[This question paper contains 4 printed pages.]

1876 *Your Roll No.* .....

B.Sc. (Gen.) / III **E**

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.)

Do any **FIVE** *out of* **SEVEN** *questions.*
All *questions carry equal marks.*
Simple calculators are allowed.

1. (a) What do you understand by statistical quality control ? Discuss its needs and utility in industry.

   (b) Define a time-series. Mention its components with illustration.

2. (a) Explain how the Principle of Least square is used to estimate trend in a time-series.

   (b) From the following data estimate the production for 2013, by fitting a linear trend.

P.T.O.

Year	2008	2009	2010	2011	2012
Production	120	200	250	285	300

3. What is meant by elimination of seasonal effect of time-series data ?

Deseasonalize the following data :

Year / Quarter	2010	2011	2012
I	30	25	31
II	26	28	29
III	22	22	28
IV	31	36	32

4. Explain single exponential smoothing method for forecasting :

The demand for a particular item during ten months of a year is as given below. The manager is considering how well the exponential smoothing serves as an appropriate technique in forecasting the demand of this item. She is testing two values of smoothing constant $\alpha = 0.5$ and $\alpha = 0.8$. Calculate :

(i) Forecasted values for each of the given α values assuming the initial forecast as 200.

(ii) Monthly average demand for each of these series of estimates and suggest which of them is most appropriate :

Month	Demand
1	213
2	200
3	198
4	207
5	220
6	232
7	210
8	215
9	212
10	220

5. Describe single sampling inspection plan for acceptance sampling and derive the expression for producer's risk, consumer's risk, ATI.

6. (a) Explain the use of $\overline{X}$ and R-charts in quality control.

(b) Explain Defect and Defective. Also mention the distribution on which the control-chart for fraction defective and no. of defective are based.

P.T.O.

7. Explain the following :

(a) ISO 9000

(b) Type-I and Type-II error

(c) Specification limits and tolerance limits