

[This question paper contains 4 printed pages.]

2506

Your Roll No.

B.Sc. / III

A

MATHEMATICAL SCIENCES – Paper VI (a)

(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 the time series. Describe the components of Time Series.
2. (a) Explain how the Principle of Least Squares is used to estimate trend in a Time Series.
(b) From the following data estimate the production for 2010, by fitting a linear trend.

Year	Production
2005	2.0
2006	3.2
2007	4.2
2008	8.3
2009	12.5

P.T.O.

3. In a Time Series, why are Moving Averages calculated? How is the period of a Moving Averages calculated?

Determine the period of Moving Average for the following data and calculate Moving Averages for that period.

Year	Value
1	240
2	235
3	227
4	238
5	250
6	242
7	228
8	226
9	245
10	268
11	274
12	258
13	280

4. (a) Write short notes on Single Exponential Smoothing method for forecasting and how it is different from Double Exponential Smoothing method.

(b) The consumption date of a item is given below :

Year	Consumption (No. of Units)
2005	512
2006	630
2007	605
2008	605
2009	602

Forecast the consumption for the year 2010 by Simple Exponential Smoothing Method assume initial forecast as 512 and $\alpha = 0.4$.

5. (a) Explain the use of \bar{X} and R-charts in Quality Control.
- (b) Control on measurements of pitch diameter of Threads in Aircraft. Fittings is checked with 5 successive items measured on regular intervals. 5 such sample are given :

Sample No.	Measurements of 5 items per hour (in 0.0001 inches)				
	1	45	44	43	42
2	40	40	43	41	40
3	40	41	42	40	42
4	42	48	43	42	45
5	42	44	47	47	45

Construct the \bar{X} and R-charts, also discuss the state of control in the Production Process.

6. (a) What do you mean by Double Sampling Plan?
How it is different from Single Sampling Plan?
- (b) What are chance and assignable causes of variation in process?
7. Explain the following :
- (a) ISO 9000
- (b) Statistical Quality Control and its advantages
- (c) C-Chart for no. of defects