



6. a) The following are the measurements of the air velocity and evaporation coefficient of burning fuel droplets in an impulse engine: (7M)

Air velocity(cm/s) x	20	60	100	140	180	220	260	300	340	380
Evaporation coefficient (mm <sup>2</sup> /s) y	0.18	0.37	0.35	0.78	.056	.075	1.18	1.36	1.17	1.65

Fit a straight line to these data by the method of least squares and use it to estimate the evaporation coefficient of a droplet when the air velocity is 190 cm/s.

- b) Find the Correlation Coefficient for the following data: (7M)

x	1	2	3	4	5
y	2	5	3	8	7

7. Consider the following data taken on subgroups of size 5. The data contain 20 averages and ranges on the diameter (in millimeters) of an important component part of an engine. Display  $\bar{X}$  and  $R$  Charts. Does the process appear to be in control? (14M)

Sample	$\bar{X}$	$R$	Sample	$\bar{X}$	$R$
1	2.3972	0.0052	11	2.3887	0.0082
2	2.4191	0.0117	12	2.4107	0.0032
3	2.4215	0.0062	13	2.4009	0.0077
4	2.3917	0.0089	14	2.3992	0.0107
5	2.4151	0.0095	15	2.3889	0.0025
6	2.4027	0.0101	16	2.4107	0.0138
7	2.3921	0.0091	17	2.4109	0.0037
8	2.4171	0.0059	18	2.3944	0.0052
9	2.3951	0.0068	19	2.3951	0.0038
10	2.4215	0.0048	20	2.4015	0.0017

**Note** :- Statistical tables and Control Chart Constants are required

