**Mathematics – I (KAS - 103)**

**MODULE 1: Matrices**

**Assignment No. - 1.1**

**Name Of Faculty: --------------------- Date of Submission: ------------**

**Question:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Topic Name** | **No of Ques/Online Ques.** | **% Covered in Exam** | **% Ques. From old paper** | **Text /Reference books to refer\*\*** |
| Elementary Transformations | 9 | 3 to 6 | 75 | B V RAMANA (Pg.13.1 – 13.10)  KREYSZIG (Pg. 182 – 200)  B S GREWAL (Pg. 35 – 42) |
| Inverse of a matrix by elementary transformations |
| Rank of a matrix by Normal form |
| Rank of a matrix by Echelon Form |

* **Very Short Question:**

1. For the given matrix prove that *A3 =19A + 30I.* **[AKTU 2016]**
2. Prove that if A, B are symmetric, then so is A+B.
3. If A is square matrix, prove that A - A' is skew-symmetric.
4. Find the rank of matrix by reducing it into normal form: **. [AKTU-2017] Ans:** 2**j**
5. Find the rank of the matrix . **[AKTU-2019] Ans:** 1

* **Short Question:**

1. Express matrix as the sum of a symmetric and a skew-symmetric matrix.
2. Find the value of '*P'* for which the rank of the matrix is 1.

**[MTU 2012] Ans:** 3

1. Find the inverse of the following matrices by using elementary transformations:

**(i)**  **[MTU 2013]**

**(ii)**  **[GBTU 2012, AKTU. 2017]**

**Ans:** **(i)** (ii) .

* **Long Question:**

1. Find the rank of the matrices by reducing it to normal form or canonical form:

**(i)** **[UPTU(SUM)2010]**

**(ii)** **[GBTU(C.O.) 2011, UPTU 2006, AKTU 2017]**

**Ans:** **(i)** Rank = 3 **(ii)** Rank = 3

1. Find the rank of matrix by reducing into Echelon form 

**[UPTU 2004] Ans:** rank = 3

**Q.11** Find the inverse employing elementary transformation A = .**[AKTU-2019]**

**Ans:**

**Q.12** Reduce the matrix A to Normal form and hence find the rank of A where A = .

**[AKTU-2019]**

**Ans:** rank = 3

**Suggested Links:**

**Inverse of a matrix by elementary transformations**

**https://www.youtube.com/watch?v=kcL5WWJjmIU**

**Rank of a matrix by Normal form**

<https://www.youtube.com/watch?v=VTHz4gjzsKI>

**Rank of a matrix by Echelon Form**

.com/wbe.com/watch?v=N33SOw1 atch?v=njDiwB[https://www.youtube](https://www.youtube.com/watch?v=njDiwB43w80)43w80

[https://www.youtu](https://www.youtube.com/watch?v=N33SOw1A5fo)A5fo

**Mathematics – I (KAS - 103)**

**MODULE 1: Matrices**

**Assignment No. - 1.2**

**Name Of Faculty: --------------------- Date of Submission: ------------**

**Question:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Topic Name** | **No of Ques/Online Ques.** | **% Covered in Exam** | **% Ques. From old paper** | **Text /Reference books to refer\*\*** |
| Linear dependence and Independence | 10 | 6 to 8 | 50 | B V RAMANA (Pg. 13.10-13.17)  KREYSZIG (Pg. 201 – 220)  B S GREWAL (Pg. 46 – 54) |
| System of Homogeneous Linear Equation |
| System of Non-Homogeneous Linear Equation |

* **Very Short Question:**

1. Discuss the condition of consistency and inconsistency of non-homogeneous linear equation.
2. For what value of *'k'*, the system of equation has no solution. **Ans:**
3. Find the value of k so that the equations

have a non-trivial solution.  **[UPTU (SUM) 2008] Ans:** *k =* 8

1. Test the consistency of system of equations and solve if possible by Gauss elimination method.
2.  **[U.P.T.U.2011]**
3. **[U.P.T.U.2010]**

**Ans: (i)**  **(ii)** Inconsistent.

1. Test the consistency for the following system of equations and if system is consistent , solve them: .

**Ans:**

1. Find the values of  and  for which the system of equations has (i) no solution

(ii) unique solution (iii) infinite number of solutions.

.

**[U.P.T.U.2015,(C.O.)2013,(SUM)2007, AKTU 2017]**

**Ans: (i)**  **(ii)**  **(iii)** 

1. Show that the equations do not have a solution unless .

 **[U.P.T.U.(SUM) 2008; M.T.U 2011]**

1. Determine *b* such that the system of homogeneous equations:

, ,

has (i) Trivial solution (ii) non-trivial solution. find the non-trivial solution.

**Ans:** (i) (ii)

**Suggested Links:**

**Linear dependence and Independence**

**https://www.youtube.com/watch?v=yLi8RxqfowA**

**System of Homogeneous Linear Equation**

[www.math.ku.edu/~lerner/LAnotes/Chapter5.pdf](http://www.math.ku.edu/~lerner/LAnotes/Chapter5.pdf)

<http://www.math.hawaii.edu/~lee/linear/sys-eq.pdf>

**System of Non-Homogeneous Linear Equation**

<https://www.youtube.com/watch?v=4jcvZmMK_28>