31/05/19

Paper / Subject Code: 31506 / Elective - I Biostatistics

T.E (Bio-medical) sem-V Choiced based

[Time: 3 hours] **[Marks : 80]**

Please check whether you have got the right question paper.

N.B: 1. Question No.1 is compulsory.
2. Attempt any three questions from Q.2 to Q.6.
3. Use of Statistical tables is permitted.
4. Figures to the right indicate Full marks

1. a) Motivated by awareness of the existence of a body of controversial literature suggesting that stress, anxiety, and depression are harmful to the immune system. Mr. GANGARAM conducted a study in which the subjects were homosexual men. Some of whom was HIV positive and some of whom was HIV negative. Data were collected on a wide variety of medical, immunological psychiatric and neurological measures one of which was the number of CD4+ cells in the blood. The mean number of CD4+ cell for the 112 mean with HIV infected was 401.8 with a standard deviation of 226.4, for the 75 men without HIV infected the mean and standard deviation were 828.2 and 274.9, respectively. Construct a 90%, 95%, & 99% confidence interval for the difference between the population mean. **5**

b) A medical research team wished to evaluate a proposed screening test for a disease. The test was given to a random sample of 450 patients with disease and an independent sample of 500 patients without the symptoms of that disease. The two samples were drawn from populations of subjects who were 65 years of age or older. The results are as follows: **5**

Test Result	Alzheimer's Diagnosis		Total
	Yes (D)	No ($\bar{D}$)	
Positive(T)	436	5	441
Negative ($\bar{T}$)	14	495	509
Total	450	500	950

Find the following probabilities using the above table :

$P(T), P(\bar{T}), P(T/D), P(\bar{T}/D), P(T/\bar{D})$

c) The probability density function of random variable is **5**

X	0	1	2	3	4	5	6
P(X=x)	k	3k	5k	7k	9k	11k	13k

Then Find K and mean and varience.

d) A simple random sample of 16 adult drawn from a certain population yield a mean weight of 63 kg. Assume that weight in the population is approximately normally distributed with a variance of 49. Do the samples data provide sufficient evidence for us to conclude that a mean weight for the population is less than 70? (Use 5% LOS) **5**

2. a) In test given to two groups of students drawn from two normal populations marks obtained were as follows : **6**

Group A: 18, 20, 36, 50, 49, 36, 34, 49, 41

Group B: 29, 28, 26, 35, 30, 44, 46

Examine the equality of variance 5% LOS

b) The chance that doctor A will diagnose a disease X correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease X died. What is the chance that his disease was diagnosed correctly? 6

c) Kerala Treading Co. Ltd. Wishes test to whether its three salesmen A, B, C tend to make sales of the same size or whether they differ in the selling ability as measured by the average size of the sales. During the last week there have been 15 sales calls, each making 5 calls. Following are the weekly sales recorded of the three salesmen. (Use 5% LOS) 8

A (Rs.)	A (Rs.)	A (Rs.)
300	600	700
400	300	300
300	300	400
500	400	600
400	400	500

3. a) A random sample of 600 men chosen from a certain city contained 400 smokers. In another sample of 900 men chosen from another city, there are 450 smokers. Do these data indicate that the first city contains more smokers than the second? (Use 5% LOS) 6

b) Find mean, variance, and coefficient of variance of weight of 200 female students given below. 6

Weight (k.g)	50	60	70	80	90
No.of student	18	42	80	40	20

c) Fit a Poisson distribution for the following distribution and also test the goodness of fit (use 5% LOS) 8

X	0	1	2	3	4	5	Total
F	142	156	69	27	5	1	400

4. a) A nurse researcher wished to know if graduates of baccalaureate nursing program and graduate of associate degree nursing programs differ with respect to mean score on a personality inventory. A sample of 50 associate graduates and a sample of 60 baccalaureate graduates yield the following means and standard deviations (Use 5% LOS) 6

Sample	$\bar{x}$	S
A	52.5	10.5
B	49.6	11.2

On the basis of these data what should the researcher concluded.

b) Suppose the average length of stay in a chronic disease hospital of a certain type of patient in 60 days with a standard deviation of 15. Use the normal distribution to find the probability that randomly selected patients from this group will have a length of stay
(i) Greater than 50 days, (ii) Less than 30 days, (iii) between 30 & 60 6

c) i) Find the Karl Pearson's correlation coefficient and the equations of regressions for the following values of X & Y : 4

X	1	2	3	4	5
Y	2	5	3	8	7

ii) Find the Spearman's Rank Correlation coefficient of the following data : 4

X	68	64	75	50	64	80
Y	62	58	68	45	81	68

5. a) The director of the rabies control section in a city health department wishes to draw a sample from the department's records of dog bites reported during the past year in order to estimate the mean age of persons bitten. He wants a 95% confidence interval, he will be satisfied to let $d = 2.5$, and from previous studied he estimate the population standard deviation to be about 15 years. How large a sample should be drawn? (Use 5% LOS) 6

b) The following data is collected on two characters. Based on this, can you say that there is no relation between smoking and literacy? (Use 5% LOS) 6

	Smokers	Non-smokers
Literates	83	57
Illiterates	45	68

c) John M. Morgan examined gallbladder function before and after fundoplication. The author measures the gallbladder rejection fraction (GBEF) before and after fundoplication. The goal of fundoplication is to increase GBEF. The data are shown below. We wish to know if these data provides sufficient evidence to allow us to conclude that fundoplication increases GBEF functioning (Use 5% LOS) 8

Pre operation (%)	22	63.3	96	9.2	3.1	50	33	69	64	18.8	0	34
Post operation (%)	63.5	91.5	59	37.8	10.1	19.6	41	87.8	86	55	88	40

6. a) The following data represent the number of units of production per day turned out by 5 different workers using 4 different types of machines: 10

		Machine Type			
		A	B	C	D
Workers	W-1	44	38	48	36
	W-2	46	40	54	44
	W-3	34	36	44	32
	W-4	42	38	46	32
	W-5	38	42	48	40

i) Test whether the men differ with respect to mean productivity. 10

ii) Test whether the mean productivity is the same for the four different machine types. (Use 5% LOS).

b) The tables shows the corresponding values of three variable X, Y and Z : 10

X	3	5	6	8	12	14
Y	16	10	7	4	3	2
Z	90	72	54	42	30	12

i) Find the linear least square regression equation of Z on X and Y.

ii) Estimate Z when X = 10 , Y = 6.

iii) Find r_{12} , r_{13} , r_{23}