IE-5342

Flipp Assignment -15, Group-03

Yashwanth, Jahir, Ariful

Answer to the Question NO:- a)

Yates Method Table

Treatment Combination	Factorial Effect						
	A	B	AB	C	AC	BC	ABC
(1)	−	−	+	−	+	+	−
a	+	−	−	−	−	+	+
b	−	+	−	−	+	−	+
ab	+	+	+	−	−	−	−
c	−	−	+	+	−	−	+
ac	+	−	−	+	+	−	−
bc	−	+	−	+	−	+	−
abc	+	+	+	+	+	+	+

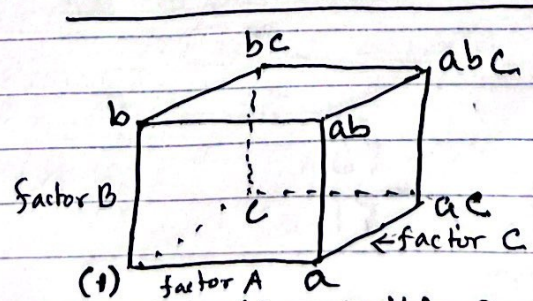
Answer to the Question NO: b)

Model Equation for 2^3 factorial design.

$$Y_{ijkl} = \mu + \alpha_i + \beta_j + \gamma_k + \alpha\beta_{ij} + \alpha\gamma_{ik} + \beta\gamma_{jk} + \alpha\beta\gamma_{ijk} + \varepsilon_{ijkl}$$

Where, $\varepsilon_{ijkl} \sim N(0, \sigma^2)$

Answer to the Question NO:- c)



Cube lebeling with corner points.

P.T.O

Answer to the Question NO:- (d)

We know,

$$\text{Effect of AB interaction} = \frac{1}{4n}[ab - a - b + (1) + abc - bc - ac + c]$$

where $n = 3$, $ab = 148$, $a = 104$, $b = 119$,
$(1) = 78$, $abc = 127$, $bc = 164$, $ac = 113$, $c = 127$.

Now,

$$\text{Effect of AB interaction} = \frac{1}{4\times 3}[148 - 104 - 119 + 78 + 127 - 164 - 113 + 127]$$

$$= \boxed{-1.67} \text{ (Ans)}.$$

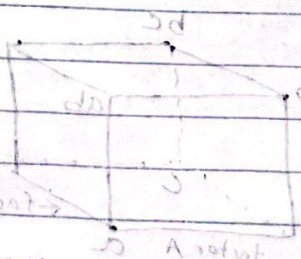
Answer to the Question NO:- (e)

We know,

$$SS_{AB} = \frac{(\text{Contrast})^2}{8n}$$

$$= \frac{[ab - a - b + (1) + abc - bc - ac + c]^2}{8\times 3}$$

$$= \frac{(-20)^2}{24} = \boxed{16.67} \text{ (Ans)}$$



Answer to the Question NO:-(f)

We know,

$$MS_{AB} = \frac{SS_{AB}}{(I-1)(J-1)(L-1)}$$

[A = I = 2 levels, B = J = 2 levels, C = L = 2 levels]

K = No. of replication = 3

$$= \frac{SS_{AB}}{(2-1)(2-1)(2-1)}$$

$$= \frac{16.67}{1}$$

$$= \boxed{16.67} \text{ (Ans)}$$

Answer to the Question NO:- (g)

Degree of freedom in Error $= IJL(K-1)$

$= 2 \times 2 \times 2 (3-1)$

$= \boxed{16}$ (Ans)

Answer to the Question NO: (h)

$$\text{F-Stat} = \frac{MS_{AB}}{MSE}$$

Now, $MSE = \frac{SSE}{IJL(K-1)} = \frac{482.67}{16}$ [where given SSE = 482.67]

$= 30.17$

So, $\text{F-stat} = \frac{16.67}{30.17} = \boxed{0.55}$

P.T.O

Now,

Critical value from R at $\alpha = 0.05$ level of significance

$\boxed{\pm 4.49}$ $\left[\text{R-code } qf(0.95, 1, 16)\right]$

Now,

F-Stat < Critical value

or $0.55 < 4.49$

~~So, we fail to reject Null Hypothesis H_0,~~

So Hypothesis.

Null Hypothesis H_0: $\alpha\beta_{ij} = 0$ [For all ij]

Alternative H_a: $\alpha\beta_{ij} \neq 0$ [For some ij]

So, as per findings, we fail to reject null Hypothesis H_0. So, AB interaction term is **not significant** at $\alpha = 0.05$. (Ans)