

BACHELOR OF ARTS EXAMINATION, 2019

(2nd Year, 3rd Semester)

ECONOMICS**ADVANCED STATISTICS**

Time : Two hours

Full Marks : 30

Answer any three questions.

 $3 \times 10 = 30$

1.(a) Suppose you roll two fair, six-sided dice, one of which is red and the other of which is green. Define the following random variables:

X = The number shown on the red die

$Y = 0$ if the two dice show the same number; 1 if the number on the green die is bigger than the number on the red die; 2 if the number on the red die is bigger than the number on the green die.

Write down a table showing the joint probability mass function for X and Y . Find the expected value of Y . Find the conditional probability mass function for X given $Y = 1$.

(b) Give an example of an estimator which is unbiased but not consistent and show that in spite of being unbiased it is not consistent. 6+4

2.(a) The following table gives the classification of some people according to their intelligence and mood upon getting up in the morning.

Mood	Intelligent	Average	Below Average
Good	10	8	5
Tolerable	8	9	10
Intolerable	5	6	14

Test whether there is any evidence of association between these characteristics.

(b) Mr Roy is shooting at a target. The probability of a hit is 0.4. What is the probability that his 10th trial results in the second hit? 6+4

3)a) Senior Citizens have incomes that are normally distributed with a mean of Rs 12528 and a standard deviation of Rs 2533. The government decides to give Puja bonus to the poorest 10%. How low a citizen's income has to be to qualify for the bonus?

b) \bar{x}_1 and \bar{x}_2 are the sample means based on two independent random samples of sizes n_1 and n_2 respectively from a population with mean μ and variance σ^2 . If $(a_1\bar{x}_1 + a_2\bar{x}_2)$ is MVUE of μ , find out a_1 and a_2 .

4. (a) What are random sampling numbers? Describe how they are used to draw simple random sample with and without replacement?

[Turn over

(b) The results of a completely randomized experiment to compare the effects of 3 different toothpastes are given below. Test the hypothesis that the toothpastes are equally effective, at 95 percent level. Assume a one way classification, linear, additive, fixed effect, Normal model is appropriate. 5+5=10

Table : Percentage Reduction in cavities for subjects

Toothpaste 1	14	15	17	20	16
Toothpaste 2	10	12	11	-	-
Toothpaste 2	12	14	15	13	-