LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **STATISTICS**

FIFTH SEMESTER – **NOVEMBER 2012**

# ST 5507/5503 - COMPUTATIONAL STATISTICS

Date : 08/11/2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

**Answer any THREE of the following questions:**

1. 1. (a) A study of randomly selected motor-cycle accidents and drivers who use cellular phones provided the following data. Based on the following data, does it appear that use of cellular phones affects driving safety? (15)

Had Accidents Had no Accidents

Cell phones used 23 282

Cell phones not used 46 407

(b) Find an α level Likelihood Ratio Test of  against based on a sample of size 10 from, where both µ and σ2 are unknown. If the observed value of sample mean and variance are 0.6 and 0.36 respectively, should the hypothesis H0 be accepted or rejected? (18)

2) a) From the following informations, Compare the precision of Systematic Sample, Simple Random Sampling and Stratified sampling.

|  |
| --- |
|  |
| **Strata** | **1** | **2** | **3** | **4** | **5** | **6** |  |  |
| **I** | 28 | 32 | 33 | 35 | 37 | 39 |  |  |
| **II** | 15 | 16 | 17 | 21 | 22 | 25 |  |  |
| **III** | 2 | 3 | 4 | 7 | 9 | 9 |  |  |
| **IV** | 5 | 7 | 9 | 12 | 14 | 15 |  |  |
| **V** | 25 | 22 | 21 | 17 | 17 | 23 |  |  |

b). A sample of 40 students is to be drawn from a population of two hundred students belonging to A&B localities. The mean & standard deviation and their heights are given below

|  |  |  |  |
| --- | --- | --- | --- |
| **Locality** | **Total No.Of People** | **Mean (Inches)** | **S.D(Inches)** |
| A | 150 | 53.5 | 5.4 |
| B | 50 | 62.5 | 6.2 |

1. Draw a sample for each locality using proportional allocation
2. Obtain the variance of the estimate of the population mean under proportional allocation.

(16+ 17)

1. (a) Compute index number for the given data using the following methods (i)

Laspeyre’s method, (ii) Passche’s method and (iii) fisher’s ideal formula (8)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item (Rs.) | Base year | | Current year | |
|  | Price (in Rs) | Quantity | Price (in Rs) | Quantity |
| Food | 12 | 20 | 20 | 22 |
| Rent | 40 | 10 | 42 | 12 |
| Clothing | 8 | 50 | 12 | 50 |
| Fuel | 20 | 20 | 24 | 22 |
| Others | 16 | 20 | 25 | 20 |

(b) Change the base year 2000 to 2003 and rewrite the series of index numbers in the

following data:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Index | 100 | 115 | 120 | 122 | 125 | 128 | 130 | 135 | 140 |

(5)

(c) Calculate the seasonal indices by the method of least squares from the following data:

(Multiplicative model) (20)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Exports of cotton textiles (million Rs.) | | | |
| Year | I | II | III | IV |
| 2001 | 71 | 68 | 79 | 71 |
| 2002 | 76 | 69 | 82 | 74 |
| 2003 | 74 | 66 | 84 | 80 |
| 2004 | 76 | 73 | 84 | 78 |
| 2005 | 78 | 74 | 86 | 82 |

1. (a) A Vendor of milk products produces and sells low fat dry milk to a company that uses it to produce baby formula. In order to determine the fat content of the milk, both the company and the vendor take a sample from each lot and test it for fat content in percent. 10 sets of paired results are :

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lot no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Company test results(X) | 0.5 | 0.58 | 0.9 | 1.17 | 1.14 | 1.25 | 0.75 | 1.22 | 0.74 | 0.80 |
| Vendor test result (Y) | 0.79 | 0.71 | 0.82 | 0.82 | 0.73 | 0.77 | 0.72 | 0.79 | 0.72 | 0.91 |

Test  against, using a paired t test with the differences. Let. (D=X-Y) (20)

(b) Let  be a random sample from. Test  against. Find the Uniformly Most Powerful Test. (13)

1. (a) The following are the weight gains (in pounds) of two random samples of young Indians fed on two different diets but otherwise kept under identical conditions:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Diet I** | 16.3 | 10.1 | 10.7 | 13.5 | 14.9 | 11.8 | 14.3 | 10.2 |
| **Diet II** | 21.3 | 23.8 | 15.4 | 19.6 | 12 | 13.9 | 18.8 | 19.2 |
| **Diet I** | 12 | 14.7 | 23.6 | 15.1 | 14.5 | 18.4 | 13.2 | 14 |
| **Diet II** | 15.3 | 20.1 | 14.8 | 18.9 | 20.7 | 21.1 | 15.8 | 16.2 |

Use U test at 0.01 level of significance **to** test the null hypothesis that the two population samples are identical against the alternative hypothesis that on the average the second diet produces a greater gain in weight.(16)

(b) The following are the speeds at which every fifth passenger car was timed at a certain

checkpoint: 46, 58, 60, 56, 70, 66, 48, 54, 62, 41, 39, 52, 45, 62, 53, 69, 65, 67, 76,

52, 52, 59, 59, 67, 51, 46, 61, 40, 43, 42, 77, 67, 63, 59, 63, 63, 72, 57, 59, 42, 56, 47,

62, 67, 70, 63, 66, 69 and 73. Test the null hypothesis of randomness at the 0.05 level

of significance. (17)

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