GOVERNMENT COLLEGE OF ENGINEERINGS (An autonomous institute of Govt. of Maharashtra)

CT-1 W-2016 SHU-101 ENGG. MATHS-1 [CE/MECH/ELPO/EXTC/CS/IN/IT] MARKS-15 TIME-1 HOUR Date-19/09/2016

- 1. Find the eigen values and eigen vectors of a matrix $A = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$ 2. Attempt any Four
 - Define linearly dependent and independent. Is the system of vectors $X_1 = (2, 2, 1)^y$, $X_2 = (1, 3, 1)^y$, $X_3 = (1, 2, 2)^y$ linearly dependent. Find the characteristic equation for $A = \begin{bmatrix} 1 & 3 \end{bmatrix}$ and use it to simplify the expression

Find the characteristic equation for $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ and use it to simplify the expression

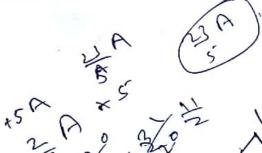
For different values of k, discuss the nature of solution for the system of equation x + 2y - z = 0, 3x + (k + 7)y - 3z = 0, 2x + 4y + (k - 7)z = 0Find non singular matrices P and Q such that PAQ is in no. and form if

$$A = \begin{bmatrix} 1 & 2 & 3 & -2 \\ 2 & -2 & 1 & 3 \\ 3 & 0 & 4 & 1 \end{bmatrix} -$$

Find the rank of a matrix by using Echelon form, where

$$A = \begin{bmatrix} 0 & 2 & 1 & 1 \\ 3 & 5 & 1 & 2 \\ 5 & -1 & 2 & 2 \\ 2 & 6 & 5 & 3 \\ 1 & 3 & -3 & -1 \end{bmatrix}$$

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GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI CLASS TEST NO.1 Winter-2015

SHU101, ENGINEERING MATHEMATICS-I

CLASS: B.Tech First Year

Date:07/09/2015

Max Marks:15

Que 1: Attempt any four of the following:

(12)

- Define rank of matrix and hence find it of $\begin{bmatrix} 2 & -1 & 0 & 5 \\ 0 & 3 & 1 & 4 \end{bmatrix}$. Verify it using normal form.
- Reduce the following matrix to echelon form and find its rank.

- c) Determine the values of λ for which the following set of equations may possess nontrivial solution. $3x + y - \lambda z = 0$; 4x - 2y - 3z = 0; $2\lambda x + 4y + \lambda z = 0$. For each permissible value of λ , determine the general solution.
- For the matrix A, find non-singular matrices P and Q such that PAQ is in the normal form and hence find $A^{-1}, \text{ where } A = \begin{bmatrix} 8 & 4 & -3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$
 - e) State Cayley Hamilton theorem and use it to find the matrix A^{64} if $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$

6. Engineering Mathematics – I URATION: 1.00 Hr. Max. Marks: 60 GOVT.COLLEGE OF ENGINEERING, AMRAVATI SIIU101 Engineering Mathematics-I Class Test-I Max. Marks:15 Que 1: Attempt the following: b) show that the eigen vector of a matrix A corresponding to eigen value 4 and eigen vector of matrix $D=2A^2-\frac{1}{2}A+3I$ corresponding to eigen value 33 are same, if $A = \begin{pmatrix} 8 & -4 \\ 2 & 2 \end{pmatrix}$ Are the following vectors L.D? if so find the relation between them. $x_1 = (0, a - b, a - c, b + c)^T$ $x_2 = (b - a, 0, b - c, c + a)^T$ $x_3 = (c - a, c - b, 0, a + b)^T$ $x_4 = (b + c, c + a, a + b, 0)$ Que 2: Attempt any three of the following: a) Find the rank by using Echelon form of the matrix $A = \begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & 4 \\ 5 & 3 & 3 & 11 \end{bmatrix}$ b) Verif Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence find A^{-1} c) For what values of λ the equations x+y+z=1, $x+2y+4z=\lambda$, $x+4y+10z=\lambda^2$ has a solution and solve d) i) Define linear dependence & linear independance of vectors. ii) State cayley Hamilton Theorem iii) Explain the Consistency in Non-homogenous Equation.

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SHU101, ENGINEERING MATHEMATICS-I Date:07/09/2015

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Max Marks:15

Que 1: Attempt any four of the following:

- a) Define rank of matrix and hence find it of $\begin{bmatrix} 2 & -1 & 0 & 5 \\ 0 & 3 & 1 & 4 \end{bmatrix}$. Verify it using normal form.
- b) Reduce the following matrix to echelon form and find its rank.

- Determine the values of λ for which the following set of equations may possess nontrivial solution. $3x + y - \lambda z = 0$; 4x - 2y - 3z = 0; $2\lambda x + 4y + \lambda z = 0$. For each permissible value of λ , determine the general solution.
- d) For the matrix A, find non-singular matrices P and Q such that PAQ is in the normal form and hence find $A^{-1}, \text{ where } \begin{bmatrix} 8 & 4 & -3 \\ 2 & 1 & 1 \end{bmatrix}$