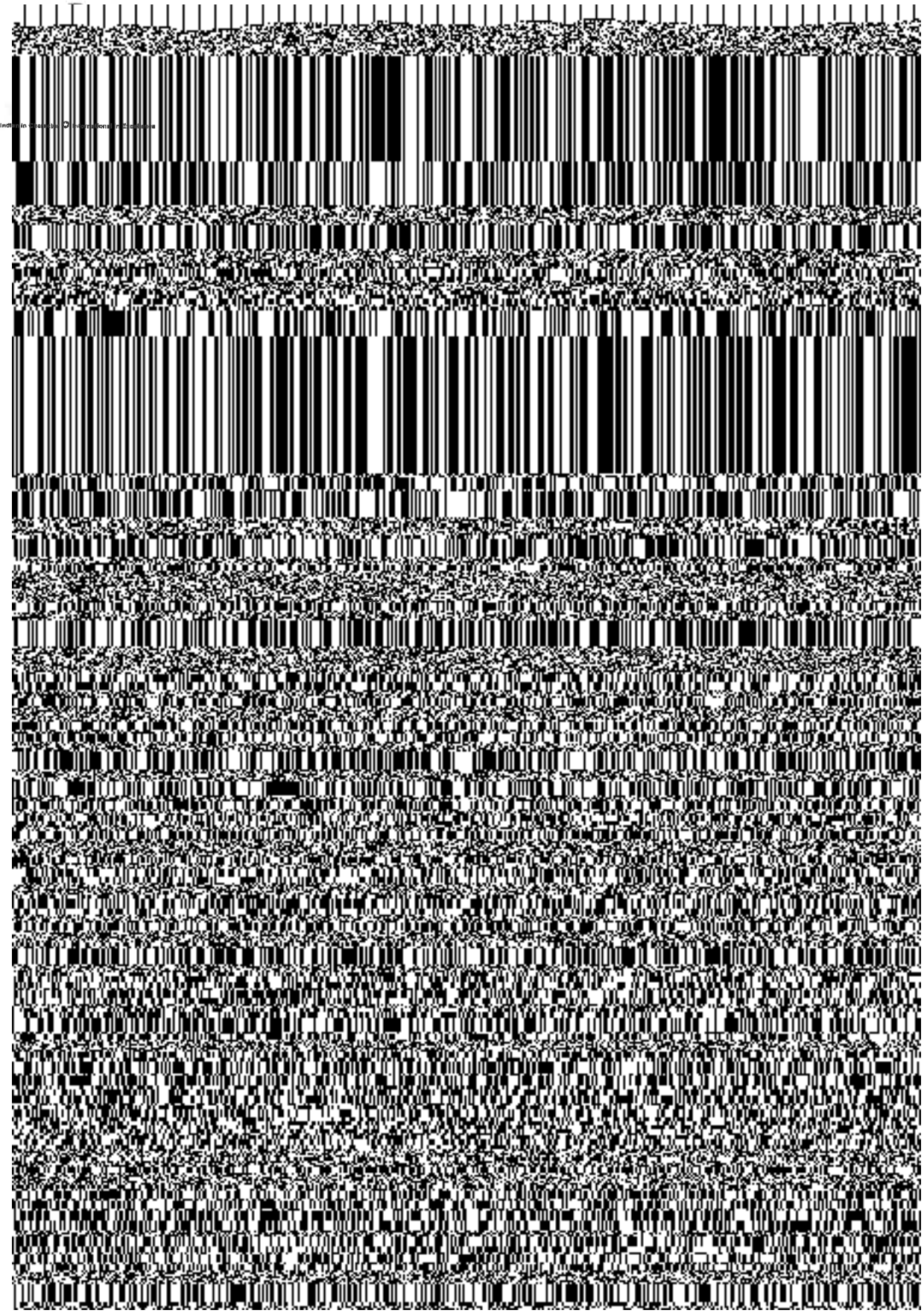

(OR)

12. Solve the equations

$$2x + 3y + z = 9$$

$$x + 2y + 3z = 6$$

$$3x + y + 2z = 8$$

by LU decomposition method. (10M)

13. Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$, and hence use it find A^{-1}. (10M)

(OR)

14. Reduce the quadratic form $x_1^2 + 5x_2^2 + x_3^2 + 2x_1x_2 + 2x_2x_3 + 6x_3x_1$ to canonical form. (10M)

15. (a) Solve $(D^2 + 7D + 12)y = e^{2x} + 6$. (5M)
    (b) Solve $(D^2 - 2D + 1)y = e^x(3x^2 - 2)$. (5M)

(OR)

16. Solve $(D^2 + a^2)y = \sec ax$ by method of variation of parameters. (10M)

17. (a) Verify the Lagrange's mean value theorem for the function $f(x) = x^3 - x$, [0,2]. (5M)
    (b) Write the Maclaurin's series of $f(x) = cosx$. (5M)

(OR)

18. Expand $f(x,y) = e^x \cos y$ in powers of x and y at (0,0) upto third degree term by Taylor's series. (10M)

19. (a) If $\sin u = \frac{x^2y^2}{x+y}$, then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3\tan u$ using Euler's theorem. (5M)
    (b) Find $\frac{du}{dt}$, where $u = sin\frac{x}{y}, x = e^t, y = t^2$. (5M)

(OR)

20. If $u = 2xy, v = x^2 - y^2, x = rcos\,\theta, y = rsin\,\theta$, evaluate $\frac{\partial(u,v)}{\partial(r,\theta)}$ without actual substitution. (10M)