

## Statistics for Decision Making - II

**Full Marks: 40 Time : 2 hr 30 minutes**

**Answer 1 and 2 and any two from the rest.**

1. The marks obtained by 20 students of College A and 15 student of College B in a mathematics test are given below:

College A				College B		
89	71	47	29	79	12	22
76	84	81	49	61	55	90
63	97	32	73	36	81	76
69	88	43	80	50	73	62
55	52	86	44	50	73	62

Do you think that students of College A are more proficient in mathematics than the students of College B? (12)

2. A firm, manufacturing rivets, wants to limit variation in their length as far as possible. The lengths (in cm.) of 10 rivets manufactured by a new process are given value. In the past, sd of the length of rivets has been 0.145 cm. Examine whether the new process may be considered to be superior to the old. (8)
3. a) If  $T_1$  and  $T_2$  are two statistics, such that,  $T_1$  is an unbiased estimator for  $\theta_1 + \theta_2$  and  $T_2$  is unbiased for  $\theta_1 - \theta_2$ , then find unbiased estimators for  $\theta_1$  and  $\theta_2$ . (4)  
 b) Let  $X_1, X_2, \dots, X_n$  be a random sample drawn from a population with mean  $\mu$  and  $\sigma^2$ . Then find the BLUE for  $\mu$ . (6)
4. a) Describe the test procedure for comparing two standard deviations of a bivariate normal distribution. (6)  
 b) Write down the regularity conditions for Cramer-Rao Lower Bound (4)
5. a) State and prove Neyman-Fisher factorization theorem. (5)  
 b) A random sample of size  $n$  is drawn from a distribution with pdf

$$f(x) = \frac{1}{\theta_2} e^{-\frac{(x-\theta_1)}{\theta_2}}, \theta_1 < x < \infty$$

0, otherwise

Where,  $-\infty < \theta_1 < \infty$  and  $\theta_2 > 0$ . Find the joint sufficient statistics for  $\theta_1$  and  $\theta_2$ . (5)

6. a) Suppose  $X_1, X_2, \dots, X_n$  be a random sample drawn from  $N(\mu, 1)$ . Find the CRLB for  $\mu^2$ . (4)  
 b) Define the following: i) p-value, ii) critical region, iii) mean square error. (3X2 = 6)