# MMDSE-3.6

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## III Semester M.Sc. Degree Examination, February - 2024
## (SLM Scheme CBCS)
## MATHEMATICS
## Course-VI : Mathematical Statistics

**Time : 3 Hours** **Max. Marks : 80**

***Instruction :*** ***Answer any five full questions.***

***Q1)*** a) Describe the graphical representation methods of data.

b) Find the mode of the following.

| Weight in kgs : | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|---|---|---|---|---|---|---|---|
| No. of Persons: | 3 | 5 | 10 | 18 | 9 | 7 | 2 |

**[8+8]**

***Q2)*** a) Show that standard deviation is independent of change of origin but not independent of chang of scale.

b) Derive the expression for standard deviation of two sets of data.

c) Compare the variability of the series A and B

Series A : 348, 457, 424, 682, 524, 388, 380, 438

Series B: 487, 508, 620, 382, 408, 266, 186, 218

**[4+4+8]**

***Q3)*** a) State and prove addition Theorem of probability.

b) A box contains 4 yellow and 6 white tennis balls two draws are made and in each draw a ball is drawn at random. What is the probability that.

i) both draw gives a yellow when first draw ball is replaced before the second draw ball is made?

ii) first draw gives a yellow and second draw gives a white ball when first drawn ball is replaced before the second draw is made?

c) State and prove Bayes Theorem.

**[5+5+6]**

***Q4)*** a) State and prove the properties of variance.

b) If $x$ and $y$ are two continuous random variable having joint density function.

$$f(x,y)=\begin{cases}\dfrac{6-x-y}{8}, & 0\le x<2,\ 2\le y<4\\ 0 & \text{, Otherwise}\end{cases}$$

Obtain i) Marginal probability density function of $x$ and $y$.

ii) Conditional density function of $x$ given $y$ =1 and y given $x$ = 2

c) In a communication system each data consists of 1000 bits Due to the noise, each bit may be received in error with probability 0.1. It is assumed bit errors occur independently. Find the probability that there are more than 120 errors in a certain data pocket.

**[5+6+5]**

***Q5)*** a) Derive mean and variance of poisson distributs.

b) If x is a exponential distributions with parameter 3.5, find variance $p(x>1)$ and $p(x\le 4)$.

c) Define F-distribution obtain its mean.

**[6+5+5]**

***Q6)*** a) Explain properties of estimator

b) Two samples gave the following results

| | | |
|---|---|---|
| Sample Size : | 12 | 8 |
| Sample mean : | 15 | 14 |
| Standard deviation : | 6 | 4 |

Find the confidence interval for the difference of two means at 95% confidence co-efficients.

**[8+8]**

***Q7)*** a) Explain error in sampling.

b) Write large sample test procedure for testing the population mean.

c) The mean IQ of 150 randomly selected boys of a college is 95 and that of 125 randomly selected girls of that college is 93 standard deviation of their IQ are 12 and 10 respectively. Test whether there is a significant difference between the average IQ of boys and girsl at 1% level of significance.

**[5+5+6]**

***Q8)*** a) Explain the small sample test procedure for testing the single mean of the population.

b) Two different types of drugs P and Q were tried on a certain patients for increasing weight 5 persons were given drug P and 7 persons were given drug Q. The increase in weight in pounds is given below.

Drug P : 8, 12, 13, 9, 3

Drug Q : 10, 8, 12, 15, 6, 8, 11

Do the two drugs differ significantly with regarded to their effect in increasing weight? Test at 5% level of significance.

c) Following are the production of wheat in 8 different years 8, 11, 15, 9, 16, 14, 5 and 10 tons. Test the hypothesis that the standard deviation is more than 3 tons?

**[5+6+5]**

