**Instructions:** 1) Figures to the right indicate maximum marks.

2) All questions are compulsory.

3) In every question Q.A. is compulsory.

4) Non- scientific calculator is allowed.

**Q1. A.** 20, 25, 19, 17, 14 consist of random sample from a population. Estimate the mean and variance of the population. (6 marks)

**B. X)** In order to test whether a coin is perfect, it is tossed 5 times. Reject null hypothesis iff 0 and 1 tail is obtained. Find Critical region and prob. Of type I error. (4 marks)

**OR**

**Y)** In order to test whether a dice is perfect, it is rolled 5 times. Reject null hypothesis iff no. 4 and 5 appears more than 4 times. Find Critical region and prob. Of type II error. (4 marks)

**Q2.A.** In a random sample of 400 persons from a large population, 120 are females. Can it be said that males and females are in ratio 5:3 in the population? Test this claim at level of significance of 5% and 1%. (4 marks)

**B. X)** Using C control chart, find whether the process is under control or not for the following data:

no. of defects : 2, 3, 4, 0, 5, 6, 7, 4, 3, 2, 4, 5, 6, 4, 0. (6 marks)

**OR**

**Y)** A population consist of 3 members 0, 4 and 6. Draw all possible sample of size 2 with replacement. Find the sampling distribution of sample mean and find mean of sample mean (6 marks)

**Q3.A.** Write a short note on Xbar and P chart. (4 marks)

**B. X)** Calculate the trend values by the method of moving averages, assuming a four yearly for the following data : (6 marks)

| Year | 1988 | 1990 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
|------|------|------|------|------|------|------|------|------|------|
| Production | 19 | 18 | 21 | 23 | 27 | 16 | 14 | 12 | 10 |

**OR**

**Y)** Fit a second degree parabolic curve by least square method to the following data: (6 marks)

| Year | 1988 | 1990 | 1992 | 1994 | 1996 |
|------|------|------|------|------|------|
| Values | 19 | 18 | 21 | 23 | 27 |

Also estimate the production for the year 1998