Total number of pages; [2]  Total number of questions: [6]  CHE4 <sup>th</sup> Sem  Mathematical Methods in Chemical Engg.  Subject Code: BTAM-401A (RG/RP)  Paper ID: M/\8 (2015 balta ortal ortal ortal balta ortal
Mathematical Methods in Chemical Engg.  Subject Code:BTAM-401A (RG RP)  Paper ID: M\8 (action of Luciand) (RG RP)  Time allowed: 3 Hrs (action of Luciand) Max Marks:60  To be specified by paper setter  Important Instructions:  All questions are compulsory  Assume any missing data Additional instruction, if any  PART A (2×10)  Q. 1. Short-Answer Questions:  (a) State and prove first shifting property of laplace transform.  (b) Discuss Cramer's rule.  (c)Write the normal equations of parabola.  (d) Define sectional five point formula?  (e) Define Curve Fitting?  (f) Discuss the criteria to choose intial approximation in Newtown's-Raphsons method.  (g) Define Eigen value Eigen vector?  (h) Define pivoting?  (i) Write the normal equation of Straight line.  (j) Check whether 1.01x +2y = 2.01, x+2y=2 is conditioned or not?  PART B (8×5)  Q. 2. Solve by using LU Decomposition method x+y+z=3, 2x-y+3z=16 and COa 3x+y-z=-3  OR  Apply Gauss-Jordon eliminatation method to solve the equation x+y+z=9, COa 2x-3y+4z=13 and 3x+4y+5z=40  Q. 3. Determine the largest Ligen value and the corresponding Eigen vector of the matrix  (2 -1 0  -1 2 -1  0 -1 2  OR
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(The Faddret's method to find the Charterstee polyment) $\begin{pmatrix} 2 & -1 & 1 \\ \end{pmatrix}$
following matrices $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$ . Also find eigen value of A  1 Using Langrange's Interpolation formula fins y(10) from the following table COc

^	5	6	9	11	
У	12	13	14	16	

OR

Derive Simpson's rule and hence evaluate  $\int_0^{\pi} Cosxdx$ 

COc

Q. 5. Given  $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$  with y(0)=1 .Find y(0.1) and y(0.2) using Runge-Kutta Cod Method of 4<sup>th</sup> order.

OR

Find the curve of best fit of the type  $y = ae^{bx}$  to the following data by the Comethod of least squares:

X	1	5	7	9	12	
у	10	15	12	15	21	

Q. 6. Evaluate  $L^{-1}\left(\frac{s^2}{(s^2+4)^2}\right)$  by Convulation theorem

Coe

Solve the Differential equation by using laplace transforms Coe  $\frac{d^2x}{dt^2} + 9x = \cos 2t$ ; x(0) = 1 and x'(0) = 1