**BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI**

**Work Integrated Learning Programmes Division**

I Semester , 2022 – 23(April,2023)

Comprehensive Examination **(Makeup)**

Course No : DSECL ZC418

Course Title : Introduction to Statistical Methods

Nature of Exam. : Open Book (Online)

*Number of questions:4*

*Number of Pages: 2*

Weightage : 40 Marks

Duration : 150 minutes

Date : 15th April,2023\_FN

**Q.1. a)**.Manufacturer of product ‘A’ claims that average life of the product is 120 months with variance 25 months. A random sample of 10 of these is with mean 125 months and standard deviation 4 months. Validate the claim of the manufacturer at 1% level of significance. **[5M]**

**b)**.It is claimed that player A is better than Player B in IPL matches during IPL bidding for players. During previous IPL season both played 18 matches with average runs scored 85 and 75 with standard deviations 9 and 2 respectively. Validate the claim using appropriate statistical procedure at 1% level of significance. **[5M]**

**Q.2.a)**.Formulate a suitable hypothesis and validate it by using appropriate statistical procedure based on the following data. (At 5% level of significance)

“Before pandemic 200 out of 750 students are attending online classes whereas after pandemic 350 out of 800 are doing the same”. **[4M]**

**b)**. Consider the following data. Use an appropriate statistical understanding (numerical) to take the decision to proceed further or not to build a simple linear regression(y = f(x)) model for prediction. If yes, use it predict y when x = 10. **[6M]**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **X** | 6 | 4 | 9 | 5 | 3 |
| **Y** | 8 | 7 | 6 | 9 | 6 |

**Q.3.** Try to model the following time series data by using two models mentioned. Suggest the better of these two to be used for forecast. [**10M]**

a) Model 1: Simple moving averages model with k = 3

b) Model 2: Weighted moving averages with weights 0.3, 0.2 and 0.1(i.e latest will be given more weightage and so on)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Month** | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Sales(in lakhs)** | 10 | 12 | 11 | 6 | 8 | 9 | 11 |

**Q.4.a).** A random variable X follows binomial distribution with n = 1000 and p = 0.001.Then find i) P(X > 700) ii) P( X < 300) iii) P ( 300 < X < 700). **[5M]**

**b)**. Consider the following probabilities. **[5M]**

|  |  |  |  |
| --- | --- | --- | --- |
| **x1** | **x2** | **y** | **P(x1, x2,y)** |
| 1 | 1 | 0 | 0.20 |
| 1 | 1 | 1 | 0.15 |
| 1 | 0 | 1 | 0.02 |
| 0 | 0 | 0 | 0.15 |
| 0 | 0 | 1 | 0.25 |
| 1 | 0 | 0 | 0.10 |
| 0 | 1 | 0 | 0.05 |
| 0 | 1 | 1 | 0.08 |

If possible find the following. If not, validate your decision

1. P (**x1)**
2. P (**x2)**
3. P((**x1, x2) / y = 0)**
4. P((**x1, x2) / y = 1)**
5. P(**x1= 0/x2= 1)**

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