LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **APRIL 2014**

ST 5507 - COMPUTATIONAL STATISTICS

Date : 15/04/2014 Dept. No. Max. : 100 Marks

Time : 09:00-12:00

Answer any THREE of the following :

1) (a) A firm that runs a string of retail outlets across a city receives complaints from its clients regarding quality and other aspects and maintains a register of complaints. The following are data on the number of complaints received on 100 randomly chosen days:

No. of Complaints	0	1	2	3	4
No. of days	30	25	20	18	7

Test at 5% level of significance whether the number of complaints per day follows Poisson distribution.

(b) The following table gives the distances that a particular brand of battery-operated vehicle ran before developing technical troubles. Data on 600 trial vehicles are available:

Distance in kms	150-250	250-350	350-450	450-550	550-650	650-750	750-850
No. of vehicles	2	4	14	50	65	105	127

Distance in kms	850-950	950-1050	1050-1150	1150-1250	1250-1350	1350-1450
No. of vehicles	87	61	53	22	8	2

Fit a normal distribution to the data and test for goodness of fit at 5 % level of significance. Estimate the probability for a randomly chosen vehicle to develop troubles before completing 200 kms.

(13 +20)

2) (a) A population consists of 6 units with 'Y' values 3, 5, 8, 11, 12, 15. By choosing simple random samples (WOR) of size 2, verify the results $E(\bar{y}) = \bar{Y}$ and $E(s^2) = S^2$.s

(b) A population with 300 units is divided into three strata. A stratified random sample was drawn and the observed values in the sample are reported below:

Stratum No.	**Stratum Size**	**Sample observations**
1	80	21, 25
2	100	32, 35, 40
3	120	40, 48, 50, 52

Obtain the estimate $\overline{y_{st}}$ and get an estimate of its variance from the sample data. (18 + 15)

3) (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)	Expenditure	Price (in Rs)	Expenditure
Food	10	600	20	1000
Rent	8	400	4	480
Clothing	8	480	12	600
Fuel	25	600	24	720
Others	16	640	20	960

(b) Change the base year 1996 to 2000 and rewrite the series of index numbers in the following data:

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Index	25	28	30	32	35	38	40	42	45

(5)

(c) Calculate the seasonal indices by the ratio to trend from the following data: (Multiplicative model) (20)

	Exports of cotton textiles (million Rs.)			
Year	I	II	III	IV
2001	71	65	79	71
2002	76	66	82	75
2003	74	68	84	80
2004	76	70	84	79
2005	78	72	86	85

4) (a) The nicotine contents in milligrams of two samples of tobacco were found to be as follows:
The nicotine contents in milligrams of two samples of tobacco were found to be as follows:

Sample A	20	16	26	27	23	22	25	24		
Sample B	27	33	42	35	32	34	38	29	31	35

Test the hypothesis, at the 0.05 level of significance, that two samples come from same population by using Independent t-test. (16)

(b) Salt - free diets are often prescribed to people with high blood pressure. The following data were obtained from an experiment designed to estimate the reduction diastolic blood pressure as a result of following a salt-free diet for two weeks. Assume the diastolic readings are normally distributed. (17)

Before	93	106	87	92	102	95	88	110
After	92	102	89	92	101	96	88	105

At 1% level of significance, to determine whether salt free diets had any effect on reduction in diastolic blood pressure by using paired t-test.

5) (a) Use Wilcoxon signed rank test to see if there is a difference between the number of days until collection of an account receivable before and after a new collection policy. Use the 5% level of significance. (16)

Before	30	28	40	42	34	28	27	25
After	32	29	37	43	37	27	33	30

(b) Body length of 8 goats of a species of goat was obtained from two different cities of a country. They were measured as:

City A	22	26	22	30	32	34	26	34
City B	14	12	10	12	8	6	16	22

Check the null hypothesis $\mu_1 = \mu_2$, where μ_1 and μ_2 are the average goat body lengths of city A and city B respectively, by using Mann-Whitney U-Test at 5% level. (17)

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