

[This question paper contains 2 printed pages.]

4690

Your Roll No. ....

B.Sc./III

AS

MATHEMATICAL SCIENCES – Paper VI

(Operational Research)

(Statistical Quality Control and Forecasting)

Time : 3 Hours

Maximum Marks : 30

(Write your Roll No. on the top immediately  
on receipt of this question paper.)

Answer any five questions.

All questions carry equal marks.

1. Define a time series and explain in details its various components. (6)
2. (a) Fit a straight line trend by the method of least squares to the following data.  
Year: 1976 1977 1978 1979 1980 1981 1982 1983  
Sales: 76 80 130 144 138 120 174 170  
(Lakh Rs.) (3)  
(b) Explain a method to fit a parabolic trend to given time series data. (3)
3. Assuming multiplicative model, and using "Ratio-to-Moving-Average" method, find the seasonal indices for the following data —

P.T.O.

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2004	686	569	741	645	739	762	768	783	842	801	677	671
2005	805	633	745	647	702	732	715	812	692	775	775	797
2006	741	633	686	716	723	737	729	859	732	706	747	764

(6)

4. Explain single and double exponential smoothing methods for forecasting. (6)
5. (a) Explain the term statistical quality control. Describe its important tools. (3)
- (b) Describe the basis of a control chart. Explain how a control chart helps to control the quality of a manufactured product. (3)
6. (a) A subgroup of five units are taken from a manufacturing process and certain quality characteristic is measured. The  $\bar{X}$  and R values are computed for each subgroup. After 20 subgroups  $\sum \bar{X} = 0.87632$  cms and  $\sum R = 0.2410$  cm. Compute the control limits for the control charts. (3)
- (b) Distinguish between a defective and a defect. Explain the construction of control charts for number of defects. (3)
7. Write short notes on the following :
- (i) Process and Product Control
- (ii) Single sampling plan for attributes (6)

(200)\*\*\*\*