(Assignment 16)

Sol1) Assumptions of anova

1. The observation are independent.
2. Parent population from which observation are taken is normal distribution
3. Variance of the responsible variable denoted by σ^2 is same for all population
4. Various treatment and environmental effect are additive in nature

Sol2) Fixed effect

in this model the variance affect factors will be controlled by the researcher and environmental effect is neglected

Random effect

Here the other environmental factors as well as

Sol3) Application of anova

Anova is used to compare the means from different populations under test settings with same variance as t-test cannot be used for more than 2 samples.

Sol4) one way anova

$y_{ij} = \mu + \tau_i + \varepsilon_{ij}$

τ_i is the effect of factor i

ε_{ij} is error.

(differ between overall mean and factor

Date : / /

Page No.:

(Two way anova):

$Y_{ijk} = \mu + \alpha_i + \beta_j + \alpha_i \beta_j + \varepsilon_{ijk}$

α, β are factors $\alpha\beta$ are interaction)

Sol5

Batch			
1	2	3	4
1600	1580	1460	1510
1610	1640	1550	1520
1650	1640	1600	1530
1680	1700	1620	1570
1700	1750	1640	1600
1720		1660	1680.
1800		1740	
		1820	

H_0 $\mu_1 = \mu_2 = \mu_3 = \mu_4$ (The means are similar the batch are

H_A at least one of the means not equal.

Now $\bar{X}_1 = 1680 \quad n_1 = 7$

$\bar{X}_2 = 1662 \quad n_2 = 5$

$\bar{X}_3 = 1635.25 \quad n_3 = 8$

$\bar{X}_4 = 1568.33 \quad n_4 = 6$

$$\bar{\bar{X}} = \frac{1680 + 1662 + 1635.25 + 1568.33}{4}$$

$$= 1636.6875.$$

$(SSB) = 7 * (1636.6275 - 1626)^2 + \frac{5}{8} * (1636.6375 - 1660)^2$

$+ 8 * (1636.6375 - 1636.25)^2 + 6 * (\frac{1636.6375}{15} - 1568.33)^2$

$(df)_{SSB} = 4 - 1 = 3$

$(SSB) = 1313.868 + 3203 + 28036.426$

$= 44373.$

$SSE = \{(1600 - 1630)^2 + \ldots (1800 - 1680)^2\}$

$+ \{(1580 - 1662)^2 + \ldots (1750 - 1662)^2\}$

$+ \{(1460 - 1636.25)^2 + \ldots (1820 - 1636.25)^2\}$

$+ \{(1510 - 1568.33)^2 + \ldots (\frac{1660}{1510} - 1568.33)^2\}.$

$= 28600 + 16880 + 85137.5 + 21350$

$= 152017.5$

$df = (7 - 1) + (5 - 1) + (8 - 1) + (6 - 1)$

$= 22$

conclusion
We cannot reject null hypothesis the bulb mean are similar.

	SS	df	MS	F	Fcritical
Between group	44373	3	14791	2.14	3.05
within group	152017.5	22	6909.88		F < Fcrit
					Fail to reject null hypothesis

Fcritical (at 0.05, 3, 22) = 3.05

$F_{0.05, 3, 22}$