

**Bachelor of Arts Examination, 2018**

**(1st year, 2nd semester)**

**Economics**

**Statistics II (OLD)**

**Time: Two hours**

**Full Marks: 30**

**Answer any three of the following.**

1. (a) In a bolt factory, machines A, B and C manufacture 25%, 35% and 40% respectively of the total output of bolts. Of their outputs, 5%, 4% and 2% respectively are defective. A bolt is chosen at random from the factory's output and found to be defective. What is the probability that it came from machine A?
- (b) Assume the probability that a newborn baby in a particular inner city hospital is HIV positive is 0.008. If 500 babies from this hospital are randomly sampled, what is the probability that exactly 5 will be HIV positive? 5+5

2. Suppose the random variable X has a pdf

$$f(x) = \begin{cases} ax^2 & \text{if } 0 < x < 3 \\ 0 & \text{otherwise} \end{cases}$$

What does 'a' have to be? Find  $P(1 < X < 2)$ ,  $E(X)$  and CDF of X. 3+2+2+3

3. (a) Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis that the true variances are equal, against the alternative that they are not, at the 90% level. 5

- (b) State the classical definition of probability and also discuss its limitations. 5

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4. (a) Show that sample mean is unbiased estimator of population mean but sample sd is not an unbiased estimator of population sd.
- (b) What do you mean by sufficiency property of an estimator? 2+5+3