Note: (i) All questions are compulsory.
(ii) Use of Calculator is allowed.

Q.1) Answer the following questions

a) **Correct the following if necessary:** **(10M)**

i. Alternative Hypothesis accepted if all means are different.
ii. ANOVA is alternative of t -test.
iii. In ANOVA we test equality of variance
iv. On RBD the total sum of square is divided into three factors.
v. Is RBD all three principles are used.

b) **Answer in One sentence:** **(10M)**

i. What is Replication
ii. Write Formula for df of SSE.
iii. RBD stands for?
iv. Write full form of SST.
v. Write the formulae for TSS of One way ANOVA.

Q.2) Attempt any TWO **(20M)**

a) Write down the ANOVA table for two One way classification.

b) The following are the data represent the number of units of production per day turned out by 5 different workmen using different types of machines.

(i) Test whether the production mean is same for four different machines types.

(ii) Test whether five men differ with respect to mean production.

Workmen	Machine Types			
	A	B	C	D
1	44	38	47	36
2	46	40	52	43
3	34	36	44	32
4	33	38	46	33
5	38	42	49	39

c) Explain the procedure of obtaining various sum of squares in one way classification.

Q.3) Attempt any TWO **(20M)**

a) what is CRD? State basic assumptions.

b) Write a note on LSD, also write mathematics model

c) Apply the techniques of Analysis of variance to the following data relating to yields of 3 varieties of wheat in 3 blocks.

Varieties	Blocks		
	I	II	III
A	110	109	108
B	107	107	106
C	108	105	104

Q.4) Attempt any TWO **(20M)**

a) Obtain expression from various mean sum of squares of LSD

b) Describe table of LSD.

c) If G = 550, N=25, $\sum_{i,i,k} y_{i,j,k}^2 = 8550.3$, $\sum_{j=1}^{k} \frac{C_j^2}{k} - C.F = 90.3$,

$\sum_{t=1}^{k} \frac{T_t^2}{k} - C.F = 65.24$, with equal degree of freedom 3, Analysis the data and give conclusion.

Q.5) Attempt any TWO **(20M)**

a) Obtain ANOVA table for two way classification.

b) Given G = 418, N = 19, TSS = 58, SST = 7, k=3, $n_1 = 8$, $n_2 = 5$, $n_3 = 6$, prepare Two way ANOVA table and give conclusion.

c) Explain in brief the concept of design of Experiments.