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

Registration Number:

Date & Session 14-12-2022 (9am)

**B.A. – V SEMESTER**

**SEMESTER EXAMINATION: OCTOBER 2022**

**(Examination conducted in December 2022)**

**ECADE 5618: Advanced Statistical Methods for Economists**

**Time: 2 ½ Hours Max Marks: 70**

**This paper contains 3 printed pages and 3 parts**

(Kindly note: Calculators/scientific calculators are permitted)

**PART-A**

1. **Answer any TEN of the following questions 3X10=30**
2. Differentiate between time series and cross-sectional data.
3. State the law of addition and multiplication of probability.
4. What are discrete and continuous random variables?
5. Compute the expected value and variance for the following data.

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

1. What is significance level in the process of hypothesis testing?
2. Suppose we have a set of 6 letters {A, B, C, D, E, F}. In how many ways can we select a group of 3 letters from this set?
3. State the central Limit theorem.
4. Mention any three properties of ‘t’ distribution?
5. Conduct an F-Test on the following samples for the determination of same variance

Sample-1 having variance = 109.63, sample size = 41.

Sample-2 having Variance = 65.99, sample size = 21.

 Critical-F for (40,20) at alpha (0.025) is 2.287.

1. Mention the properties of a good estimator.
2. A mobile manufacturing company wants to improve sales. Past sales data indicate that the population mean was $100 per transaction. After training sales force, recent sales data (taken from a sample of 25 salesmen) indicates an average sale of $130, with a standard deviation of $15. Did the training work? Test your hypothesis at a 5% alpha level (Critical ‘t’ value is 1.71)
3. . What are mutually exclusive and collectively exhaustive events?

**Part B**

1. **Answer any TWO of the following questions 5X2=10**
2. 1000 students at a college are rated according to their IQ and Economic conditions. Use Chi-Square test to find out whether any association between economic condition and IQ levels. (Critical Value at 2 d.f at 0.05 level of significance is 5.99)

|  |  |  |  |
| --- | --- | --- | --- |
|  | High | Medium | Low |
| Rich | 160 | 300 | 140 |
| Poor | 140 | 100 | 160 |

1. Write a note on the properties of the normal distribution.
2. Differentiate between the correlation and covariance.

**Part C**

1. **Answer any TWO of the following questions 15X2=30**
2. Discuss the procedure of hypothesis testing with an example.
3. A manufacturing company has purchased three new machines of different makes and wishes to determine whether one of them is faster than the others in producing a certain output. Five hourly production figures are observed at random from each machine and the results are given below:

|  |  |  |  |
| --- | --- | --- | --- |
| Observations | A1 | A2 | A3 |
| 1 | 25 | 31 | 24 |
| 2 | 30 | 39 | 30 |
| 3 | 36 | 38 | 28 |
| 4 | 38 | 42 | 25 |
| 5 | 31 | 35 | 28 |

Use one-way analysis of variance (ANOVA) and determine whether the machines are significantly different in their mean speed (Given at 5% level critical value=3.89)

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 ʎ=1.7, construct PDF and CDF up to the arrival of 9 customers.