ANSWER KEYS

1. (3)	**2.** (3)	**3.** (3)	**4.** (3)	**5.** (1)	**6.** (1)	**7.** (2)	**8.** (21)
9. (3)	**10.** (3)						

1. (3)

$\because$ System of equation has non trivial solution. It is possible only when $\Delta = 0$.

$$\therefore \Delta = \begin{vmatrix} 1 & -c & -c \\ c & -1 & c \\ c & c & -1 \end{vmatrix} = 0$$

$\Rightarrow 1(1-c^2)+c(-c-c^2)-c(c^2+c)=0$

$\Rightarrow 2c^3+3c^2-1=0$

$\Rightarrow c=-1, \frac{1}{2}$

Hence, the greatest value of $c=\frac{1}{2}$.

2. (3) For the given system to have a non-trivial solution, we must have

$$\begin{vmatrix} 1 & \mathrm{k} & 3 \\ 3 & \mathrm{k} & -2 \\ 2 & 3 & -4 \end{vmatrix} = 0 \Rightarrow \mathrm{k}=\frac{33}{2}$$

3. (3)

$$\Delta = \begin{vmatrix} 2 & 6 & 0 \\ 6 & 20 & -6 \\ 0 & 6 & -18 \end{vmatrix} = 0$$

$$\Delta_1 = \begin{vmatrix} -11 & 6 & 0 \\ -3 & 20 & -6 \\ -1 & 6 & -18 \end{vmatrix} \neq 0 : \Delta_2 = \begin{vmatrix} -2 & -11 & 6 \\ 6 & -3 & 20 \\ 0 & -1 & 6 \end{vmatrix} \neq 0$$

and $\Delta_3 = \begin{vmatrix} 2 & 6 & -11 \\ 6 & 20 & -30 \\ 0 & 6 & -1 \end{vmatrix} \neq 0$

Hence, the system is inconsistent.

4. (3)

$$\begin{vmatrix} \lambda-1 & 3\lambda+1 & 2\lambda \\ \lambda-1 & 4\lambda-2 & \lambda+3 \\ 2 & 3\lambda+1 & 3(\lambda-1) \end{vmatrix} = 0$$

$R_2 \rightarrow R_2 - R_1$

$R_3 \rightarrow R_3 - R_1$

$$\begin{vmatrix} \lambda-1 & 3\lambda+1 & 2\lambda \\ 0 & \lambda-3 & -\lambda+3 \\ 3-\lambda & 0 & \lambda-3 \end{vmatrix} = 0$$

$C_1 \rightarrow C_1 + C_3$

$$\begin{vmatrix} 3\lambda-1 & 3\lambda+1 & 2\lambda \\ 3-\lambda & \lambda-3 & 3-\lambda \\ 0 & 0 & \lambda-3 \end{vmatrix} = 0$$

$\Rightarrow (\lambda-3)^2[6\lambda]=0 \Rightarrow \lambda=0, 3$

sum of values of $\lambda=3$

5. **(1)** Given system of equation is

$x+y+z=6$

$x+2y+3z=10$

$x+2y+\lambda z=\mu$

If given system of equation has no solution, then D = 0 and atleast one of the determinants $D_1,\ D_2,\ D_3 \neq 0$

Here $D=0$

$\Rightarrow \begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & \lambda \end{vmatrix} = 0$

$\Rightarrow 1(2\lambda-6) - 1(\lambda-3) + 1(2-2) = 0$

$\Rightarrow 2\lambda-6-\lambda+3+0=0$

$\Rightarrow \lambda-3=0$

$\Rightarrow \lambda=3$

Also, $D_1 = \begin{vmatrix} 6 & 1 & 1 \\ 10 & 2 & 33 \\ \mu & 2 & 3 \end{vmatrix} \neq 0$

$\Rightarrow 6(6-6) - 1(30-3\mu) + 1(20-2\mu) \neq 0$

$\Rightarrow 0-30+3\mu+20-2\mu \neq 0$

$\Rightarrow \mu-10 \neq 0$

$\Rightarrow \mu \neq 0$

6. **(1)**
For unique solution, $\Delta \neq 0$.
$\Rightarrow \begin{vmatrix} 1 & 1 & 1 \\ 2 & 1 & -1 \\ 3 & 2 & k \end{vmatrix} \neq 0$
$\Rightarrow 1(k+2) - 1(2k+3) + 1(4-3) \neq 0$
$\Rightarrow -k \neq 0 \Rightarrow k \neq 0$
Thus, $S = R - \{0\}$.

7. **(2)**
We have,
$3x-y+4z=3$
$x+2y-3z=-2$
$6x+5y+kz=-3$
For infinitely many solutions,
$|A| = 0$
$\Rightarrow \begin{vmatrix} 3 & -1 & 4 \\ 1 & 2 & -3 \\ 6 & 5 & k \end{vmatrix} = 0$
$\Rightarrow 3(2k+15)+k+18-28=0$
$\Rightarrow 7k+35=0$
$\Rightarrow k=-5$

8. **(21)** We observe $5P_2 - P_1 = 3P_3$

So, $15 - K = -6$

$\Rightarrow \ K = 21$

9. **(3)**

$P_1 : x + 2y - 3z = a$

$P_2 : 2x + 6y - 11z = b$

$P_3 : x - 2y + 7z = c$

Clearly

$5P_1 = 2P_2 + P_3$ if $5a = 2\,b + c$

$\Rightarrow$ All the planes sharing a line of intersection

$\Rightarrow$ infinite solutions

10. **(3)**

$$D = \begin{vmatrix} 1 & -2 & 0 \\ 1 & -1 & k \\ 0 & k & 4 \end{vmatrix} = 4 - k^2$$

so, A is correct and B, C, E are incorrect. If $k = 2$

$$D_1 = \begin{vmatrix} 1 & -2 & 0 \\ -2 & -1 & 2 \\ 6 & 2 & 4 \end{vmatrix} = -48 \neq 0$$

So no solution