IAE - II

Answer Key.

Part A.

CRD	RBD.
This design provides a one way classified data according to levels of a single factor.	The analysis of the design is simple and straight forward as in the case of two-way classification
It has a simple layout	The analysis of this decision is not as simple as CRD.

2. In Latin square, the formula for dof for residual (SSE) d.f = (n-1)(n-2), sub n=2, dof = 0
MSE = 0. ∴ 2x2 Latin square is not possible.

3. $$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

4. Gauss Jacobi
Gauss Seidal.

5. $x+2y=3$
$2x+3y=5$

$$A \sim B = \left[\begin{array}{cc|cc} 1 & 2 & 1 & 0 \\ 2 & 3 & 0 & 1 \end{array}\right] \quad R_2 \Rightarrow R_2 - 2R_1$$

$$= \left[\begin{array}{cc|cc} 1 & 2 & 1 & 0 \\ 0 & -1 & -2 & 1 \end{array}\right]$$

$$R_1 \Rightarrow R_1 + 2R_2$$

$$\Rightarrow \left[\begin{array}{cc|cc} 1 & 0 & -3 & 2 \\ 0 & -1 & -2 & 1 \end{array}\right]$$

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

6)
a) $N = 12$

$\frac{T^2}{N}$

TSS

SSC

SSR

SSE

ANOVA.

b) $x \log_{10} x - 1.2 = 0$.

$f(x) = x \log_{10} x - 1.2$

$f'(x) = \log_{10} x + \log_{10} e$

$= \log_{10} x + 0.4343$

$f(1) = 1.2$ (+ive)

$f(2) = (-0.598)$ (-ive)

The root lies between

1 & 2

$\therefore x_0 = 1.5$.

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$= 2.746$

$x_2 = 2.746$

$x_3 = 2.746$.

$\therefore x = 2.746$.

7)a) $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{pmatrix}$

$A \sim B = \left[\begin{array}{ccc|c} 1 & 1 & 3 & 1 \\ 1 & 3 & -3 & 0 \\ -2 & -4 & -4 & 0 \end{array}\right]$

$R_2 \to R_2 - R_1$, $R_3 \to R_3 +$

$R_3 \to R_3 + R_2$.

$\left[\begin{array}{ccccc} 1 & 1 & 3 & 1 & 0 \\ 0 & 2 & -6 & -1 & 1 \\ 0 & 0 & -4 & 1 & 1 \end{array}\right]$

$R_1 \to R_1 + R_2$ $R_2 \to R_2$

$R_1 \to R_1 - 2R_2$

$\left[\begin{array}{ccccc} 1 & 0 & 0 & 3 & 1 \\ 0 & 1 & 0 & -5/4 & -1/4 \\ 0 & 0 & 1 & -1/4 & -1/4 \end{array}\right]$

$A^{-1} = \begin{bmatrix} 3 & 1 & 3/2 \\ -5/4 & -1/4 & -3/4 \\ -1/4 & -1/4 & -1/4 \end{bmatrix}$

$30x - 2y + 3z = 75$

$2x + 2y + 18z = 30$

$x + 17y - 2z = 48$

$$x = \frac{1}{30}[75 + 2y - 3z]$$

$$y = \frac{1}{17}[48 - 17y + 2z]$$

$$z = \frac{1}{18}[30 - 2x - 2y]$$

$x = 2.5798$

$y = 2.7976$

$z = 1.0693$.

Part C.

$N = 16$

$\frac{T^2}{N} = 1$

$TSS = 157$

$SSR = 3.5$

$SSC = 2.5$.

$SST = 144.5$

$SSE = 6.5$

ANOVA Table.

Source	Sum of Sq	Dof	Mean F
Rows	3.5	3	MSR = 1.67
Column	2.5	3	MSC = 083
Treatment	144.5	3	MST = 48.17
Error	6.5	6	MSE = 1.08

$$F_R = \frac{MSR}{MSE} = 1.081$$

$$F_C = \frac{MSE}{MSC} = 1.30$$

$$F_T = \frac{MST}{MSE} = 44.60$$

	C.V	T.V
F_R	1.081	< 4.76 accept
F_C	1.30	< 8.94 accept
F_T	44.60	> 4.76 reject

b) Eigen value $A = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$

$$y_1 = Ax_0 = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = 25 \begin{bmatrix} 1 \\ 0.04 \\ 0.08 \end{bmatrix}$$

$$x_2 = Ax_1 = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix} \begin{bmatrix} 1 \\ 0.04 \\ 0.08 \end{bmatrix} = 25.2 \begin{bmatrix} 1 \\ 0.04 \\ 0.08 \end{bmatrix}$$

$$x_3 = 25.1778 \cdot \begin{bmatrix} 1 \\ 0.0450 \\ 0.06884 \end{bmatrix}$$

$$x_4 = 25.1821 \begin{bmatrix} 1 \\ 0.0451 \\ 0.0685 \end{bmatrix}$$

$\therefore \lambda = 25.1821$.