Birla Institute of Technology & Science, Pilani

Work Integrated Learning Program Division
M. Tech. Data Science and Engineering (DSE)
First Semester 2019 - 2020
Comprehensive Examination (Regular)

Course Number	:	DSEWP ZC416
Course Title	:	Mathematical Foundations for Data Science
Type of Exam	:	Open Book
Weightage	:	50 %
Duration	:	180 minutes
Date of Exam	:	21st June 2020

No. of Pages : 2
No. of Questions : 11

Session: FN (09.00 to 12.00 PM)

Q1.Using the method of partial pivoting solve the system of equations,

$2x-3y+4z=7$; $5x-2y+2z=7$; $6x-3y+10z=23$ **5M**

Q2. For what value of λ & μ the following equations have (i) No solutions (ii) Unique solutions (iii) Infinite solution

$2x+3y+5z=9$; $7x+3y-2z=8$; $2x+3y+\lambda z=\mu$ **5M**

Q3.Using Gauss Jordon method find the invers of the matrix $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ **5M**

Q4. For what value of K the vectors V= (1,-2,K) in R^3 space is a linear combination of the vectors u_2=(3,0,-2), u_2=(2,-1,-5) LAST **4M**

Q5. Test whether the vectors (1, 1, 2), (1, 2, 5), and (5,3,4) form a basis in R^3 space. Find dimension. LAST **4M**

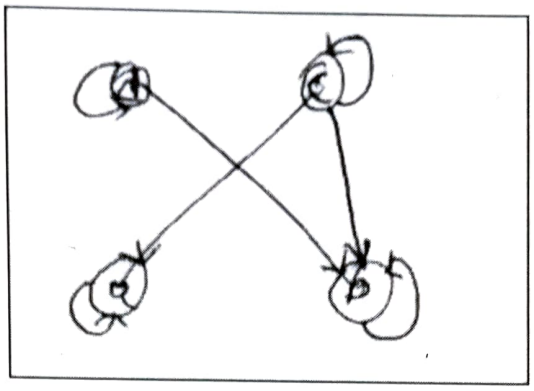
Q6. Using Rayleigh power method find the largest Eigen value and the corresponding Eigen vector of the matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ **5M**

Q7. Using simplex method maximize z =2x+4y subject to the constraints $3x+y \leq 22$; $2x+3y \leq 24$, $x \geq 0$, $y \geq 0$ **6M**

Q8. Show that the function f (x, y), $= \left\{\frac{xy}{x^2+y^2},\ (x,y) \neq (0,0)\ 0, (x,y) = (0,0)\right\}$ *contd/−* is continuous at every points except at the origin. **4M**

Q9. A computer company requires 30 programmers to handle system programming jobs and 40 programmers for application programming, if the company appoints 55 programmers to carry out these jobs how many handle only system programming jobs? **4M**

Q10. Find the relation R whose digraph of the relation is as shown below. Also find in degrees and out degrees. **4M**



Q11. Let A, B, C, D, E represent five cricket teams. Suppose that the teams A, B, C have played one game with each other and the teams A, D, E have played one game with each other, represents this in a graph, hence determine

(i) The teams that have not played with each other
(ii) The number of games played by each team. **4M**

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