

Date:07-03-2022

Registration number:

ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27

B.A. ECONOMICS – V SEMESTER

SEMESTER EXAMINATION: OCTOBER 2021

(Examination conducted in March 2022)

**ECA DE 5618 - Advanced Statistical Methods for Economists**

Time- 2 ½ hrs Max Marks-70

This question paper contains 3 printed pages and 3 parts

**Part A**

1. **Answer any 10 questions 3x10=30**
2. What are time series and cross section data?
3. Distinguish between population and sample.
4. State the classical definition of probability with an example.
5. What are null and alternative hypothesis?
6. Mention the properties of a good estimator.
7. State any three properties of the normal distribution.
8. What is a complement of an event?
9. What are Type I error and Types II errors in hypothesis testing?
10. Differentiate between the correlation and covariance.
11. What are Bivariate and multivariate distributions?
12. There are five flights daily from Bengaluru to UK. Suppose the probability that any flight arriving late is 0.20, using Binomial formula, compute the probability that exactly one of the flight is arriving late.
13. John sells new cars for Ford. He usually sells largest number of cars on Saturday. He has developed the following probability distribution for the number of cars he expects to sell on a particular Saturday. Compute the expected value and variance.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. of cars sold (x) | 0 | 1 | 2 | 3 | 4 |
| f(x) | 0.1 | 0.2 | 0.3 | 0.3 | 0.1 |

**Part B**

1. **Answer any 2 questions 2x5=10**
2. The Myrtle Beach international airport’s short term parking lot is close to the terminal, so someone meeting an incoming passenger has only a shortcut walk to the baggage claim area, a good place to meet. To decide if the shortcut lot has enough parking places, the manager of airport parking needs to know if the mean time in the lot is more than 40 minutes. A sample of 12 recent customers showed they were in the lot of the following lengths of time, in minutes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Minutes | 55 | 49 | 53 | 47 | 39 | 27 | 64 | 48 | 48 | 53 | 37 | 56 |

Test whether is it reasonable to conclude that the mean time in the lot is more than 40 minutes by using the ‘t’ test (At 0.05 significance level critical ‘t’ value is 1.796)

1. Based on information on 1000 randomly selected fields about the tenancy status of the cultivation of these fields, and use of fertilizers, which are collected in an agro economic survey, the following classification was noted

|  |  |  |
| --- | --- | --- |
|  | Owned | Rented |
| Using fertilizers | 416 | 184 |
| Not Using fertilizers | 64 | 336 |

By using Chi Square test would you conclude that, the owner cultivators are more inclined towards the use of fertilizers? (For v=1 at 0.05 level of significance critical chi square value is 3.84)

1. By using Pearson’s correlation coefficient, investigate the relationship between smoking and lung capacity for the following data and interpret the result.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Cigarettes (*X* ) | 0 | 5 | 10 | 15 | 20 |
| Lung Capacity (*Y* ) | 45 | 42 | 33 | 31 | 29 |

**Part C**

1. **Answer any 2 questions 2 x15=30**
2. Discuss the steps of hypothesis testing with the help of the following example.

To verify whether a course in accounting improved the performance a similar test was given to 12 participants before and after the test. The marks are as follows

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Before the course | 44 | 40 | 61 | 52 | 32 | 44 | 70 | 41 | 67 | 72 | 53 | 72 |
| After the course | 53 | 38 | 69 | 57 | 46 | 39 | 73 | 48 | 73 | 74 | 60 | 78 |

By using paired ‘t’ test can we conclude that there is a difference in the marks between before and after the test (The critical ‘t’ value at 0.05 level of significance is 2.201)

1. To assess the significance of possible variations in performance in a certain test between the schools of a city, a common test was given to a number of students at random. The results are given below

|  |  |  |  |
| --- | --- | --- | --- |
| School A | School B | School C | School D |
| 8 | 12 | 18 | 13 |
| 10 | 11 | 12 | 9 |
| 12 | 9 | 16 | 12 |
| 8 | 14 | 6 | 16 |
| 7 | 4 | 8 | 15 |

By applying ANOVA technique test whether the mean performance of students of difference schools are similar. (For 3, and 16 d.f. at 5 % level of significance the critical F value is 3.24)

1. On Thursday morning between 9 am to 10 am customers arrive at a mean rate of 1.7 customers per minute at the oxford university credit union and enter the queue for the teller window. Using Poisson formula with μ=1.7, construct PDF and CDF up to 9 customers arriving. Present your answer diagrammatically.