, $|AB| = 60$. Then $|B| =$ [c]

a. 6 b. 2 c. 3 d. Can't be determined

20. A = $\begin{bmatrix} 1 & 0 & -1 & 2 \\ 0 & 2 & 4 & 5 \\ 0 & 0 & 3 & 6 \\ 0 & 0 & 0 & 4 \end{bmatrix}$. Then $|A| =$ [a]

a. 24 b. 0 c. 10 d. Doesn't exists

II. Fill in the blanks

1. The set consisting of only the zero vector space V is a subspace of V, called the <u>zero subspace</u>
2. If v_1, v_2 are in vector space V and H = span {v_1, v_2} then H is a <u>Subspace</u> of V
3. The null space of an m x n matrix A, is the set of all solutions to the <u>Homogeneous equations Ax = 0</u>
4. The <u>null space</u> of an m x n matrix A is a subspace of R^n
5. The column space of an m x n matrix A is a subspace of R^m
6. The pivot columns of a matrix A from a basis for <u>Col A</u>
7. Nul A = {0} if and only if the equation Ax = 0 has only the <u>Trivial solution</u>
8. <u>The range of T</u> is the set of all vectors in W of the form T(x) for xεV
9. Nul A = {0} if and only if the linear transformation x→Ax is <u>One-one</u>
10. If vector space V has a basis B = {b_1, b_2, ……… b_n} then any set in V containing more then n vectors must be <u>Linearly dependent</u>
11. If two matrices A and B are <u>row equivalent</u> then their row spaces are the same.
12. The rank of A is the <u>dimension of the column space</u> of A
13. If A is an m X n matrix then, rank A + dim Nul A = <u>n</u>
14. A non-zero vector x of a matrix A such that Ax = λ x for scalar λ is called an <u>Eigen vector</u>
15. A scalar λ is called an <u>Eigen value</u> of A if there is a non-trivial solution x of Ax = λ x
16. The eigen values of triangular matrix are the entries on its <u>main diagonal</u>
17. If v_1, v_2, ……….v_r are eigen vectors that correspond to district eigen values λ_1, λ_2 ……… λ_r of an n x n matrix A, then the set{ v_1, v_2, ……….v_r } is <u>linearly independent</u>
18. A scalar λ is an eigen value of an n x n matrix A if and only if $|A-\lambda I| = 0$ has a non trivial solution.
19. If n x n matrices A and B are similar then they have same <u>eigen values</u>
20. If A is non invertible then $|A| = 0$

III. DESCRIPTIVE QUESTIONS

1. Define Vector Space.
2. Show that H = $\left\{ \begin{bmatrix} s \\ t \\ 0 \end{bmatrix} / s, t \in R \right\}$
3. Define Linear transformation.
4. Find the Eigen Value of the Matrix A=$\begin{bmatrix} 1 & 6 \\ 5 & 2 \end{bmatrix}$
5. Define Rank.